





Prepared for: Town of Swanzey, NH Founded 1753 & New Hampshire DOT Department of Transportation

Swanzey NH Route 10 Corridor Study

Prepared by SWRPC Southwest Region Planning Commission

June 2021

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Introduction

New Hampshire Route 10 (NH 10) is an important State highway presently carrying approximately 7,400 vehicles per day at the Winchester Town Line and 14,400 vehicles per day at the Keene Town Line with daily vehicle traffic volumes steadily increasing south to north. Many of those using the corridor are local Swanzey residents and workers, however, NH 10 is a significant regional thoroughfare as well. Beyond the 5.5 mile length of the corridor in the Town of Swanzey, the highway directly connects users to the large employment and service center, Keene, to the north, the Town of Winchester to the south, as well as many other destinations in other parts of Cheshire County, Massachusetts and beyond. Though most highway users are motorists, there is the occasional pedestrian and bicyclist.

While the highway is owned and maintained by the State, and the New Hampshire Department of Transportation (NHDOT) has general performance goals to maintain a highway that gets people quickly and efficiently to their destination, is safe, and is in a good state of repair, effective corridor management cannot happen in a vacuum. Local governments like the Town of Swanzey are responsible for guiding development and permitting the activities accessing the highway from local driveways and local street networks connected to the highway. Both the State and Town have a responsibility to ensure the highway is meeting corridor user needs whether it's a business owner adjacent to the highway, a freight operator making deliveries, a work commuter, or a resident that lives in a neighborhood near the highway. Developing a common understanding about corridor related issues and needs provides a basis for the Town, State and other relevant partners to have a similar frame of reference for coordination and communication.



The State of New Hampshire recognizes NH 10 as a Tier 2 highway or "Statewide Corridor" - - designed to provide a level of mobility just below interstate highways and other limited access highways.

The *Swanzey NH Route 10 Corridor Study* (Study) was undertaken in 2020 and 2021 by Southwest Region Planning Commission (SWRPC) with support from a Town of Swanzey appointed Working Group with a goal to better understand the corridor including opportunities for improvements and challenges to proactively address. In the following report, the Study puts the NH 10 corridor under a microscope to ask the following big questions:

- How is the corridor used today and who is using (living, working, shopping, and traveling through) the corridor?
- Is the corridor meeting the needs and expectations of stakeholders today? Using available trend data and information, what is the direction and outlook for the corridor and is this in line with these needs and expectations?
- Based on these findings, what recommendations does the Swanzey NH Route 10 Corridor Working Group have for future management of the corridor?

Corridor Use Today

In this section, the report starts by asking "How is the corridor used today and who is using (living, working, shopping, and traveling through) the corridor? To answer these questions, we look at motorized and non-motorized transportation use of the corridor, characteristics of the population using the corridor, zoning and land use conditions for guiding development and permitting land use activities, and the state of economic development and housing on the corridor.

Transportation

Motorized Transportation Infrastructure and Trends

Most people using NH 10 in Swanzey drive on the highway, although there is a small fraction of people that walk and ride bicycles along the highway as well. Daily vehicle traffic is an average of 14,400 vehicles per day at the Keene and Swanzey town line and 7,400 vehicles per day at the Winchester and Swanzey town line. Traffic volumes increase incrementally from south to north.

Indeed NH 10 is designed for moving vehicle traffic. The Federal Highway Administration considers NH 10 a minor arterial highway, meaning that it is designed to link larger cities and towns and be part of an integrated network that provides intercounty and interstate service.[1] NHDOT considers NH 10 a Tier 2 highway meaning that is intended for moderate to high motor vehicle traffic volumes.[2]

From Keene to Winchester, NH 10 is a two-lane rural highway with vehicle lanes ranging from 11 feet to 12 feet wide and shoulders ranging from 1 foot to 10 feet wide. Passing areas exist on the stretch of highway but there are no passing lanes. There are a number of dedicated left-turn and right-turn lanes to several minor streets along the highway, as well as a stretch of two-way left-turn lanes between California Street and Cobble Hill Road in West Swanzey.[3] The passing areas and dedicated turning lanes are designed to keep traffic moving and reduce vehicle conflicts.

All interconnecting roadways along the NH 10 Corridor carry low volumes of traffic. The highest traffic volume of any intersecting roadway is at Base Hill Road averaging 2,900 vehicles per day. California/Main Street carries approximately 1,900 vehicles per day and Ash Hill Road approximately 1,100 vehicles per day. All other intersecting roads carry less than 1,000 vehicles per day. Base Hill Road represents the only roadway that connects NH 10 directly to another arterial highway (NH 9). All other roads serve mostly local traffic and occasionally regional traffic. The gravitational effect of the City of Keene as a regional employment and service center has many people living on the intersecting roadways traveling back and forth from the Keene area, resulting in higher traffic volumes on NH 10 the closer the highway approaches Keene.

Town-wide, the percentage of Swanzey residents that typically drive to work is 97%.[4] This high number is not unusual for Southwest New Hampshire, where most of the local landscape is rural and most transportation trips tend to be too far for walking or bicycling. A SWRPC analysis of people living in housing located just ¼ mile off of NH 10 are estimated to contribute 5,400 trips a day on the highway all by themselves.[5]

Most of the traffic volume on the highway consists of personal vehicles. The proportion of truck traffic (tractor trailers as well as commercial trucks and buses) on the corridor varies ranging from about 2% of traffic on the northern end of the corridor and approaches 7% of the traffic on the southern end of the corridor. At the southern end of the study area, truck traffic reaches over 500 trucks per day. Most of the truck traffic in that location are 2 axle 6 tire single unit (Class 5) trucks rather than tractor trailer trucks.

Among those driving the corridor, different data sources suggest that there is moderate carpooling activity. The Census estimates that a little more than 7% of Swanzey resident workers regularly carpool, meaning that approximately 90% of them drive alone.[6] SWRPC collects rideshare data as well, the most recent of which is from 2019. On NH 10 south of Base Hill Road during peak hours SWRPC observed the rideshare rate of vehicles with 2 or more people was 13% in the a.m. peak hour and 23% in the p.m. peak hour. The SWRPC data source is different than the Census data in that it counts worker commuting as well as other personal vehicle trips (shopping, etc.), but the data is limited in that it is a snapshot of motorist behavior and there may be some daily or seasonal variability. There are no formal rideshare lots along or near the NH 10 corridor and there is no strong ridesharing promotion in New Hampshire at this time, so most ridesharing is thought to occur informally.

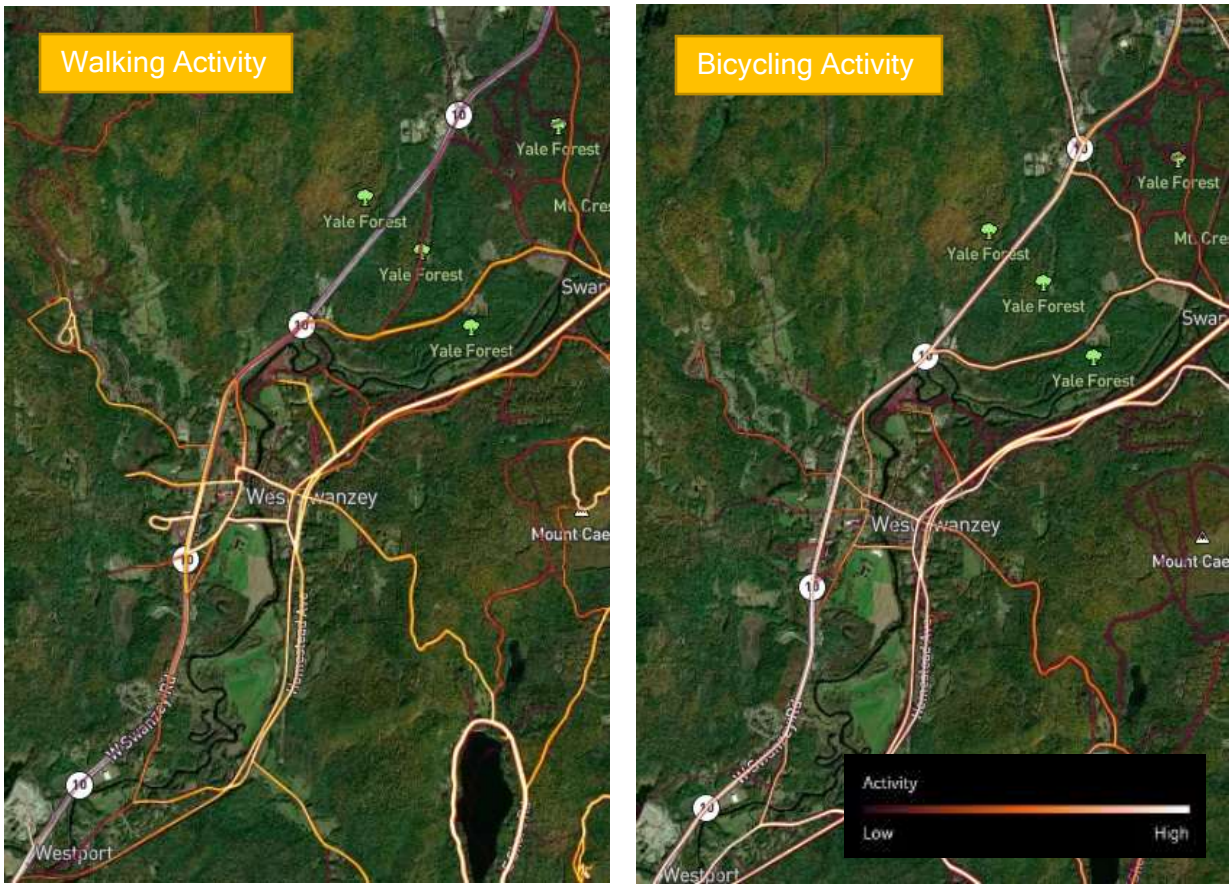
As for transit, there is no fixed route bus service on the corridor except for a shopping shuttle operated by Home Healthcare, Hospice and Community Services that connects Keene and Marlborough residents with the Market Basket grocery store at the northernmost end of NH 10.

Non-Motorized Transportation Infrastructure and Trends

Available data on walking and bicycling along the corridor is very limited. However, Strava, a popular online social network used by athletes, tracks walking and bicycle trips through a global positioning system (GPS) app. In the Strava maps below (Figure 1), the whiter and thicker lines indicate higher walking and bicycling activity. Actual count data is not provided by Strava, but their data can be calibrated with other count data. SWRPC has walker and bicycle volume data on Ashuelot Rail Trail in West Swanzey and recorded an average of 62 daily users in June 2018. On the NH 10 corridor the area between California Street and Cobble Hill Road shows strong walking and bicycling activity, which is probably due to the availability of the only sidewalk on the corridor. Other nearby areas with walking and bicycling activity include the Ashuelot Rail Trail and Homestead Avenue between Main Street and Denman Thompson Highway. While walking activity is not strong along the entire NH 10 corridor, bicycling activity is relatively high and stable all along NH 10, presumably indicating steady use by recreational bicyclers. Walking activity is high on Perry Lane as well as the cross streets connecting NH 10 to the Ashuelot Rail Trail including Main Street, Swanzey Street, West Street, South Winchester Street, and Denman Thompson Highway.

Pedestrian and bicycle infrastructure is limited along the corridor. NHDOT's Statewide Asset Data Exchange System (SADES) which includes comprehensive data showing New Hampshire sidewalks, crosswalks, curb ramps, and pedestrian access buttons shows that the only pedestrian infrastructure on NH 10 is concentrated in West Swanzey (Figure 2). This includes a stretch of asphalt sidewalk between Cobble Hill Road and West Street on the east side of the highway. The local sidewalk network extends to the west, across NH 10, on West Street, however, there is no crosswalk facility. All other sidewalk connections are on the east side of the highway in West Swanzey Village.[7] That being said, there are plans to expand sidewalk and bicycle infrastructure

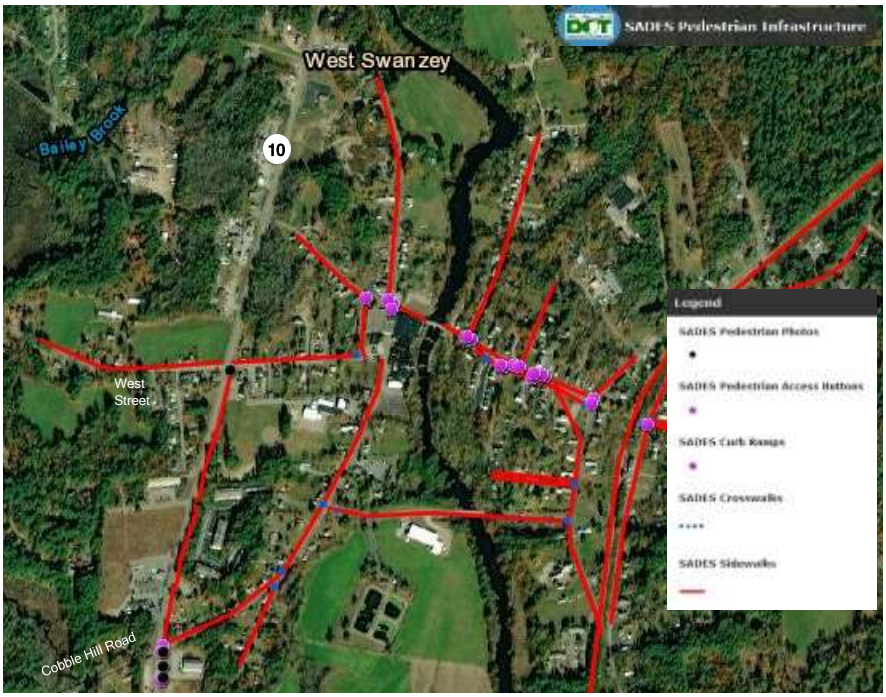
Figure 1: Strava Maps Showing Walking and Bicycling Activity of App Users On and Near NH 10 in Swanzey



Source: Strava Metro, Activity from June 2019 to May 2021

along other parts of the corridor. Sidewalks are currently being improved on West Street and South Winchester Street. In addition, the Town of Swanzey has recommended that an upcoming Keene based highway reconstruction project (#40666), which involves installing sidewalks and bicycle lanes on Winchester Street (NH 10) from NH 101 to the Swanzey town line, be extended to the main entrance of the Market Basket plaza on

Figure 2: SADES Pedestrian Infrastructure Map of West Swanzey Area



Source: New Hampshire Department of Transportation

the northern end of the corridor.[8]

As noted earlier, NH 10's highway shoulders, which are used occasionally by bicyclists and pedestrians, range from 1 to 10 feet wide depending on their location. Highway shoulders less than 4 feet in width are considered unsafe for bicyclists and pedestrians. Locations where shoulders are less than 4 feet include the northern part of the corridor from the Keene and Swanzey town line to approximately the Monadnock Humane Society driveway, a portion of the west side of the highway on the southbound approach to Base Hill Road (the shoulder was replaced with a right-turn lane), and the area consisting of NH 10 from approximately two-tenths of a mile south of Whittemore Farm Road to one-tenth of a mile north of North Winchester Street.

Population

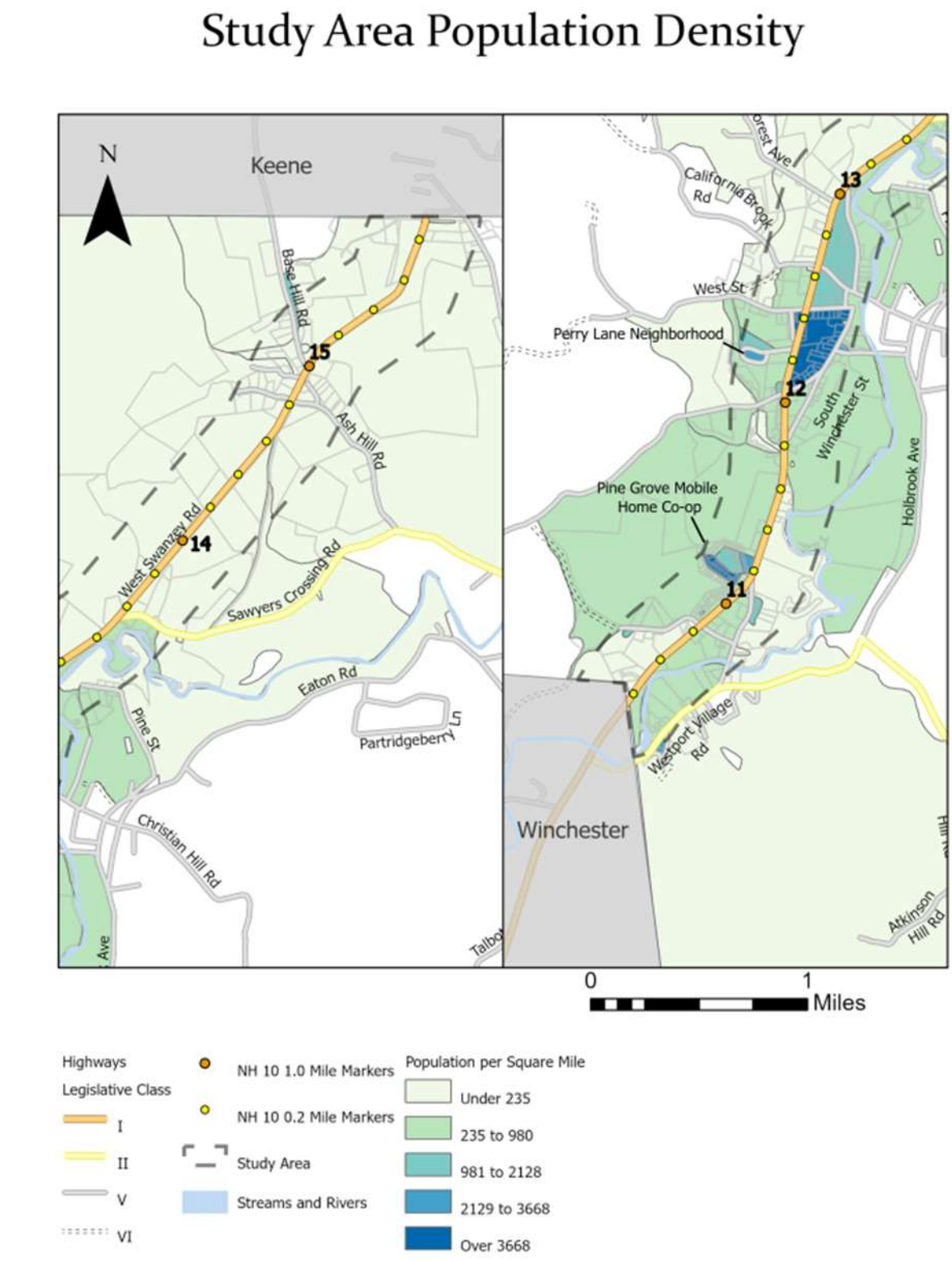
Based on U.S. Census data, SWRPC estimates there are approximately 2,000 people residing within a quarter mile radius of the NH 10 Corridor in Swanzey which is equivalent to more than a quarter of Swanzey's entire population.[9] Town-wide Swanzey's population grew 70% from 4,254 to 7,230 between 1970 and 2010, which was faster than Cheshire County as a whole (47%), but slower than New Hampshire (78%) over the same period. Between 2000 and 2019, the latest U.S. Census data available, Swanzey's population is expected to have actually decreased by 10 people to 7,220 people. According to the NH Office of Strategic Initiatives, however, Swanzey's population is expected to follow historic trends, growing faster than Cheshire County but slower than the State as a whole. Estimates from the agency show Swanzey growing 5% from 2010 to 2040 or 7,230 to 7,662 people. It is anticipated that the corridor population will grow at least as fast as the Town overall, if not faster due to the available developable land along the southern half of the corridor, public sewer and water availability and the convenience of NH 10 to reach jobs, shopping destinations and services.

Today population density along the corridor is lower on the northern portion of the corridor (under 235 people per square mile) and denser in the southern part of the corridor (235 people or more). By far the area with the highest density is in West Swanzey Village in an area roughly bounded by North Winchester Street, South Winchester Street, Cobble Hill Road, and NH 10 consisting of over 3,600 people per square mile. The Perry Lane neighborhood and the Pine Grove Mobile Home Park Cooperative also exhibit higher densities ranging from 2,100 to 3,600 people per square mile. Population density can have an important effect on what forms of transportation options are viable, with greater density tending to increase opportunities for walking, bicycling and transit.

Like other parts of Cheshire County, the average age of Swanzey's population is getting older. In the coming years, the proportion of youth is expected to continue to decrease and the proportion of seniors is expected to continue to increase. Town-wide, the median age has increased from 38.4 years in the 2000 Census to 43 years in 2010, and was estimated to be 50.0 in 2019.[10] In 2019, the proportion of youth (younger than 18) living along the corridor was estimated to represent 19% of the population and seniors (65 and over) 27%.[11] Based on the 2019 U.S. Census American Community Survey data and assuming the population on the corridor was about 2,000 people in 2019, there were an estimated 380 youth and 585 seniors living on the corridor at that time.

Generally, there is a strong correlation between a person's age and transportation need. Transportation needs of the young and old differ from the middle age population. Youth under 18

Figure 3: Population Density on the NH 10 Corridor in Swanzey



Source: U.S. Census Bureau, 2010 Decennial Census

either cannot drive or if they can drive, vehicle affordability may be an issue. National statistics show that 1 in 5 seniors 65 and over do not tend to drive either.[12] These trends are certain to present increasing challenges for a community that relies almost entirely on personal motor vehicle transportation, especially since the senior population is expected to continue growing to at least 2040.

Another significant population group that is sensitive to the cost of transportation are low-income residents. In 2019, the estimated number of people with a ratio of income to poverty level of 150% or less was about 13% of the population living on the corridor or approximately 255 people.[13] On NH 10 there are clusters of areas where people may be challenged by income levels and depend on safe walking and bicycling conditions. The U.S. Census provides data for census designated places (CDP), which are areas that are often recognized as places constituting concentrations of population. One such CDP exists on the NH 10 Corridor representing the West Swanzey area. Although median income appears to continue rising throughout Swanzey since 2010, the median income in West Swanzey remains significantly lower than the town-wide median income. In 2019 the median income in West Swanzey was $58,494 versus $65,019 town-wide.[14] Outside of West Swanzey Village, there are a number of clusters of low- and moderate-income populations along NH 10 including two housing developments owned by Keene Housing, one housing development on Main Street owned by Southwestern Community Services, as well as the Pine Grove Mobile Home Park and Winchester Woods apartments.

However, transportation is not only expensive for people living close to the federal poverty level. According to the Center for Neighborhood Technology, which estimates annual housing and transportation costs for a median income household across the United States, they estimate that transportation consumes about 24% of household income for people living along the NH 10 Corridor in Swanzey. Combined with high housing costs, which the same entity estimates costs approximately 27% of median household income, transportation is quite expensive.[15]



The Google Maps vehicle, which captures continuous street view images along U.S. highways, captured this pedestrian waiting to cross the street from Winchester Woods Apartments to the Market Basket in Swanzey on NH 10. There are no crosswalks or sidewalks in this area today. Image from www.google.com/maps

Another category of the population sensitive to a personal vehicle dominated transportation system are people with disabilities. In Swanzey, the percentage of people with a cognitive, ambulatory, self-care and independent living difficulty (individuals can be categorized in more than one), is 6.9%, 12.1%, 4.1% and 7.3%, respectively.[16] Assuming rates of disability are distributed evenly throughout Swanzey, this would represent up to 240 people living along the NH 10 Corridor.

Zoning

Swanzey's current zoning, which guides new development and land use activities along the corridor, generally emphasizes a desire for commercial and business related development directly adjacent to the corridor, and de-emphasizes housing adjacent to the corridor (Figure 4). Among the seven zoning districts currently administered in Swanzey, six of these zones are located within a quarter mile radius from NH 10.

Table 1: Total Area Associated with Zoning Districts Within a Quarter Mile of the NH 10 Corridor

Zoning District Name	Commercial/ Industrial	Business	Residence	Rural/ Agricultural	Village Business I	Village Business II	Total
Total Area (Acres)	834	475.7	173.3	133.7	10.2	5.2	1632
Acres as Percent of Total Study Area	51.1%	29.2%	10.6%	8.2%	0.6%	0.3%	100%

Source: Town of Swanzey

With the exception of a small piece of Rural/Agricultural frontage on NH 10 and a stretch of highway on the west side of NH 10 between Anthony Circle and Kempton Road that is zoned residential, frontage on NH 10 is entirely dominated by the Commercial/Industrial and Business Zones. The northern half of the corridor is dominated by the Commercial/Industrial Zone, while the southern half of the corridor is Business.

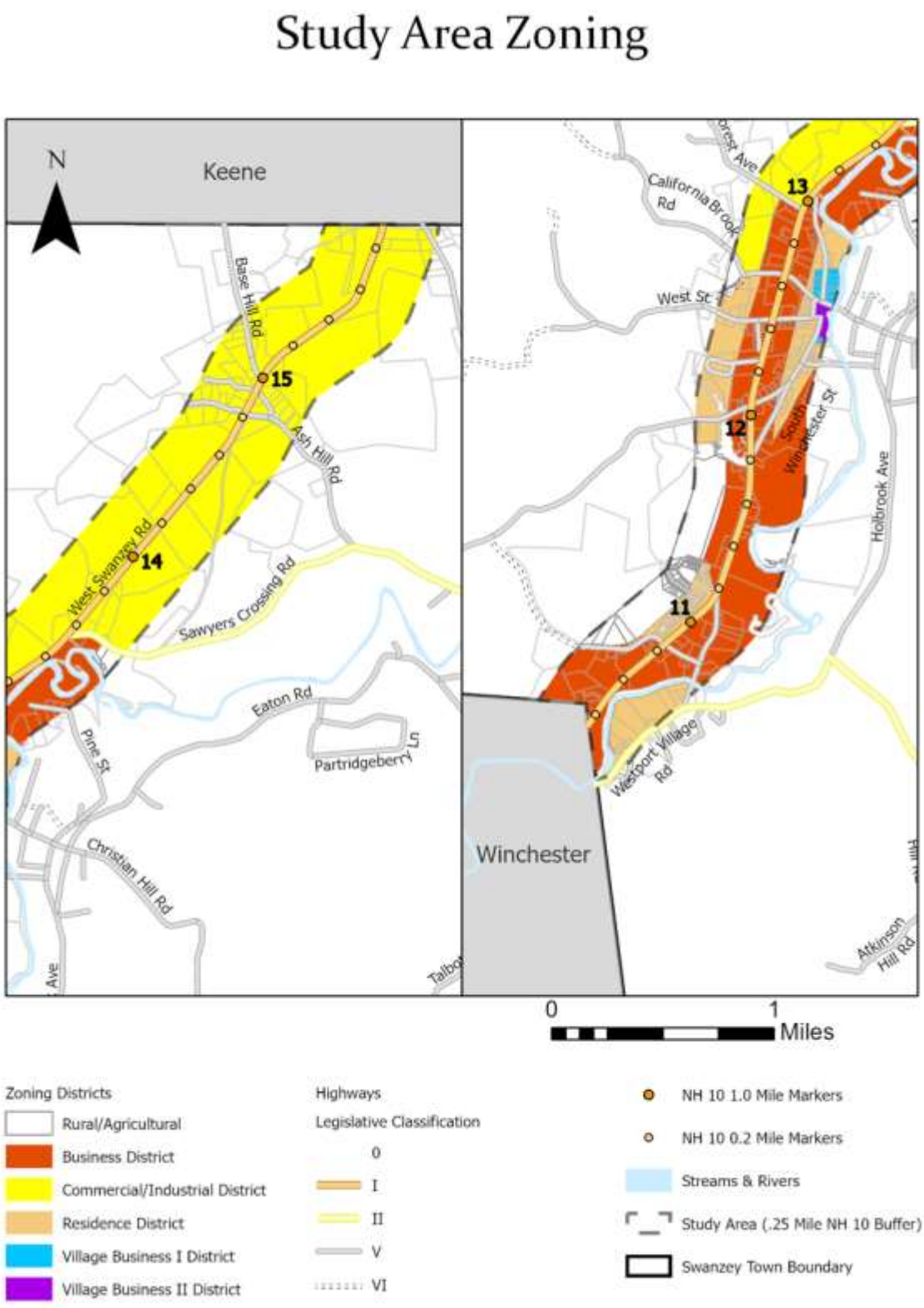
Overall, the Town of Swanzey's zoning regulations encourage low-density development. The three most prominent zoning districts of Business, Commercial/Industrial and Residence require a minimum lot size of one acre. Lots even larger than 1 acre are required in the case of properties within the Commercial/Industrial districts with direct frontage to NH 10 or multifamily properties not connected to public sewer.

Table 2: Minimum Lot Size, Frontage and Setbacks Associated with the NH 10 Corridor

Zoning District Name	Commercial / Industrial	Business	Residence	Rural/ Agricultural	Village Business I	Village Business II
Minimum lot size (acres)	3; 1 with feeder road	1	1	3	0.5	0.5
Minimum frontage (feet)	225; 125 with feeder road	125	150	225	100	100
Front, side, rear setback (feet)	30, 20, 20	75, 20, 20	30, 20, 20	30, 20, 20	30, 20, 20	30, 20, 20

Source: Town of Swanzey

Figure 4: Zoning Along the NH 10 Corridor in Swanzey



Source: Town of Swanzey

Notable among the zones, the Commercial/Industrial district has an objective to "minimize strip development and encourage off road development on portions of Route 10". The district promotes its goal by requiring a 3-acre minimum lot size for properties utilizing access to NH 10 while only requiring a 1-acre minimum lot size for parcels using access to "feeder roads". Allowances for reduced frontage are also available for development that is connected to NH 10 via feeder roads.

The Commercial/Industrial Zone permits land uses such as manufacturing, research facilities, warehousing, educational uses, business and professional offices, restaurants, gas stations, lodging, retail sales and services, and other miscellaneous commercial and industrial type land uses. Housing of any kind is not allowed even by special exception, however, home businesses are allowed for existing residential land uses located within the Zone. In fact, there are no special exceptions allowed in the Commercial/Industrial Zone.

The Business Zone permits many of the same land uses as the Commercial/Industrial Zone, however, it does not allow land uses that are more industrial in nature like manufacturing or research and testing laboratories. The Business Zone allows by special exception all types of housing (single, two-family, multifamily and manufactured housing) and some types of land uses that tend to have large traffic generation such as drive-thru establishments.

The Village Business Districts tend to encourage many of the same business land uses allowed in the other zones with Village Business II allowing for some industrial land uses. Multifamily housing is also allowed as of right in the Village Business II Zone. Village Business I allows single family and manufactured housing as of right, and two-family and multifamily dwellings by special exception.

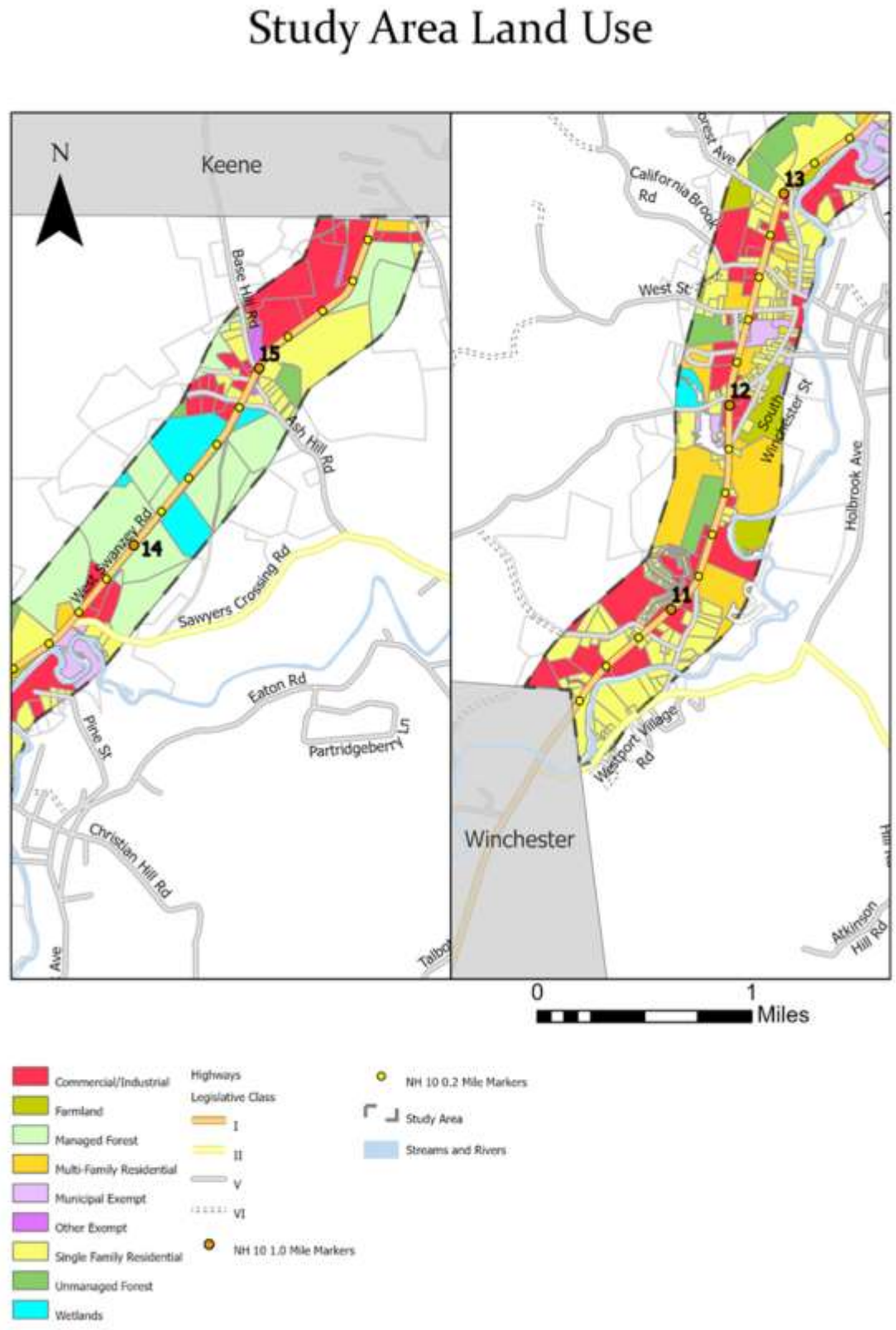
The Rural/Agriculture Zone allows for low density residential, agricultural uses as well as some other miscellaneous uses (e.g. industrial parks, septage lagoons, gravel pits, recreational uses like camps, etc,). The Residential Zone allows for single, two-family, multifamily and manufactured housing, home based businesses, some agricultural businesses and other miscellaneous land uses. Only single family housing, manufactured housing, and customary agricultural uses are allowed by right.

In addition to the five zones adjacent to or near the corridor, there are three overlay districts within a quarter mile radius of NH 10 including the Wetlands Conservation District, Shoreland Protection District and the Flood Plain District. The Wetlands Conservation District applies to scattered sites within the Study Area where wetlands are found, while the Shoreland Protection District applies to areas near the Ashuelot River. The Flood Plain District applies to portions of the Study Area which lie within a FEMA designated flood hazard area. The first two districts are designed to protect the resources for which they are named and the Flood Plain District is intended to ensure the health and safety of the population living or working in areas built in floodplain areas.

Land Use

Transportation activity on NH 10 is derived in part by the land use activities occurring along the corridor. For the Study, SWRPC examined existing land uses ¼ mile radius distance from NH 10, comprising a total of 1,632 acres. In that area there are 527 parcels, most of which are single-family homes, and commercial and industrial properties (Figure 5). Land uses along the corridor are primarily low density meaning that demand for access to the corridor is spread out along the highway for the most part. An exception to this trend is the West Swanzey area, which shows

Figure 5: Land Uses Along the NH 10 Corridor in Swanzey



Source: Town of Swanzey

denser patterns of development in an area built for walkability when houses were constructed before and during the dawn of the automobile age. In addition, there are clusters of denser housing along the highway or just outside of the ¼ mile radius of NH 10 such as Pine Grove Mobile Home Park Co-op located at Anthony Circle (122 units) and California Brook Estates located off of California Street (98 units). In the northern half of the study area land uses are predominately forests managed by Yale University, but there are also a number of low-density commercial and industrial properties, and low-density residential properties. Land uses within the southern half of the study area are more diverse, with a mix of both single-family and multi-family residential, commercial properties, unmanaged forests, and farmland.

Table 3: Characteristics of Land Uses Within a Quarter Mile Radius of NH 10

Land Use Type	Single Family Residential	Multi-Family Residential	Commercial/ Industrial	Managed and Unmanaged Forest	Wetlands	Other
Parcels	355	30	77	27	10	23
Acres	451	167	386	427	90	53
Average Parcel Size	1.27	5.57	5.01	15.81	9.00	4.96
Acreage as Percent of Total Study Area	27%	10%	23%	26%	5%	5%

Source: Town of Swanzey and Southwest Region Planning Commission

Today, single-family residential properties are the most prevalent land use by number of parcels and acres along the corridor. In terms of acreage, commercial/industrial and managed forest lands make up the other two predominant forms of land use along the corridor. Managed forest accounts for the largest parcels, with only 19 parcels accounting for 341 acres of land within the corridor. Much of the managed forest land is contained within the Yale-Toumey forest, which is protected through Yale University as part of their forestry program.

Economic Development

The NH 10 Corridor is a significant engine of economic activity in Swanzey. There were approximately 500 jobs within a ¼ mile radius of the NH 10 Corridor in 2018. The most prominent economic sector represented in the area is retail, accounting for 237 or 53% of the jobs on the corridor, followed by other services (excluding public administration) (68 jobs), wholesale trade (43), construction (31) and manufacturing (25).[17] Major retail operations on the corridor include Market Basket, Gomarlo's Shop n' Save Supermarket, and many other smaller retail establishments. The category, "other services (excluding public administration)," represents a hodgepodge of



Gomarlo's Shop n' Save Supermarket is one of the larger employers on NH 10 located in West Swanzey.

service industries[18] including automotive repair and maintenance for which there are several examples along the corridor including Bob's West Swanzey Garage, NH 10 Auto Inc. and others. An example of wholesale trade on the corridor is the Tire Warehouse. Construction-oriented businesses include Ingram Construction Corporation, Cheshire Builders Inc., and SUR Construction West, Inc. among several others. Examples of manufacturing businesses include Turmoil Inc. and the West LA Beer Company.

Overall, business activities on the NH 10 Corridor are estimated to make up almost a quarter of the jobs in the Town, particularly if one accounts for jobs just outside of the ¼ mile radius of the highway. Industry sectors in which the number of NH 10 Corridor jobs exceed 25% of the Town's total jobs and thus have a significant presence in the Town's economy include retail (37%), accommodation and food services (33%) and other services excluding public administration (67%).

Table 4: Comparison of Jobs Along NH 10 Corridor and Town of Swanzey in its Entirety

Industry	2018		2019	
	Count	Share of Jobs on NH 10 Corridor	Count	Share of Swanzey jobs
Agriculture, Forestry, Fishing and Hunting	0	0%	0	n/a
Mining, Quarrying, and Oil and Gas Extraction	0	0%	0	n/a
Utilities	0	0%	0	n/a
Construction	31	6%	216	14%
Manufacturing	25	5%	221	11%
Wholesale Trade	43	9%	n	n
Retail Trade	264	53%	707	37%
Transportation and Warehousing	16	3%	103	16%
Information	2	0%	n	n
Finance and Insurance	0	0%	0	n/a
Real Estate and Rental and Leasing	3	1%	13	23%
Professional, Scientific, and Technical Services	1	0%	65	2%
Management of Companies and Enterprises	0	0%	n	n
Administration & Support, Waste Management and Remediation	13	3%	70	19%
Educational Services	0	0%	n	n
Health Care and Social Assistance	12	2%	40	30%
Arts, Entertainment, and Recreation	0	0%	n	n
Accommodation and Food Services	22	4%	66	33%
Other Services (excluding Public Administration)	68	14%	101	67%
Public Administration	1	0%	654	0%
Totals	**501**	**100%**	**2256**	**22%**

n = data do not meet disclosure standards. Note that some "0's" for the 2018 data set may actually account for such a small number of jobs that they do not meet disclosure standards so the LEHD gave the industry a value of 0 jobs.

U.S. Census Longitudinal Employer-Household Dynamics, 2018 and Bureau Labor Statistics, 2019

The majority of people working along the corridor aged 29 or younger represent approximately 41% of people working in the corridor area. Workers aged 30 to 54 come in a close second at 39% of the workforce, and older workers 55 and over represent the balance at about 20% of the workforce. Forty-eight percent of the workers on the corridor make $1,250 or less per month, with 31% making $1,251 to $3,333 and the remaining 21% making above $3,333.

Job commuting trends associated with employment on the NH 10 Corridor shows interesting patterns. Among the land uses within a ¼ mile radius of NH 10, there are somewhat more people commuting into the corridor for jobs (491) than people commuting away for jobs (431). Interestingly, there are only 7 Swanzey residents living along the corridor that work on the corridor. Eighty-seven people representing the NH 10 Corridor workforce live in Swanzey, and an additional 123 people live in the neighboring communities of Keene and Winchester. Almost a third (32%) of the people working on the corridor have a round-trip commute of 50 or more miles, suggesting a large proportion of workers are coming from quite far away.

The top employment destination for the 431 residents living along the corridor is Keene (171 people). The distribution of worker's other job destinations are quite spread out. After Keene, the top job destinations attract only a few workers and are fairly distant including Brattleboro (13), Concord (12), Manchester (7) and Lebanon (6). Like people commuting to work on the corridor, there are a significant number of people that reside along the corridor and commute far away. The proportion of residents making round trip work-related commutes of 50 or more miles is 32%, the same percentage of people commuting into the NH 10 Corridor for work.

Housing

While housing development is not allowed as a permitted use in the Commercial/Industrial Zone and is less of a focus in the Business Zone (the two most extensive zones on the corridor), housing within the ¼ mile radius of the NH 10 highway is nevertheless prevalent today. According to Town of Swanzey assessing data, there are 644 units of housing within the area across 385 parcels. Of those, the majority (58%) of units are single-family homes, followed by multi-family units of four or more units which make up 36% of all units. Duplex and triplex properties comprise 4% and 3% of the housing stock in the area of study, respectively. Of those units in multifamily buildings with 4 or more units, 92 units are subject to some form of income limitation while 137 units are unrestricted units on the private market.

Table 5: Housing Stock Presently Within ¼ mile radius of NH 10 Corridor in Swanzey

Housing Type	Number of Parcels	Number of Units	Housing Type as Percentage of Stock
Single Family*	355	371	58%
Duplex	12	26	4%
Triplex	6	18	3%
Four or more units	12	229	36%
Total	385	644	100%

**Includes 116 units of Manufactured Housing in the Pine Grove Cooperative*

Source: Town of Swanzey

Corridor Performance & Outlook

This next part of the report attempts to answer the question, "Is the corridor meeting the public's needs and expectations today?" Also, "Using available trend data and information, what is the direction and outlook for the corridor and is this in line with the Town of Swanzey's vision for the corridor?"

There are a number of ways to evaluate corridor performance and whether aspects of corridor performance are heading in the right direction. Guidance can be found in materials such as:

- Local plans, studies or policy documents that are relevant to or related to NH 10;
- Information collected during the course of the *Swanzey NH 10 Corridor Study*;
- Government partner (regional, state) policies and reference documents that share interest in the proper management of the NH 10 corridor; and
- Best management practices guidance where no other specific guidance is available or known.

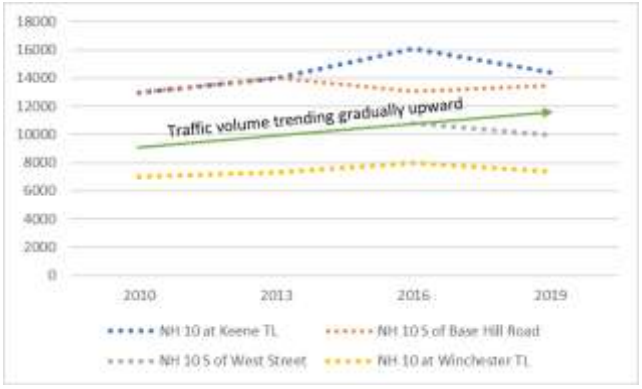
These resources can be helpful in understanding local preferences and attitudes or generally recognized preferences and attitudes relating to corridor management topics. In the following section, the report attempts to evaluate the corridor's performance or outlook as it relates to motor vehicle traffic, non-motorized transportation, population change, zoning and land uses, economic development, and housing using the aforementioned sources when available.

Motor Vehicle Traffic

The transportation goal in the 2003 Swanzey Master Plan is "to provide a safe, efficient and diversified transportation network that is sensitive to the Town's rural character." Safety and efficiency, in particular, are directly related to motor vehicle traffic and highway performance and traffic growth, highway capacity, speeding, and crashes are indicators often considered to evaluate highway safety and efficiency.

In three locations along the corridor, traffic volumes have been tracked for the last decade. This includes NH 10 at the Keene/Swanzey town line, NH 10 south of Base Hill Road and NH 10 at the Winchester/Swanzey town line. Traffic counts at NH 10 south of West Street did not start until 2016, but are also referenced in this analysis. Traffic changes during the past decade show ups and downs with a recent decrease in the last 3 year period for three of the counting sites. However, a regression based trendline show traffic volumes slowly increasing on NH 10 over the entire period.

Figure 6: Traffic Volume Change for Four Locations on the NH 10 Corridor in Swanzey, NH



Source: New Hampshire Department of Transportation

Going back in time even farther would show steady, slow growth in traffic volumes during the 2000s. This slow increase is expected to continue. The NHDOT Bureau of Traffic's model for southwest New Hampshire during the 2010s showed an average annual traffic growth rate of .63% per year.[19] All things being equal, expectations are that slow, increasing growth in traffic volumes will continue into the future on NH 10.

Despite this growth, it is anticipated that most of the highway as built today can withstand additional traffic volume growth given the highway's existing design for vehicle capacity. While an engineering study is recommended for a more specific and accurate evaluation of the corridor's capacity, there are "rules of thumb" that are helpful in understanding capacity at the planning level. For instance, when analyzing peak hour traffic, the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) reference for maximum saturation flow per lane is 1,900 vehicles per hour. In the case of NH 10, the highest measured peak hour on the corridor is at the Keene and Swanzey town line and reaches only about 1,470 vehicles for *two lanes combined*, well below the TRB's saturation flow rate guidance.



While traffic is increasing slowly on NH 10 in Swanzey, there is plenty of capacity for growth.

Another capacity measure that can be used is level of service. When estimating level of service for 2-lane highways with left-turn lanes like NH 10, the TRB's HCM states that a highway's level of service begins degrading (Level D/E) at about 18,300 vehicles per day. While these levels of traffic volumes are occurring on NH 10 in Keene south of the NH 10/12/101 roundabout, they are not approaching those levels in Swanzey. The highest traffic volume recorded on NH 10 in Swanzey in 2019 was at the Keene/Swanzey town line at 14,443 vehicles per day. Though it is possible that significant changes in traffic growth can occur in a relatively short time depending on land use development activities, NHDOT's current average annual growth rate of .63%, if applied to the 2019 ADT measured at the Keene/Swanzey town line, wouldn't reach Level of Service D/E until 2074.

While the level of service on NH 10 performs well today, SWRPC has noticed some vehicle platooning on the highway, particularly as traffic volumes increase toward the northern end of the corridor as traffic builds on the approach to Keene. Platooning refers to the tight spacing and long grouping of vehicles behind each other resulting in very short headways or "gaps" between each vehicle. Platooning can lead to higher incidences of rear-end collisions for vehicles within a platoon especially if vehicles are improperly distanced (tailgating) or in cases of driver inattention. Platooning can also result in side-impact collisions for drivers attempting to enter the highway from driveways or unsignalized intersections and miscalculating safe gaps to enter the highway.

The TRB HCM indicates that gap acceptance depends on a number of factors including prevailing speed, number of lanes on the highway, and what type of traffic movement a vehicle is making from a minor side approach. A right turning movement needs the least amount of time. On a two lane highway, a left turn typically requires an additional second of gap time, and crossing the road

requires a half second more than a right hand turn. Trucks require more time than passenger vehicles. For the study, gap data was assessed in four locations including NH 10 at the Keene and Swanzey town line, NH 10 south of Base Hill Road, NH 10 south of West Street and NH 10 at the Swanzey and Winchester town line. For all the prevailing speeds recorded on NH 10, 6.5 seconds is a point at which gaps become higher risk for drivers even making right hand turns.

Based on the data that was collected, conditions are highest risk for drivers at NH 10 south of Base Hill Road in the p.m. peak hour when the percent of gaps less than 6.5 seconds accounts for almost 75% of the traffic during the peak hour. Other times with sizeable periods of gaps of 6.5 seconds or less include the p.m. peak period near the Keene and Swanzey town line and the a.m. peak period at NH 10 south of Base Hill Road. Based on SWRPC's research, during peak hours at least 50% of the traffic is following a vehicle by less than 6.5% at all locations.

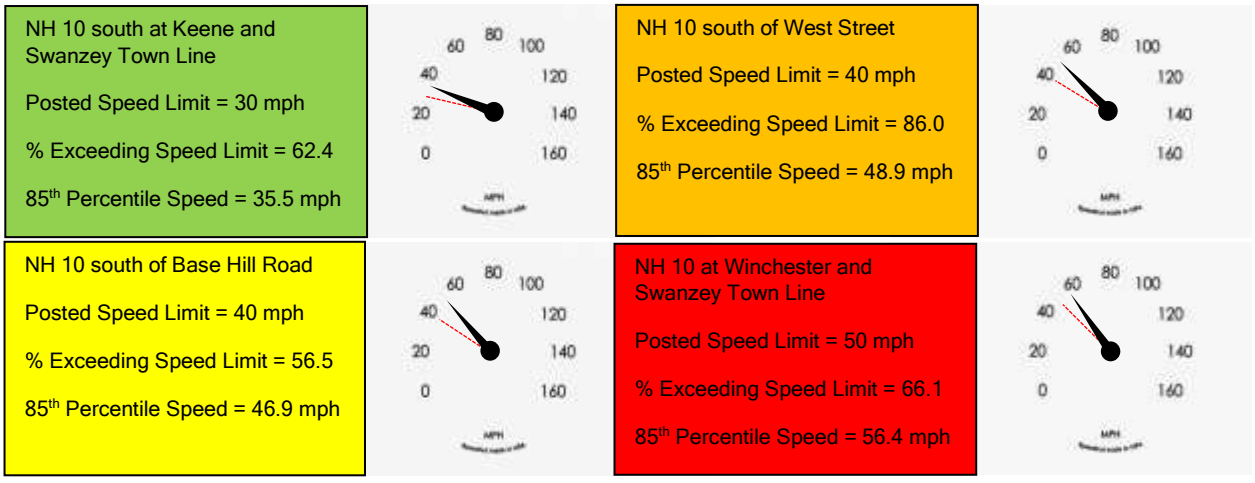
Table 6: Morning and Afternoon Peak Hour - Percent of Vehicle Gaps Less Than 6.5 seconds on NH 10 in Swanzey

Location	Peak Hour	Prevailing Speed (mph)	% of Gaps Less Than 6.5 Seconds
NH 10 at Keene line	8-9 a.m.	37 NB, 35 SB	56.9
	4-5 p.m.	36 NB, 34 SB	73.4
NH 10 south of Base Hill Road	7-8 a.m.	43 NB, 48 SB	71.6
	5-6 p.m.	49 NB & SB	74.2
NH 10 south of West Street	7-8 a.m.	51 NB & SB	52.4
	4-5 p.m.	49 NB & SB	62.2
NH 10 at Winchester line	7-8 a.m.	56 NB, 57 SB	49.6
	4-5 p.m.	56 NB & SB	58.6

Source: Southwest Region Planning Commission

Readers may be surprised to see in the previous table that even during peak hours some of the prevailing speeds are up into the high 50 mph range. Speeding, indeed, appears to be pervasive throughout most of the corridor. Transportation engineers typically consider the 85th percentile speed as "prevailing speed" and therefore it is often used to inform the design speed and posted speed limit of a road. Among the four sites where speed data was collected, most drivers' prevailing speed exceed the posted speed limit. The difference between the prevailing speed and posted speed limit is greatest at the Winchester and Swanzey town line, by almost 13 mph. South of West Street the prevailing speed limit is nearly 9 mph greater than the speed limit. Speeding is a concern, because it tends to have a significant influence on crash severity. Speeding is particularly dangerous for pedestrians and bicyclists.

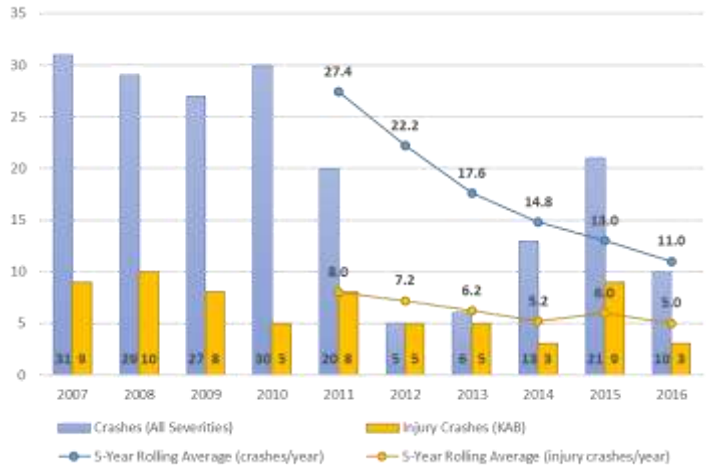
Figure 7: Speed Data Associated with Four Locations on the NH 10 Corridor in Swanzey



Source: Southwest Region Planning Commission

According to data collected by the NH Department of Safety, there were 192 crashes on the Swanzey portion of NH 10 between 2007 and 2016. During that period crash incidents were on a downward trend, decreasing from 40 to 13 on an annual basis. This is consistent with a downward trend observed for the entirety of the town over the same period. The change in injury and fatality crashes also shows a decline over time, however, the trend is less variable, ranging from 10 to 3 annual crashes. Fortunately, among the 65 injury and fatality crashes, there were only 3 fatalities and 4 serious injuries during the period. All other injuries were listed as minor.

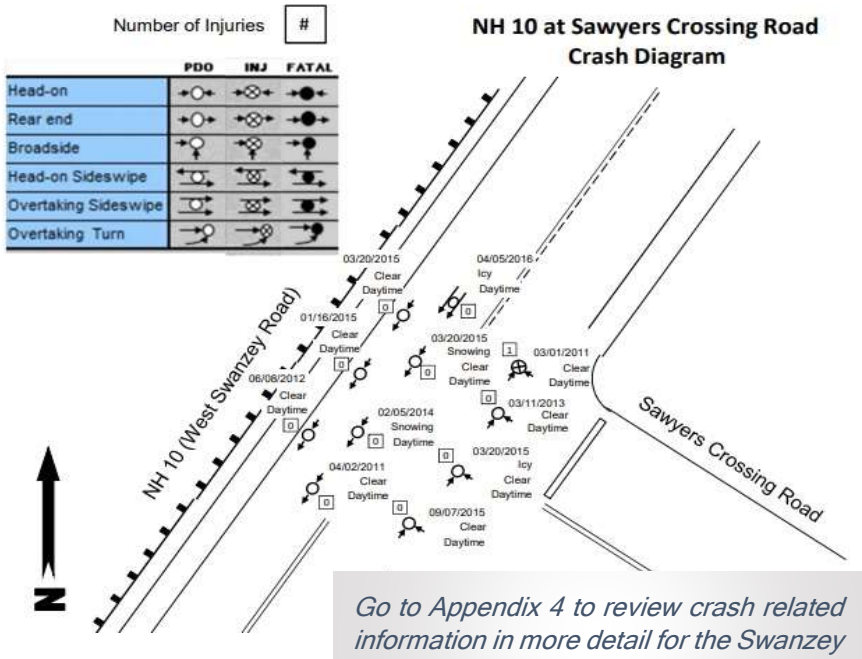
Figure 8: Number of Crashes on NH 10 in Swanzey, 2007-2016



Source: NH Department of Safety

The location of fatalities included the area north of the intersection of NH 10 and Base Hill Road, and two additional locations between North Winchester Street and Sawyer's Crossing Road. Serious injuries were reported on NH 10 in front of the Market Basket, on a straight stretch of highway three-tenths of a mile south of Whittemore Farm Road, at the intersection of Sawyer's Crossing Road, and at the intersection of North Winchester Street. SWRPC analyzed each of the fatality and serious crash locations for the study and observed that the only place showing obvious patterns of similar crash configurations was at the intersection of Sawyer's Crossing Road where in addition to the serious injury there were three other broadside collisions between vehicles pulling out of Sawyer's Crossing Road and northbound NH 10 traffic. Even with the crash patterns, there was only one injury recorded between 2007 and 2016.

Figure 9: Crash Diagram for NH 10 and Sawyer's Crossing Road, 2007-2016



Source: Swanzey Police Depar

Go to Appendix 4 to review crash related information in more detail for the Swanzey NH 10 Corridor Study.

In addition to conducting an analysis of the crash patterns at the locations of fatalities and serious injuries, SWRPC reached out to the Swanzey Police Department for additional candidate

locations where the police recalled higher than average call responses to crashes. The locations referred by the police included NH 10 at Base Hill Road including driveways associated with the nearby Citgo Station, the intersection of Sawyer's Crossing Road, the area between Sawyer's Crossing Road and North Winchester Street, the intersection of North Winchester Street, the intersection of California Street and the intersection of West Street. Among those locations, recognizable crash patterns were observed at the intersection of Base Hill Road, Sawyer's Crossing (discussed above), California Street and West Street. As part of the study effort, a team from the Swanzey NH 10 Working Group investigated the data from those sites and conducted a field review for the four sites with recognizable crash patterns. Information from those reviews led to recommendations, which follow in the next section of the report.

Other observations with the NH Department of Safety crash data are that after "no improper driving" (39%) the most common reasons for cause of accident are "driver inattention/distraction," "failure to yield right-of-way," "following too close," "physical impairment," "skidding," and "illegal/unsafe speed" (collectively 37%), in that order. The most common location of first harmful event occurred "along the road" (48%), followed by "at intersection/intersection related" (28%), and "along road at driveway access" (21%). Most crashes involved a collision with another vehicle (65%), occurring in dry conditions (72%) during daylight hours (68%) on clear days (63%).

Non-Motorized Transportation

For non-motorized transportation performance, SWRPC focused on safety and accessibility. Swanzey's Master Plan, which calls for a "diversified" transportation system as well as the Town's 2015 adoption of a Complete Streets Policy and Complete Streets Design Guidelines, suggest that pedestrian and bicycle safety and accessibility are important local goals for non-motorized transportation. A 2016 Safe Routes to School Action Plan for Cutler Elementary School also discusses the importance of pedestrian and bicycle safety and accessibility as it relates to NH 10.

In the 2007-2016 crash dataset referenced earlier in the report, there was only one pedestrian and one bicycle crash recorded by the NH Department of Safety during the period. The pedestrian crash occurred south of Sawyer's Crossing Road near Swanzey Self-Storage and was listed as a serious injury. Apparently, an intoxicated pedestrian was walking home from Keene and may have stepped in the roadway when they were hit by a southbound vehicle. The bicycle crash occurred at the intersection of California Street and NH 10. According to police reports, the bicyclist was heading north on NH 10 and was hit by a southbound vehicle turning left on California

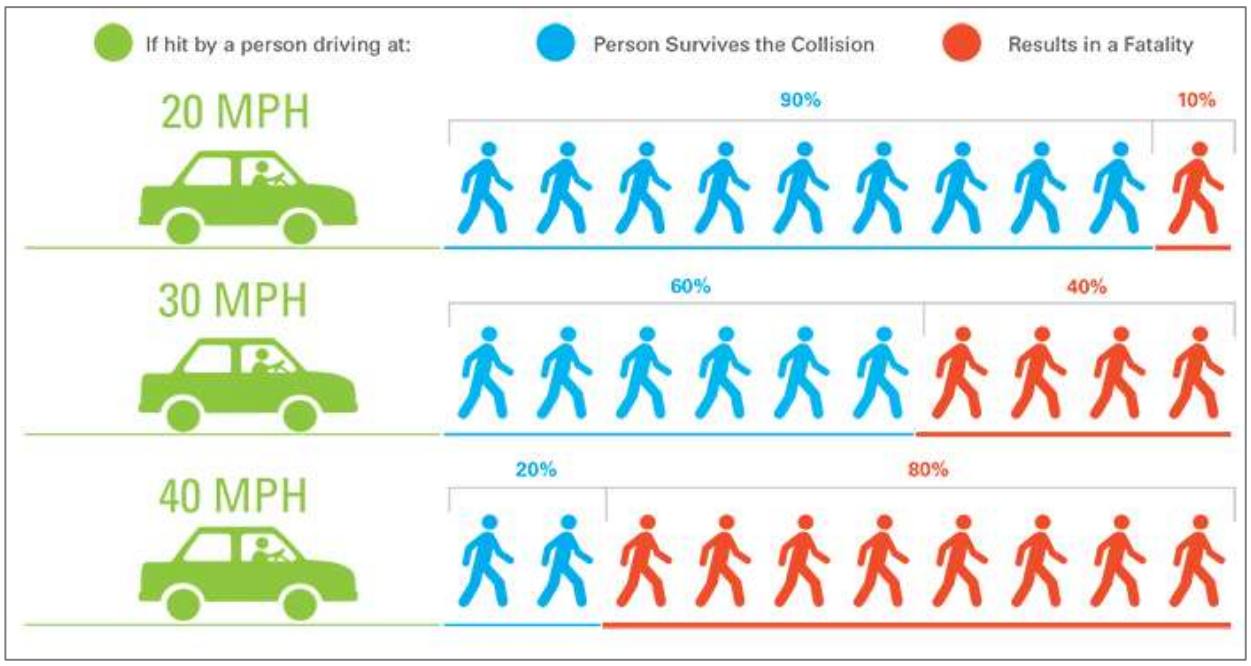


Cutler Elementary School's 2016 Safe Routes to School Action Plan noted that 10.5% of the student body lived within walking and bicycling distance of the school on the west side of the NH 10, but that NH 10 crossing conditions are currently unsafe.

Street and failing to yield to the bicyclist's right-of-way. The Swanzey Police noted that the bicyclist was hit directly by the vehicle, and sustained injuries to their shoulder.

Despite the low number of pedestrian and bicycle crashes, safety is a concern on the highway especially in areas that are more urban and are likely to attract more foot and bike traffic. This is even more of a concern considering that speeding is pervasive on the corridor (See Figure 10). Presently, NH 10 bifurcates parts of the corridor that may otherwise be naturally connected and accessible by pedestrians and bicyclists. These locations, which include somewhat dense mixes of housing, retail and employment include the West Swanzey area and the very northern section of the corridor near the Keene and Swanzey town line. In West Swanzey, there are no pedestrian crossings on the highway despite a mix of housing and destinations including places of employment, a grocery store, a post office, and an elementary school on either side of the highway. While there is some sidewalk infrastructure along NH 10, it is only located on the east side of the corridor between Cobble Hill Road and West Street, opposite of popular locations like the supermarket and post office. California Street has sidewalks approaching NH 10 but they do not fully reach the corridor. Another location that doesn't quite reach NH 10, South Winchester Street, is currently being addressed by a Swanzey improvement project.

Figure 10: Relationship Between Speed and Pedestrian Safety



Source: Institute of Traffic Engineers

In addition to the West Swanzey area, the northern part of the corridor near the Keene border is another location where housing density is higher and places of employment and shopping are within walking and bicycling distance, but the area is separated by NH 10 without safe crossing opportunities. The Town of Swanzey has recommended pedestrian and bicycle improvements for this section of NH 10 as part of a project that NHDOT and City of Keene are addressing for the area. Both of these areas are top candidates for improved pedestrian and bicycle safety and improved accessibility.

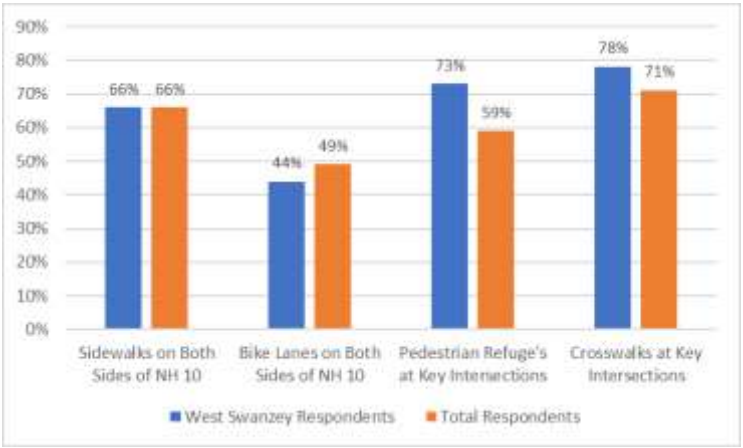
The minimum safe recommended shoulder width for on-road bicycling is four feet unless facing a guardrail, curb or other roadside barrier, in which case 5 feet minimum is recommended.[20] On NH 10, shoulder widths less than 4 feet along the corridor are located from the Keene and Swanzey town line to approximately the Monadnock Human Society driveway as well as west side of the highway where a right turn lane was created for southbound traffic turning on Base Hill Road. Shoulders appear to be 4 feet wide in the area starting about two-tenths of a mile south of Whittemore Farm Road to about a tenth of a mile north of North Winchester Road which contains a good deal of guardrail. Shoulders in the West Swanzey area appear to be 4.5 feet.

Even with appropriately wide shoulders, however, other factors can diminish bicyclist safety. The current draft NHDOT Pedestrian & Bicycle Transportation Plan, which grades statewide highways on a number of factors (posted and prevailing highway speeds, shoulder width, roadway configuration, etc) considers all of NH 10 in Swanzey a Bicycle Level of Traffic Stress (BLTS) of 4, the poorest grade for any highway that allows bicycling. BLTS 4 describes "roadways with no designated bikeways, multilane traffic, and motor vehicles traveling at high speeds. [These roadways] are [s]uitable to a limited number of adults."[21]

Despite gaps in pedestrian accessibility and less than safe conditions for most bicyclists along NH 10, Strava data (discussed in the last section) demonstrates that some members of the general public are bicycling in numbers along the corridor and walking in the West Swanzey area in the vicinity of NH 10. Demand for walking and bicycling may continue to grow as infrastructure conditions improve. Currently, the Town of Swanzey is upgrading much of the existing sidewalk network in West Swanzey and was awarded a federal Transportation Alternatives Program grant to upgrade the Ashuelot Rail Trail. Both of these projects, and an initiative by the Monadnock Region Rail Trail Coalition to bring wayfinding signage on to the Ashuelot Rail Trail, are designed to make walking and riding conditions more comfortable, safe and attractive.

As part of the Swanzey NH 10 Corridor Study, SWRPC conducted a visual preference survey that asked West Swanzey residents and other users of the corridor what they thought about improvements to pedestrian and bicycle accommodation and safety on the stretch of NH 10 from North Winchester Street and South Winchester Street. Potential improvements included installing sidewalks on both sides of NH 10, introducing bike lanes on either side of NH 10, and installing pedestrian refuges or crosswalks at key locations like the intersections of California Street, West Street, Cobble Hill Road and South Winchester Street. All of the improvements proved popular with West Swanzey residents and all users of the highway, but especially the pedestrian improvements.

Figure 11: Percent of Survey Respondents Indicating Preference for Pedestrian and Bicycle Infrastructure Improvements Over Existing Conditions for NH 10 Area Between N. and S. Winchester Streets1



Source: Southwest Region Planning Commission

Population

Previously it was noted that there are some segments of the population that may require alternative transportation choices either due to age, ability, or income. Youth under driving age, without a parent or guardian chauffeuring them, require safe walking and bicycling environments as a transportation alternative. As previously established, one out of five seniors 65 and older tend to not drive and may require some form of transit. People with ambulatory or other disabilities may also need transit services. Low income households or young people that do not yet have access to a vehicle may find driving too expensive and can make their budget stretch further if inexpensive forms of transportation are available to them like sidewalks, bikeways and transit.

In addition to the already identified need for pedestrian and bicycle infrastructure in the West Swanzey area and the northern part of the corridor, SWRPC developed an estimate of transit demand based on a methodology created by the Community Transportation Association of America (CTAA). The methodology assumes that 15% of the population 65 and over as well as the population living in poverty have a need for transportation assistance and will need to make at least one one-way trip every nine days. This is equivalent to a person needing transportation assistance to make 41 trips per year, a very conservative estimate. Based on the most recent population data from the US Census for the census block groups surrounding the NH 10 corridor, SWRPC estimated that the equivalent demand for the study area would be approximately 4,700 trips needed per year. Keep in mind that this level of service is meant to accommodate people needing occasional rides to medical appointments, shopping, banking and other basic needs. It is not meant to accommodate people seeking transportation to employment. Employment transportation is covered later in the Economic Development section of this report.

As noted earlier, transit is currently not available on the NH 10 corridor. Volunteer driver programs, however, such as the Community Volunteer Transportation Company (CVTC), do offer services to people needing rides. Rides typically require the rider to notice CVTC of their need for a ride at least 5 days in advance and ride availability is contingent on the availability of volunteer drivers. While this can be helpful for occasional riders, a more substantial transit service that doesn't require such a large notice would improve convenience for more non-drivers.

Zoning and Land Use

Earlier in the report, it was noted that there are two zones that extend along most of the NH 10 Corridor: the Commercial/Industrial Zone and the Business Zone. In Swanzey's Zoning Ordinance, the Commercial/Industrial Zone's stated intent is "to minimize strip development and encourage off road development on portions of Route 10." The Business Zone's purpose is to "provide for the development of commercial uses that are oriented to the traveling public or are traffic generators of such size as to be more properly located on a highly accessible highway network." Both of the zones' stated purposes are noteworthy in that they imply the need to balance maintaining highway mobility with land use development. This is an excellent framework for managing the corridor into the future.

One way for the Town of Swanzey to work with the state to balance mobility with land use access is through access management. Access management describes the systematic control of the location, spacing, design and operations of all access points to a roadway including driveways,

medians, and intersections. Driveways, in particular are a domain in which NHDOT and Swanzey share responsibility on NH 10, though medians and intersections can be addressed by the coordination efforts between the State and town to mitigate major traffic impacts. NHDOT regulates driveway permits for new curb cuts or changes of land use along the highway, and Swanzey can influence access management through its site plan and subdivision review processes. For the *Swanzey NH 10 Corridor Study*, SWRPC evaluated current driveway configurations in light of existing state permitting requirements and learned that there were 2 parcels that have smaller road frontage than what is currently required by NHDOT, 13 parcels that fall under NHDOT's corner clearance requirements and 9 parcels with driveways wider than what is allowed by NHDOT. Furthermore, SWRPC found 8 suspected parcels that may be nonconforming with NHDOT's rule about not allowing miscellaneous objects in the highway right-of-way and 3 parcels that may be nonconforming with NHDOT's rule disallowing parking, loading, vending or servicing in the highway right-of-way. These findings could be used to inform future driveway permitting along the corridor and rectify unsafe curb cuts or improve the design of those curb cuts.

Go to Appendix 7 to review the full access management analysis conducted for the Swanzey NH 10 Corridor Study.

Noted above is Swanzey's strategy in the Commercial/ Industrial Zone to encourage feeder roads off of NH 10 to minimize strip development and encourage off road development. According to the Swanzey Department of Planning and Economic Development, there is only one known example of this occurring since the provision was introduced to the zone, specifically the development of Whittemore Farm Road which today provides access to a number of businesses including The Cheshire Horse, Cheshire Builders, and First Student, Inc. among others. Whittemore Farm Road is a good example of this type of development, but why aren't there other examples? One of the primary reasons is probably due to the fact that most of the zone is made up of conservation land or well protected forest like the Yale-Toumey Forest. In Figure 12, below, the Commercial/ Industrial Zone is mostly in the northern part of the corridor shown on the left panel of the map. Although this land is not

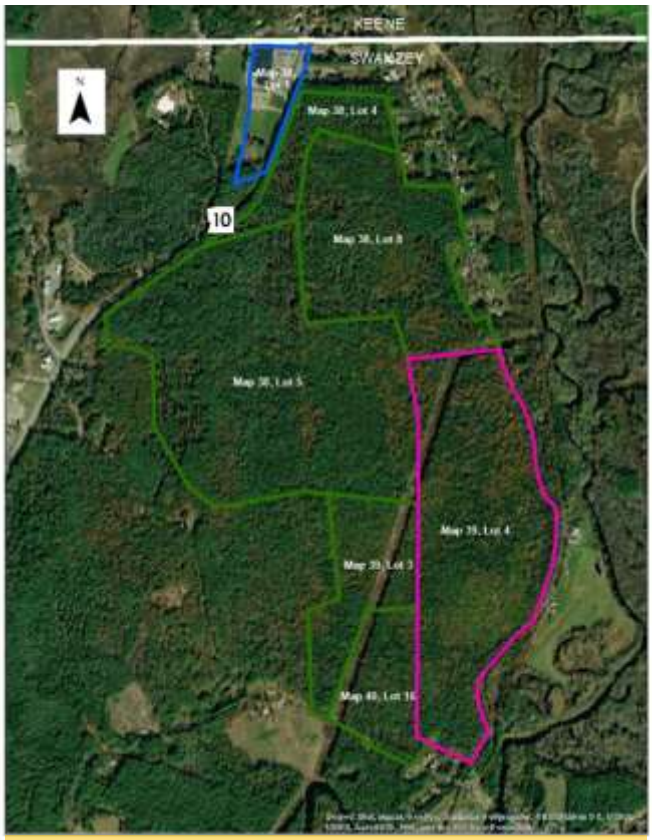


Whittemore Farm Road is a successful example of the Swanzey Planning Board's strategy to encourage commercial and industrial growth while preserving safety and mobility on NH 10. The road serves a number of businesses through one access point and successfully attracted several businesses. Photo Credit: Google Maps

encumbered with conservation easements, it is likely to remain a working and learning forest for years to come and therefore, off-limits to commercial and industrial uses.

A potential opportunity for opening up more land to commercial/industrial uses while retaining the important conservation land for Yale-Toumey Forest is to examine opportunities to conduct a land exchange with town owned land that can be used by the forest. Land appropriate for forestry off the corridor and contiguous with current conservation land could potentially be "swapped" for land along the corridor where commercial and industrial land is desired. For instance, the Town of Swanzey owns approximately 140 acres adjacent to Yale-Toumey Forest with its holding of tax map 39, parcel 4. To the west side of the Swanzey owned land all of the land is held by Yale-Toumey Forest and one of the parcels, tax map 38, lot 5, approximately 177 acres, has approximately one quarter mile of frontage on NH 10. The parcel's assessed taxable value was only $129,544 in 2020. The assessed taxable value for the 16.4 acre Market Basket property, just north of the site, was more than $7 million.[22]

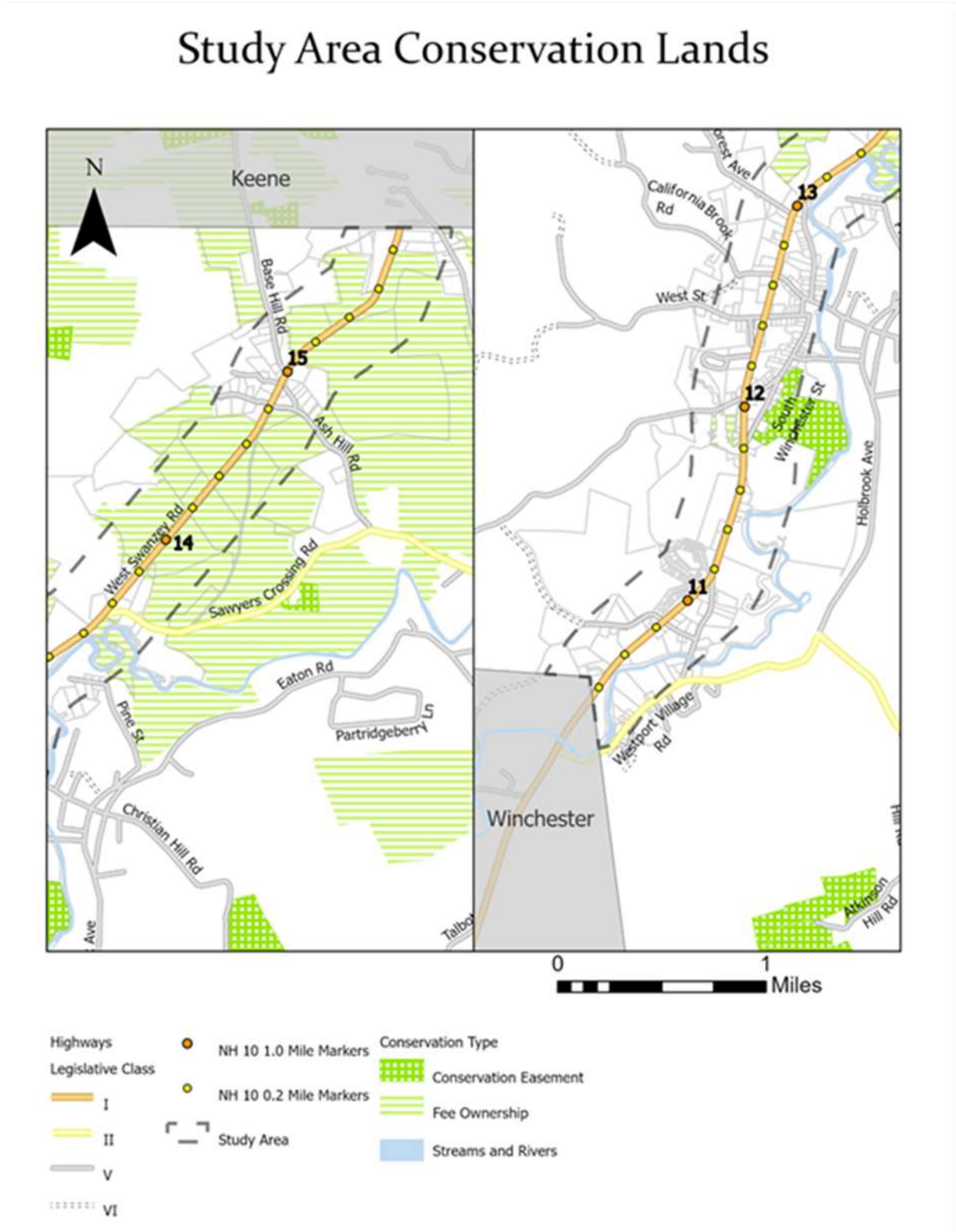
Figure 12: Land Ownership on the Northern End of NH 10



Yale-Toumey Forest owns a number of parcels adjacent to NH 10 (in green). One way for the Town of Swanzey to facilitate more commercial/industrial development on the northern part of the corridor is to consider a land swap. A parcel owned by the Town of Swanzey (in pink) lies adjacent to the Yale Toumey Forest. The cost valuation of land owned now occupied by the Market Basket plaza (in blue) cost valuation rose over 6,000% when the property was developed in 2010.

At the time of writing, the Town of Swanzey Planning Board is evaluating its zoning framework and whether it is meeting the Town's goals. Earlier in the report, SWRPC observed that the Town has a strong interest in attracting economic development to the corridor as evidenced by the land uses that it permits in its various zones along the corridor.[23] Despite the emphasis on commercial and industrial development uses, SWRPC observed that the majority of existing parcels consist of housing. Although most housing along the corridor is not dense, average housing parcel sizes are relatively small on the corridor when compared to average commercial parcel sizes, 1.27 acres to 5.01 acres. To facilitate growth and change on the corridor, it may be challenging to allow for commercial and industrial development after "low hanging fruit" larger parcels are developed. Additional development may require the assembly of several smaller parcels. The expansion of existing public water and sewer on much of the corridor in parts of West Swanzey and the northern part of the corridor may be one way in which the Town can be assistive in creating an incentive for combining parcels as well as allowing for greater density along the corridor to accommodate the growth that it desires. The water system in the village of West Swanzey is owned and managed by the private West Swanzey Water Company. Water infrastructure that extends from the Keene City line to Market Basket is a public water line.

Figure 13: Conservation Land Along the NH 10 Corridor in Swanzey



Source: Southwest Region Planning Commission

If increased density is a strategy that Swanzey wants to embrace to accommodate growth in West Swanzey, much of the existing development pattern in the area provides a template for that density. However, SWRPC noted that current zoning dimensional requirements other than the Village Commercial Districts do not align with existing land use patterns. In West Swanzey the majority of parcels are zoned either Residential or Commercial/Industrial, and both of those zones require a minimum lot size of 1 acre. However, an analysis of parcel sizes in West Swanzey identified at least 73 parcels of just over 100 that are under 1 acre in size. In addition, 31 parcels were under half an acre. This indicates that there is an existing pattern of development in West Swanzey Village that is not allowable under current zoning regulations.

Go to Appendix 8 to review the full results of the Swanzey NH 10 Corridor Study Visual Preference Survey.

However, some existing zoning guidance may be preferred by the majority of the population. In the visual preference survey that was conducted by SWRPC for this study, three zoning related questions were asked relating to setbacks, parking orientation, density, and connectivity. Overall, 53% of respondents indicated that an intervention to reduce setbacks was either "Worse" or "Much Worse" than existing conditions. The alternative setback showed a street view of Woodstock, VT where seating is approximately 10-15 feet close to the highway and there is on-street parking. In another question 42% of respondents indicated that they prefer parking in front of commercial locations rather than to the side or behind a building. Only 29% percent thought the arrangement would be better and 28% percent stated that they had no preference. Another zoning change proposed the increased use of shared driveways, multistory buildings and increased connectivity as an alternative to current strip development (Figure 14). The reference image used was the Mad River Taste Place and surrounding neighborhood in Waitsfield, VT. Overall, respondents had mixed reactions to the commercial density intervention with 48% viewing the intervention favorably while 34% were opposed to the intervention. West Swanzey residents responded similarly, with slightly higher support than opposition.

Figure 14: Images Used for Swanzey NH 10 Corridor Study Visual Preference Survey





Source: Google Maps

The question about density will continue to be a balancing act for the Town of Swanzey where a majority of the public have identified the goal of keeping the Town's rural character, but also want community vibrancy and economic growth. While the Master Plan Sub-Committee agreed to uphold the rural character sentiment in their 2003 Master Plan, the authors included a caveat:

> "Swanzey is a town of many parts. The overall impression of these 45 square miles may be "rural," but included herein are the "village business districts" of West Swanzey and North Swanzey. The Master Plan Sub-Committee does not seek to turn the clock back on these densely-settled, and relatively industrialized, districts to uphold an arbitrary definition. Rather, we feel it reasonable to capitalize on the municipal infrastructure already in place to "channel" future high-density residential and commercial projects to those neighborhoods."[24]

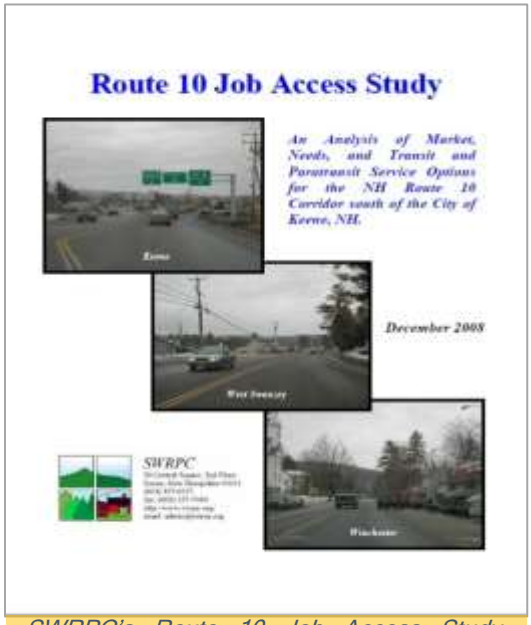
Economic Development

Between 2010 and 2018, the number of jobs along the NH 10 Corridor increased by 267 jobs or 114%. The vast majority of these new jobs (213) were in the retail sector. This likely reflects the development of Market Basket within the northern section of the Study Area and to a lesser degree the Dollar General in the southern section of the Study Area since 2010. During the same time, the corridor added 56 other services (excluding public administration) jobs, 23 manufacturing jobs, 13 wholesale trade jobs, 16 transportation and warehousing jobs, and there were small gains in other sectors as well. Industries with losses in jobs included construction (-3), real estate, rental and leasing (-4), educational services (-45), accommodation and food services (-11) and public administration (-7). Overall, the share of low wage jobs ($1,250 per month or less) increased by more than 15% and the share of high wage jobs (more than $3,333 per month) decreased by about 7%. The increase in low wage jobs is probably associated with the large increase in retail jobs.

Go to Appendix 6 to review the full results of the Swanzey NH 10 Corridor Study Demographic, Economic Activity and Housing Analysis



Market Basket, a retail supermarket, is one of the largest new employers to locate on NH 10 in Swanzev in the last decade.



SWRPC's Route 10 Job Access Study, published in 2008, verified interest in transit from a number of households living on the corridor.

One of the big takeaways from the economic development data discussed earlier in the report was that it showed that 42% of the workers employed one quarter mile from NH 10 lives in Keene, Swanzey and Winchester. This statistic alongside other findings suggests that there may be synergies for developing transit service along the corridor. For instance, if low wage jobs continue to grow along the corridor there may be a benefit to developing more affordable transportation options for those workers such as public transit. Moreover, existing and prospective employers along the corridor may be attracted to alternative transportation offerings to help with worker retention and absenteeism. Another consideration is that most of the residents living on the corridor work in Keene (40%), and that there are large numbers of Winchester residents commuting to Keene as well (25% of Winchester residents and 26% from downtown Winchester residents).[25] This dynamic suggests that there may be demand for transit going both ways on the NH 10 corridor from Winchester to Keene. Indeed, this was a finding from a SWRPC transit feasibility study conducted in 2008, called the *Route 10 Job Access Study*. That study included surveys of residents living along NH 10, including residents living in Swanzey Township Housing (Southwestern Community Services), Pine Grove Mobile Home Park, and Keene Housing developments', Riverbend Apartments and Evergreen Knoll Apartments. Among the findings from the study's surveys is that 50% of workers reported that they would likely use public transit.

Housing

According to its 2003 Master Plan, "it is Swanzey's goal to provide for a full range of safe and adequate housing to meet the needs of all Swanzey residents of all ages and income levels, and to contribute our 'fair share' to regional needs."[26] In the previous section of the report, SWRPC determined that there were 644 units of housing along the quarter mile buffer area on either side of NH 10. The mixture of housing available is more diverse than many other places in Cheshire County. While most housing units are single-family homes (371), there are a number of units that fall into the category of duplex, triplex and multi-family housing (273). Some units were built for low income working families including housing units located in Swanzey Township Housing, Riverbend Apartments, Evergreen Knoll Apartments and some of the units in Winchester Woods Apartments. In this respect, there does appear to be a good mixture of housing available to people of different income levels. One caveat is that although there appears to be a sizeable senior population living on the corridor, SWRPC is unaware of any senior housing developments available on the corridor. Given what is known anecdotally about the target populations for the low income housing listed above, it is anticipated that most seniors living near the corridor are residing in single family homes including manufactured homes.

Despite the mixture of housing types, there does appear to be very low vacancy rates in the area. In 2019, Swanzey had an estimated 6.5% vacancy rate for all housing units, however Swanzey also had an estimated 0% vacancy rate for rental units in the Town. While this number is an estimate, and is a town-wide figure, it indicates that there is a severely low vacancy rate in the Town for rental housing. By comparison, the estimated rental vacancy rate in the State of New Hampshire is 3.9%, and 3.4% in Cheshire County. For owner occupied units in Swanzey, there is a 1.8% vacancy rate, which is on par with Cheshire County and the State of New Hampshire, though still quite low. The low vacancy rate may provide part of the explanation for one of this study's economic development findings, which found that 30% of the people working along the corridor have a round trip commute of 50 or more miles.

Relative to this vacancy issue, is the previously mentioned finding that new housing development tends to have more hurdles among the zones bordering the NH 10 Corridor and a question as to whether existing contributes to slow growth in housing, particularly multifamily developments. The Commercial/Industrial zone does not allow any form of housing by right or special exception, the Business zone only allows housing by special exception and multifamily dwellings are only allowed by right in the Village Business District II (multifamily housing is allowed by special exception in the Residence, Business and Village Business I districts.

Table 7: Housing Permitted in Zoning Districts Along NH 10 Corridor in Swanzey

District	One Family Dwelling	Manufactured Home	Two Family Dwelling	Multifamily Dwelling
Rural/Agricultural	By Right	By Right	By Special Exception	Not Permitted
Residence	By Right	By Right	By Special Exception	By Special Exception
Business	By Special Exception	By Special Exception	By Special Exception	By Special Exception
Village Business 1	By Right	By Right	By Special Exception	By Special Exception
Village Business 2	Not Permitted	Not Permitted	Not Permitted	By Right
Commercial/Industrial	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Source: Town of Swanzey Zoning Ordinance, 2021

Recommendations

Reflecting on the findings of the NH 10 Corridor Study, the Swanzey NH 10 Corridor Study Working Group developed four broad goals that it believes can help the Town and its partners improve the NH 10 corridor by addressing challenges and taking advantage of opportunities. The goals are:

A. Improve highway safety;
B. Improve highway and land use coordination;
C. Make improvements that will foster sustained economic vitality; and
D. Improve pedestrian and bicyclist access particularly in higher density areas of the corridor.

An assortment of capital project and action recommendations were developed to follow through on these goals in the following table. These represent higher priority projects and actions that the Working Group believes merit consideration. Projects and actions are categorized as short term (1-3 years), medium term (4-10 years) and long term (10 or more years). In addition, the table includes lead parties that the Working Group believes would ensure project or action success, as well as potential funding sources to conduct the work. Many of the recommendations revolve

around making two areas of the NH 10 corridor, the northern section of corridor near Keene and West Swanzey into areas of activity (nodes) where there would be a greater sense of place, and where vehicle traffic would slow down and not bifurcate the highway as it does in other parts of the corridor. Between those nodes of activity, vehicles would have a more traditional rural highway driving experience.

A. Improve highway safety			
1. Capital Projects			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*
a. Build raised median at Citgo Station near Base Hill Road. Consider rumble strips in short term	NHDOT/ Town of Swanzey	Long Term	NHDOT Ten Year Plan/ NHDOT Betterment Program
b. Adjust skewed angle for westbound Sawyer's Crossing Rd vehicles turning left (southbound) on NH 10	NHDOT/ Town of Swanzey	Long Term	NHDOT Ten Year Plan/ NHDOT Betterment Program
c. Consider 11 foot lanes throughout corridor to decrease corridor speeding	NHDOT/ Town of Swanzey	Short Term	NHDOT Resurfacing Program
d. Consider installation of vegetative median and left turn pockets in place of two-way left-turn lane in West Swanzey	NHDOT/ Town of Swanzey	Long Term	NHDOT Ten Year Plan
2. Actions			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*
a. Address brush clearing sight distance issue at southeast quadrant of California Street and NH 10	NHDOT/ Town of Swanzey	Short Term	Town of Swanzey Department of Public Works Budget
b. Develop plan for consistent speed enforcement including consideration of speed feedback signs	Town of Swanzey Police Department	Medium Term	Town of Swanzey Police Department Budget/ National Highway Traffic Safety Administration grants
c. Consider opportunities to make land use development changes (e.g., shorter setbacks, density changes, changes to architectural standards) to provide a visual cue for motorists that they are entering a shopping/activity area	Town of Swanzey Planning Board	Short Term	Town of Swanzey Planning and Economic Development Budget
B. Improve highway and land use coordination			
1. Capital Projects			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*

a. Construct gateway signage on NH 10 on northbound and southbound approaches to West Swanzey providing a visual cue to motorists that they are entering a shopping/activity area	NHDOT/ Town of Swanzey	Medium Term	Town of Swanzey/ Civic Club or Business Donations
b. Consider development of volunteer landscaping program for West Swanzey area signaling that motorist are entering a shopping/activity area	Town of Swanzey	Medium Term	Civic Club or Business Donations
c. Schedule any sewer or water upgrades with planned highway improvements	Town of Swanzey/Sewer Commission	Short Term	Private Development/ Water and Sewer District Budgets
2. Actions			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*
a. Draft and execute a memorandum of understanding between NHDOT and Town of Swanzey formalizing the driveway review process between the two entities	NHDOT/ Town of Swanzey	Short Term	NHDOT District IV Budget/ Town of Swanzey Planning and Economic Development Budget
b. Create a database or reference document of parcels along NH 10 that can be flagged and addressed for future change of use driveway permits, site plan and/or subdivision reviews	NHDOT/ Town of Swanzey	Short Term	NHDOT District IV Budget/ Town of Swanzey Planning and Economic Development Budget
c. Consider nodal development (place creation) strategy for corridor, potentially for West Swanzey area and northern portion of corridor, that plans for density of uses, pedestrian and bicycle trips, and transit stops	Town of Swanzey	Medium Term	Town of Swanzey Planning and Economic Development Budget
d. Reassess incentives and disincentives for Commercial/Industrial district feeder roads and implement changes as necessary	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget
e. Explore potential for land swap in Commercial/Industrial district that preserves conservation land, but opens up land along corridor for feeder roads and development	Town of Swanzey	Medium Term	Town of Swanzey Planning and Economic Development Budget
C. Make improvements that foster economic vitality and sustainability			
1. Capital Projects			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*

a. Seek grant funding to build "middle mile" sewer and water infrastructure development for West Swanzey and northern part of corridor	Town of Swanzey/Sewer Commission	Medium Term	Northern Border Regional Commission, USDA, EDA, NHDOT Ten Year Transportation Plan
b. Construct gateway signage for West Swanzey area alerting motorists about local businesses and amenities	Town of Swanzey	Short Term	Civic Club or Business Donations
2. Actions			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*
a. Conduct feasibility study with Winchester and Keene on NH 10 based transit service	Town of Swanzey/ SWPRC	Short Term	Federal Transit Administration 5305e planning grant
b. Develop water and sewer build out plan and policy framework for West Swanzey area and northern part of corridor; Conduct feasibility study of acquisition of West Swanzey Water Company	Town of Swanzey/Sewer Commission	Medium Term	Town of Swanzey Planning and Economic Development Budget
c. Create and implement landscaping requirements for land uses along NH 10 in West Swanzey area and northern part of corridor	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget
d. Create and implement restrictions on % of impermeable surface allowances for new development in West Swanzey in vicinity of aquifer	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget
e. Reassess diversity of land uses allowed along Business and Commercial/Industrial zones including allowances for housing	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget
f. Consider opportunities to create connectivity and synergies between neighboring land uses such as the creation of shared driveways, sidewalk connectivity in site plans and subdivision proposals, and the promotion of a diversified mix of land uses for the West Swanzey and northern part of the corridor	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget
g. Develop brand and marketing materials to advertise businesses and cultural institutions in West Swanzey	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development

			Budget/ Local Businesses
h. Identify important cultural, natural and commercial attractions along NH 10 that would benefit from wayfinding signage	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget/ Local Businesses
i. Consider reductions in dimensional requirements to allow for patterns of development that mirror historic development patterns in West Swanzey	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget
D. Improve pedestrian and bicyclist access particularly in higher density areas of the corridor			
1. Capital Projects			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*
a. Install sidewalks and consider bike lanes for NH 10 from Keene and Swanzey town line to Market Basket entrance; As part of project consider mid-block crosswalk installation at Winchester Wood Housing and Market Basket traffic light	NHDOT/ Town of Swanzey	Medium Term	NHDOT Ten Year Transportation Plan
b. Consider installation of crosswalks with potential pedestrian refuges and/or rectangular rapid flashing beacons at NH 10 intersections with California St, West Street, Cobble Hill Rd. and South Winchester St.; As part of project consider installation of sidewalks on west side of highway between California St. and South Winchester St., as well as sidewalk gap improvement on California St. approach to NH 10	NHDOT/ Town of Swanzey	Medium Term	Transportation Alternatives Program, Congestion Mitigation Air Quality Program, NHDOT Ten Year Transportation Plan
c. Widen highway and shoulders for bicycle accommodation on the northern part of the corridor from the Keene Town Line to approximately the Monadnock Humane Society.	NHDOT/ Town of Swanzey	Medium Term	NHDOT Ten Year Transportation Plan/ Betterment Program
d. Consider shifting road on NH 10 southbound approach to Base Hill Road by narrowing painted median and reintroducing shoulder next to right-turn lane.	NHDOT/ Town of Swanzey	Short Term	NHDOT Resurfacing Program
2. Actions			
Recommendation	*Lead Party*	*Time Frame*	*Potential Funding Sources for Implementation*

a. Evaluate connectivity and wayfinding to West Swanzey for pedestrians, bicyclists and others using Ashuelot Rail Trail and vice versa	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget/ SWRPC UPWP
b. Integrate walking and bicycling infrastructure requirements for new development or changes of use in the West Swanzey area and northern part of the corridor	Town of Swanzey	Short Term	Town of Swanzey Planning and Economic Development Budget/ SWRPC UPWP

Endnotes

[1] https://www.fhwa.dot.gov/planning%20/processes/statewide/related/highway_functional_classifications/section03.cfm#Toc336872984 accessed 5/28/2021.
[2] Tier 2 is the category just under Tier 1 highways which include interstate highways and other limited access highways. See https://nh.maps.arcgis.com/apps/webappviewer/index.html?id=1d83377ccf4d4236bb11f3de2b82eab5 for a map of Tier highways in New Hampshire. For NHDOT's Tier definitions see https://www.nh.gov/dot/org/commissioner/amps/documents/tier_definitions.pdf, both accessed 5/28/2021.
[3] See Appendix showing Access Management findings.
[4] U.S. Census Bureau, American Community Survey 5 Year Estimates, 2019, Table S0801. An additional 6% of Swanzey workers work at home, leaving only 4% of the working population using another mode of transportation such as walking or bicycling. This figure measures all Swanzey residents as opposed to Swanzey residents only using NH 10.
[5] See appendix with land use and zoning analysis.
[6] U.S. Census Bureau, American Community Survey 5 Year Estimates, 2019, Table S0801. This figure measures all working Swanzey residents as opposed to Swanzey residents only using NH 10.
[7] See https://www.arcgis.com/apps/webappviewer/index.html?id=6ce5a2afccc843ceb872cf8a4dd8a3ad
[8] This project extension was also recommended by the SWRPC Transportation Advisory Committee for the draft FY 2023-2032 Ten Year Transportation Improvement Plan. The Plan will be reviewed by the Governor and Legislature between December 2021 and June 2022.
[9] The official 2010 Census Block count for the study area was 2,038 people which is based on census blocks located within a quarter mile of NH 10. Please note that Census Blocks differ greatly in size and shape, and some larger rural blocks included in this Study Area population calculation include people living outside of the quarter mile radius from NH 10. At the time of writing the report, 2020 data was not yet available. The official 2019 ACS 5 Year Estimate count for census block groups 9709 1 and 4, which comprises western Swanzey and includes all of NH 10 was 2,582 people.
[10] US Census, Table S0101, 2019: ACS 5-Year Estimate Tables.
[11] US Census, Table B01001, 2019: ACS 5-Year Estimate Tables based on 77% of population in Census Block Groups 9709 1 and 4.
[12] "Travel Trends for Teens and Seniors," National Household Travel Survey Report, February 2019.
[13] US Census, Table C17002, 2019: ACS 5-Year Estimate Tables based on 77% of population in Census Block Groups 9709 1 and 4.
[14] US Census, Table S1901, ACS 2018 5-year estimates, Table S1901 for West Swanzey CDP.
[15] https://htaindex.cnt.org/map/ accessed on 6/16/21. Data is from census block groups 9709 1 and 4.
[16] US Census, Table S1810, 2019: ACS 5-Year Estimate Tables for Town of Swanzey (smaller geographic data is not available).
[17] Longitudinal Employer-Household Dynamics data, 2018.
[18] https://www.bls.gov/iag/tgs/iag81.htm accessed 6/16/21. The US Bureau of Labor Statistics defines it as establishments that are "…primarily engaged in activities, such as equipment and machinery repairing, promoting or administering religious activities, grantmaking, advocacy, and providing drycleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services."
[19] See https://www.nh.gov/dot/org/operations/traffic/documents/20-0529-updated-2009-2019-growth.xlsx
[20] See https://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt14.cfm
[21] Alta Planning and Design, *NHDOT Pedestrian & Bicycle Transportation Plan – DRAFT Summary of Level of Traffic Stress Analysis,* 2020.
[22] Town of Swanzey Assessing Department. Note that the parcel just north of 38-5, 38-4, is 28 acres and has almost a half mile of frontage on NH 10 directly across the street from the Market Basket. The property's assessed tax value was only $2,736 in 2020. A tradeoff of the land swap idea is less undeveloped land would be available in the area of North Swanzey. Yet the area is growing organically as Keene runs out of its own developable land and growth extends into Swanzey.

[23] The Commercial/Industrial and Business Zones are in line with the 2003 Swanzey Master Plan Update's Economic Development section which states that the Town wants to continue to raise the percentage of total valuation that is commercial/industrial. See 2003 Swanzey Master Plan, p. 24.
[24] 2003 Swanzey Master Plan, p. 5.
[25] Longitudinal Employer-Household Dynamics data, 2018.
[26] 2003 Swanzey Master Plan Update, p.6.

Appendix 1:

Swanzey NH 10 Corridor Study Working Group Meeting Materials

Southwest Region Planning Commission
37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Swanzey NH Route 10 Corridor Study Working Group

March 11, 2020
9:00 a.m.

Whitcomb Hall
17 Main Street
West Swanzey, NH

Agenda

I. Welcome and Introductions

II. Role and Responsibilities of Working Group

III. Overview of Swanzey NH Route 10 Corridor Study

IV. Feedback on First Quarter Scope Items

V. Other Matters

VI. Next Meeting

VII. Adjourn

Southwest Region Planning Commission
37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Agenda Item III

Date: March 11, 2020
To: Swanzey NH Route 10 Corridor Study Working Group
From: Staff

RE: Overview of Swanzey NH Route 10 Corridor Study

Background

SWRPC staff will present the scope of work and timeline for the Swanzey NH Route 10 Corridor Study. A copy of the draft scope of work is attached.

Working Group members are encouraged to review the attachment and ask any questions that they have regarding the Study.

Recommendation

For your information.

Swanzey NH Route 10 Corridor Study
Draft Scope of Work
February 20, 2020

Purpose

The purpose for conducting a study of the NH Route 10 Corridor (Corridor) in the Town of Swanzey is to develop findings and recommendations that will improve mobility, accessibility and safety for all users of the Corridor. The main thrust of the Study will be an examination of the Corridor as a transportation facility, but the Study will also examine the highway's relationship to surrounding land uses and economic activities. Therefore, the Study will also include recommendations on ways to align future efforts to improve the transportation facility with the Town of Swanzey's land use and economic development goals.

Study Area

The focus of the study area will be on NH Route 10 from the Swanzey/Keene border to the Swanzey/Winchester border – a distance of approximately 5.5 miles. In an effort to understand traffic circulation patterns, and adequately document land use and economic activities adjacent to the Corridor, the study area will consider major streets and trails intersecting NH Route 10 and adjacent land up to ¼ mile from the Corridor. The Study may also consider regional traffic generators outside of the ¼ mile area that may affect transportation activity on the Corridor.

Intent & Considerations

The intent of the Study is to examine a range of transportation modes including but not limited to driving (personal and commercial traffic), walking, biking, and taking a bus. Transportation users of all ages and abilities will be considered including vulnerable populations (such as those with disabilities, without access to a vehicle, lower income). Local and significant user groups from outside the Corridor area will be considered. Input from land owners and business owners adjacent to the Corridor will also be considered in the Study.

Public Involvement

The Study will include an ad hoc working group to provide feedback and guidance to SWRPC periodically throughout the Study. All meetings of the working group will be posted and open to the public. SWRPC will conduct a survey or a stakeholder interview effort as part of the Study. Assistance will be required from the Town of Swanzey if the survey is a targeted postal mail or e-mail survey or requires names and contact information for a stakeholder interview effort (see below in *Expectations from Town of Swanzey*). SWRPC is available to assist the Town of Swanzey in presenting the Study's findings and recommendations for up to two meetings (e.g. Select Board, Planning Board, or public meeting). Feedback from the public will be recorded and changes to the findings and recommendations will be considered before a final draft of the Study is published.

Scope of Work Components

Within available resources, the following research will be conducted by SWRPC for the Study.*

Summary of Studies, Plans and Policies

With assistance from the Town of Swanzey and the working group, SWRPC will inventory and summarize state, regional and local plans that may have a bearing on the future management and use of NH Route 10. In addition to summarizing the documents, the summary will highlight the relevance that each document has to future planning on the Corridor.

Evaluation of GIS Crash Data and Trends

SWRPC will examine available GIS crash data from the NH Department of Transportation (NHDOT) and Department of Safety. The analysis will examine historical crashes, with special attention to fatalities, injuries and high crash trends. The analysis will consider crash attribute information such as seasonal trends, time of day, weather, crash types, and other information.

Field Review and Analysis of Crash Reports

With assistance from the Town of Swanzey and the working group, SWRPC will conduct a field review of a limited number of areas (3 to 5) that have been identified as having safety issues. SWRPC will work with the Swanzey Police Department to examine crash reports associated with each area if reports are available. NHDOT District IV and Town of Swanzey staff will be invited to accompany SWRPC staff on field reviews of the identified areas.

Accessibility Scan

SWRPC will perform an evaluation of accessibility issues (how people reach goods, services and activities) on the NH Route 10 Corridor from the perspective of people driving, walking, biking or taking the bus. One element of the accessibility scan will focus on access management including an identification of on-road access management features (medians, double left hand turn lanes, etc.), a scan of access points that are conforming and non-conforming with the existing NHDOT and local driveway permitting regulations, and a scan of potential changes to access management on the Corridor based on available land use and planning information. The assessment will also examine vulnerable non-driver or potential non-driver populations and existing or potential demand for other transportation infrastructure that improves accessibility on the Corridor.

Traffic Data Collection

The traffic data collection effort will examine historic traffic conditions on the Corridor. In addition, new research will be conducted to address gaps in historical data including research that helps identify the mix of vehicle types using the Corridor, the speed of traffic, gaps between vehicles, and traffic volumes. Some of the feedback on unsafe areas and issues (see *Field Review and Analysis of Crash Reports* above) will drive some of the traffic data that is collected. Up to three turning movement counts can be included in the effort if there is a determination that the data is needed to analyze unsafe areas or issues. No bicycle or walking counts are budgeted for this effort. Ridesharing data recently conducted by SWRPC will be incorporated into the data collection effort.

Land Use and Economic Activity Analysis

SWRPC will conduct an analysis of land uses along the Corridor. This effort will include documentation of existing zoning, existing land uses and proposed future land uses on the Corridor. The analysis will

consider natural and regulatory constraints as it relates to future development opportunities on the Corridor and an identification of sections of the Corridor with growth potential. As part of this analysis, SWRPC will identify existing and future plans for water and sewer development along the Corridor. A summary of housing stock on the Corridor and potential housing growth opportunities will also be considered. The economic activity analysis will involve a demographic overview of people living on or near the Corridor as well as a general analysis of jobs along the Corridor, commuters using the Corridor, types of economic activity and how this relates to transportation demand along the Corridor.

Survey or Stakeholder Interviews

A survey or stakeholder interviews can be helpful in gathering information about stakeholders' perceptions of issues or gathering factual data where there are currently data gaps. At this time, SWRPC does not have a specific survey or stakeholder interview component for the study in mind, but has reserved a small budget to conduct either survey or stakeholder interviews. As the study progresses, SWRPC, the Town of Swanzey and the working group will consider where a survey or stakeholder interviews might be helpful for better understanding conditions along the Corridor. This activity is proposed to be placed towards the end of the study to help address potential data needs identified during the earlier phases of the study.

The analysis of each of the work plan components, will include findings and recommendations that will be compiled in a final report at the conclusion of the study.

Work Plan/Milestones/Timeline

This study is expected to last 18 months. Five meetings with the working group are planned. As mentioned previously, two public meetings to present the final draft are also planned. Below is a description of the timeline in narrative form. A visual depicting the project schedule is attached to this scope of work as well.

- Quarter 1: January - March 2020:
  - Recruit and finalize working group membership
  - Conduct 1st ad hoc advisory committee meeting introducing scope of work and further developing list and *Summary of Studies, Plans and Policies* that should be consulted for the study
  - Complete *Summary of Studies, Plans and Policies*
  - Conduct *Evaluation of GIS Crash Data and Trends*
  - Begin *Accessibility Scan*
- Quarter 2: April - June 2020:
  - Conduct 2nd working group meeting presenting on the on the *Evaluation of GIS Crash Data and Trends* and soliciting feedback to prioritize locations for the *Field Review of Crash Reports*
  - Begin *Traffic Data Collection*
  - Begin *Land Use and Economic Activity Analysis*
  - Finalize *Accessibility Scan*
- Quarter 3: July - September 2020:
  - Conduct 3rd working group meeting presenting findings from *Field Review and Analysis of Crash Reports* and *Accessibility Scan*

- Finalize *Traffic Data Collection*
- Continue *Land Use and Economic Activity Analysis*

- Quarter 4: October - December 2020:
  - Conduct 4th working group meeting presenting findings from *Traffic Data Collection* and if warranted receive feedback to finalize plan for *Survey or Stakeholder Interviews*
  - Finalize *Land Use and Economic Activity Analysis*
  - If warranted, begin *Survey or Stakeholder Interviews*
- Quarter 5: January - March 2021
  - If warranted complete *Survey or Stakeholder Interviews*
  - Conduct 5th working group meeting presenting findings from *Land Use and Economic Activity Analysis*, *Survey or Stakeholder Interviews* and presentation of draft findings and recommendations
  - Complete draft study with staff findings and recommendations and invite working group review
- Quarter 6: April - June 2021
  - Finalize study based on working group feedback
  - Present study including findings and recommendations at up to two meetings

Final Report

SWRPC will compile a final report with an emphasis on the findings and recommendations of the Study and submit a paper and electronic copy to the Town of Swanzey.

* SWRPC's technical assistance in conducting this Study is supported by its contract with NHDOT in providing on-going transportation planning services. Accordingly, SWRPC's ability to provide services is contingent on funding available through this contract and the efficient completion of various components of this proposed work scope. In the event SWRPC's ability to deliver any or all services completed in this work scope needs to be reconsidered and/or modified, SWRPC will discuss this with town officials.

SWRPC is under no obligation to complete the entire scope of work outlined herein without sufficient resources to off-set the cost of staff time required to do so.

Tasks	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Quarter 5			Quarter 6		
	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
Recruit and finalize ad hoc advisory committee																		
Conduct 1st ad hoc advisory committee meeting		1																
Summary of Studies, Plans and Policies																		
Evaluation of GIS Crash Data and Trends																		
Accessibility Scan																		
Conduct 2nd ad hoc advisory committee meeting				2														
Field Review and Deep Dive of Crash Reports																		
Conduct 3rd ad hoc advisory committee meeting								3										
Traffic Data Collection																		
Land Use and Economic Activity Analysis																		
Survey or Stakeholder Interviews																		
Conduct 4th ad hoc advisory committee meeting											4							
Development of draft findings and recommendations																		
Conduct 5th ad hoc advisory committee meeting															5			
Finish draft study with staff findings and recommendations																		
Finalize study based on ad hoc committee feedback																		
Present study in two meetings																	6 7	

Legend

- J. B.
- Henry & J. B.
- James & J. B.
- Henry, Interns & J. B.
- Henry, James & J. B.
- # Meetings

Southwest Region Planning Commission
37 Ashuelot Street Keene, NH 03431 603-357-0557 Fax 357-7440

Swanzey NH Route 10 Corridor Study Working Group

June 4, 2020
8:30 a.m.

Zoom Meeting Link:
https://bit.ly/2zwNWlP
Call-in Number: 1 646-558-8656

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Agenda

I. Welcome and Introductions

II. Overview & Findings from Summary of Policies, Plans and Studies

III. Overview & Findings from GIS Crash Analysis

IV. Feedback on Prioritization of In-Depth Review of Crash Locations

V. Other Matters

VI. Next Meeting

VII. Adjourn

Southwest Region Planning Commission
37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Southwest Region Planning Commission

Swanzey NH Route 10 Corridor Study Working Group

Meeting Summary

March 11, 2020

Members Present: Matthew Bachler, *Planning and Economic Development* Director; Michael Branley, *Town Administrator;* Mike Gomarlo, *Economic Development Advisory Committee;* John Kallfelz, *NHDOT District 4*; Eric Mattson, *Fire Department*; Scott Self, *Planning Board, Sewer Commission;* Glenn Smith, *Public Works Director.*

Staff members present: J. B. Mack, *Principal Planner;* Henry Underwood, *GIS Specialist/Planner.*

I. Welcome and Introductions

J. B. Mack called the meeting to order at approximately 9:05 a.m., welcomed those in attendance, and introductions were made. Attendees commented on various concerns and interests that they have with the Swanzey NH Route 10 Corridor:

- John Kallfelz said he is familiar with the Town's concern about the speed of traffic and advised attendees that lane configurations were adjusted and speed limit postings reduced near Gomarlo's Market (north of Cobble Hill Road) several years back. No specific complaints have come to the District 4 office or have been brought up by staff since then.
- Scott Self commented that over the years the zoning along Route 10 was adjusted by the Planning Board and the Town to attract business and a recent concern is the availability of water and sewer connections to support that development.
- Eric Mattson said emergency service calls were frequent along the Corridor but there were no obvious trends.
- Mike Gomarlo mentioned some concerns were water, sewer and driveway access. He mentioned a 1971 State law regarding curbcut access and did not feel the law was fair. He added that there seemed to be stormwater runoff problems in the area between Nick's Restaurant and West Street, filling up fields and wooded areas near a condominium development. He also referred to a specific drainage ditch near Mr. P's that was filled, resulting in more drainage issues to the south. He said he would like to see these issues addressed by the project.
- Matthew Bachler mentioned safety concerns at Base Hill Road, Sawyers Crossing Road and South Winchester Street intersections. The section of Route 10 between North Winchester Street and South Winchester Street is a particular concern. He said it is more developed, hosts a school and a significant number of people walking. He would like to see the roadway more pedestrian-friendly and oriented to the community and feels there would be economic benefits to the Town by reducing vehicle speeds. He mentioned water distribution as a particular constraint.

- Michael Branley commented he was encouraged that the project will be able to take a comprehensive look at the Corridor as previous efforts have had a narrow focus.
- Glenn Smith agreed with others and said safety is a particular concern.

II. Role and Responsibilities of Working Group

J. B. Mack reviewed the scope and timeline of the study. He said the plan is for the Working Group to meet a total of five times over an 18-month period (through June of 2021) and each will be an hour to an hour and a half, plus time to review materials. Many of the meetings will be based on materials presented by SWRPC that require feedback and input. SWRPC also budgeted time to participate in two public meetings to present findings and recommendations. He encouraged attendees to talk with colleagues and their social networks about the study, their concerns, and their aspirations. All meetings are to be posted as public meetings and anyone who is interested may attend.

III. Overview of Swanzey NH Route 10 Corridor Study

J. B. Mack summarized the scope of work for the project and referenced a printed copy in the meeting packet. He said although it is a transportation-focused study, land use, economic development and water & sewer service will be considered. Although transit would not be a focus, he mentioned a previous study found there was a significant target population for such service in Winchester and West Swanzey. The study area will include Swanzey itself, but Keene and Winchester can be discussed. The study area is about 5.5 miles along Route 10 and will also consider land and road connections within a quarter of a mile off the highway.

He said components of the scope will include a summary of studies, plans and policies (such as the West Swanzey Charette, Master Plan, local policies, state policies, etc.). Crash data and safety trends will be analyzed and include a review of crash reports based on information from the Police Department relative to specific areas of concern. Matthew Bachler mentioned that three intersections were the subject of road safety audit applications and that data was readily available. J. B. Mack added that between three and five sites could be candidates for in-person field review. He described an accessibility scan component of the scope of work which would include a review of driveway regulations, conformance of existing curb cuts with regulations, and potential locations for future curb cuts. Attendees commented that the addition of a center turn lane has been beneficial but it could be extended south to Dollar General. J. B. Mack said the scan would also address walking and bicycling conditions in the area. He added that SWRPC will take a closer look at traffic data in the area through volume counts, turning movement studies, speed studies, and an analysis of gaps in traffic. Attendees commented that "car platooning" can be an issue during peak times. SWRPC will also analyze land uses along the Corridor based on assessing records. J. B. Mack said SWRPC will be reaching out to the West Swanzey Water Company and Sewer Commission for data about these assets. The project will also include a survey or interviews. J. B. Mack asked attendees to keep this idea in mind and that there is no specific plan right now. Matthew Bachler suggested the list of recommendations in the final report should ideally identify responsible parties.

IV. Feedback on First Quarter Scope Items

J. B. Mack provided a handout listing the plans, policies and studies currently identified for review and asked for feedback. Michael Branley asked if areas in need of fire suppression will be included. He said he could share a report from Southwest NH Mutual Aid. Matthew Bachler suggested the economic development chapter of the Master Plan will be updated during the 2020 calendar year and the Southwest New Hampshire Comprehensive Economic Development Strategy. He also noted that a Town-sponsored community survey was conducted last summer. Information and results from an upcoming focus group meeting that will be co-hosted by SWRPC may also be helpful. The Town's Emergency Operations Plan, Yale University, Monadnock Conservancy, and Natural Resources Inventory were suggested as other

resources. Scott Self provided additional background on the sewer system and said there were no specific long range plans. Recent state requirements have diminished the capacity of the plant to where it cannot be increased without remediating nitrogen and phosphorus.

Henry Underwood provided an overview of the proposed GIS crash data and trends exercise via a handout. He said the activity will occur primarily in the first quarter of this year and involved a review of a crash dataset published by New Hampshire Department of Safety and New Hampshire Department of Transportation. The database will allow SWRPC to examine weather conditions, contributing factors, severity, and type. An analysis can tell us about what safety issues should be considered for recommendations. He summarized findings by the State about areas with poor safety performance compared to similar intersections or sections of road around the State (using a 2002-2011 dataset). A newer data source would be analyzed and mapped as part of the project. John Kallfelz pointed out that the mile markers presented in the safety results do not correspond to the mile markers installed along the road. Henry Underwood said he would confirm the mile markers. Attendees reviewed a "heat map" of crashes. John Kallfelz added that the best resource would be from the Town – to avoid the delays. Attendees asked if car crashes with people biking and walking could be highlighted. Henry Underwood suggested a safety-related question on a community survey could help with gaps in data.

J. B. Mack also described an Accessibility Scan, including a review of curb cuts (distance between access point, distance between access points and intersections, etc.).

V. Other Matters

No other matters were discussed.

VI. Next Meeting

J. B. Mack said he would initiate a poll for a meeting in mid- or late-May. Attendees commented that a morning time would work well.

V. Adjourn

The meeting adjourned at 10:05 a.m.

Respectfully submitted,

Henry Underwood
GIS Specialist/Planner

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Agenda Item II

Date: June 4, 2020
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Overview & Findings from Summary of Policies, Plans and Studies

Background

SWRPC staff will present information that summarizes relevant policies, plans and studies that are likely to inform future plans for the NH Route 10 Corridor. A copy of the Summary of Policies, Plans and Studies is attached.

During the June 4th meeting, SWRPC staff will review results of its research and discuss major findings. Working Group members are encouraged to read the document prior to the meeting and ask any questions that they have regarding the Summary.

Recommendation

For your information.

Summary of Policies, Plans and Studies

SWRPC Staff, with input from the Swanzey NH 10 Advisory Group, compiled and reviewed a wide variety of documents and policies relevant to the NH 10 corridor. Such materials include the Swanzey Master Plan, Southwest Connects: Southwest Region Transportation Plan, Cutler Elementary Safe Rotes to School Action Plan, Route 10 Job Access Reverse Commute Study, NHDOT's Long Range Transportation Plan, and municipal master plans for neighboring communities. The documents are organized in the table below based on their geographic scope; namely whether they are specific to the Town of Swanzey, other communities in the corridor, the Southwest New Hampshire region, or the State of New Hampshire. A brief list of major findings, as well as more comprehensive summary of each document as it relates to NH 10, can be found below.

Findings

- Both Swanzey and its neighboring communities of Keene and Winchester recognize the importance of NH 10 as a corridor to support current and future development. In particular, all three communities recommend future commercial and industrial development to be promoted along the Corridor.
- The Ashuelot Rail Trail provides an opportunity to serve as a parallel pedestrian and bicycle facility to NH 10. In particular, the rail trail provides an important connection for bicycles and pedestrians between Keene and West Swanzey Village that runs parallel to NH 10, as well as connections farther south to Winchester and Hinsdale.
- West Swanzey Village has redevelopment potential that is encouraged both by the Town through an economic revitalization zone, in the Town's master plan, and through the results of the West Swanzey Village charette hosted by Plan NH. West Swanzey also represents a significant node of population density, and a concentration of low-income population along the Corridor.
- Because of the cost of transportation, the disproportionate number of low-income residents and ongoing predictable trip patterns between Keene, Swanzey and Winchester, NH 10 may be well suited for transportation modes beyond the personal motor vehicle. Such transportation would need to be a result of coordination between Swanzey and its surrounding towns. Residents have also indicated that a lack of transportation options is a significant issue in Swanzey.
- Swanzey has indicated a strong desire for its transportation system to accommodate all transportation users, including bicyclists and pedestrians. NH 10 currently acts as a crossing barrier and there are safety issues for pedestrians and bicyclists, particularly in the West Swanzey Village area.
- The Corridor plays an important role in hazard mitigation as a primary evacuation route and a concentration of services and resources which would be needed in the event of a disaster. Populations along NH 10 south of West Swanzey Village are identified as being at risk of isolation in the case of a disaster.
- While the southern half of the NH 10 corridor within Swanzey overlies an important stratified drift aquifer which provides ample groundwater, the area north of West Swanzey Village possesses limited groundwater resources and water and wastewater infrastructure. This limits the development potential of the northern half of the NH 10 corridor.
- Collaboration between NHDOT and the Town of Swanzey is key for the NH 10 corridor to reflect the needs and wants of the Town. While NHDOT has established policies for corridor management,

the Town of Swanzey through its complete streets policies and other studies has demonstrated that it has a distinct vision for the Corridor that may not be captured in current NHDOT policy.

Title and Date	Description
Swanzey-Specific Documents	
Swanzey Master Plan, 2003 Update, Transportation, Economic Development & Land Use Chapter. Pgs 71 -84, 24-25	Swanzey's Master Plan, developed and adopted in 2003, is the current guiding document for land use and development along NH 10 until the 2020 update is completed. The plan also contains a transportation chapter, which has an overall goal for the Town's transportation system to "provide for a safe, efficient and diversified transportation system that is sensitive to the Town's rural character". In the plan, NH 10 is classified as an arterial road that is maintained by the State and listed to be in good to fair condition. The primary goal for NH 10 in the plan is to address safety and congestion issues at the NH 10/Base Hill Road intersection, as well as continued conversations with City Express to coordinate transit development. In the land use chapter of the plan, higher density development in West Swanzey Village is recommended along with commercial and retail development along NH 10. The economic development chapter of the plan calls primarily for increasing industrial and commercial development. While the chapter makes no direct mention of NH 10, the corridor represents a major concentration of both industrial and commercial development in Swanzey.
Town of Swanzey Zoning Map, 2018	The majority of NH 10 through Swanzey is zoned "business district" and "commercial/industrial district", with a small path of "residence district" south of West Swanzey Village. This is in line with the current industrial and commercial development in place along NH 10. Residential development is allowed in the "business district", which is primarily south of Forest Ave west of NH 10 and south of Sawyers Crossing Road east of NH 10. The zoning map is most current as of March 13, 2018.
Swanzey Complete Streets Policy, 2015	Adopted in 2015 by the Town of Swanzey, the complete streets policy is an ordinance that calls for the "Town, through this policy, to ensure that the safety of all users – including motorists, pedestrians of all ages and abilities, bicyclists, emergency responders, freight providers, and users of public transit – is considered in all municipally managed transportation projects and project phases". The policy was developed and passed in conjunction with planning and design guidelines for complete streets in the context of Swanzey's street network and serves as a guiding document for the Town in developing their transportation system in future projects. While NH 10 is a state-owned road, the policy states that "the Town… will encourage partners such as the NHDOT to develop and implement complete streets elements… when working on projects or programs in the Town".
Swanzey Complete Streets Planning & Design Guidelines, 2015	A document adopted in conjunction with the complete streets policy passed the same year, the *Swanzey Complete Streets Planning & Design Guidelines* serve to provide guidance for the implementation of the Town's complete streets policy. The guidelines provide example right-of-way configurations for numerous typologies of streets. Street typologies include collector streets, compact neighborhood streets, and

	residential streets.[1] Collector streets have the highest traffic volume and are recommended to have separate and wide pedestrian and bicycle space, as well as more developed lighting, curbs and other infrastructure. Compact neighborhood streets are recommended to have narrower vehicle lanes, paved shoulders, green buffer, and an unobstructed pedestrian pathway. Residential streets are recommended to have narrow travel lanes, a paved shoulder and sidewalks on at least one side of the street. Rural streets and state routes are also mentioned in the guidelines but are not subject to the complete streets policy. The guidelines also serve to educate municipal officials and the general public on the elements of a complete street. While NH 10 is managed by NHDOT, the guidelines make mention that the Town will encourage NHDOT to incorporate complete streets elements while working on projects within Swanzey.
Swanzey Hazard Mitigation Plan, 2016 Update pgs 25 – 33, 42 – 44.	Developed by SWRPC in conjunction with the Swanzey Hazard Mitigation Committee in 2016, Swanzey's most recent Hazard Mitigation Plan discusses the NH 10 corridor frequently. NH 10 was the site of previous localized flooding events in the 800 block of West Swanzey Road and the NH 10 corridor south of Cobble Hill Road was the site of a small forest fire due to a lightning strike. The NH 10 Corridor in the 800 block of West Swanzey Road is identified as having medium-high risk of future flooding events. Three phase electric utility poles that run parallel to NH 10 were identified as having moderate risk of damage during snow and ice events. A handful of residential properties in West Swanzey in the area described above were identified as being at risk for future flooding events from the California Brook System. NH 10 serves as a primary evacuation route for both Swanzey and the region and is connected to a number of resources that are critical to protect from future events, including large employers and cultural facilities. South of West Swanzey off of NH 10, a manufactured housing park was identified as being both at risk and isolated in the case of a hazardous event. There are also numerous resources that would be necessary in a disaster event along NH 10 such as grocery stores and gas stations. The plan recommends a number of mitigating culvert projects for roads adjacent to NH 10.[2]
West Swanzey Charette, November 2012 pgs 8-12	This report details a design charette held by Plan NH in West Swanzey over two days in November of 2012. Over the course of two listening sessions, a group of experts in planning and real estate from Plan NH met with Town officials and residents to brainstorm around the revitalization of West Swanzey Village. As a primary corridor to and from West Swanzey Village, NH 10 was central to the conversation. The Charette group conducted a macro-level analysis of NH 10's relationship with the Village and identified the need to identify possible future downtown businesses that would not compete with existing commercial development along the route. The primary recommendation for NH 10 through Swanzey is the creation of

[1] Collector Streets within the study area include Westport Village Road, Base Hill Road, and Ash Hill Road. Compact Residential Streets within the study area include California Street, West Street, Cobble Hill Road, and North & South Winchester Street. Residential streets in the study area include Cobble Hill Road west of NH 10, Perry Lane, West Street west of NH 10, Aylward Avenue, and California Street west of NH 10.

[2] Within the .25 mile study area, this includes a culvert on Base Hill Road. Within a half mile radius, culvert replacements at Forest Avenue and California Brook Road are also recommended.

	four "gateways" for West Swanzey Village along NH 10[3], as well as the creation of a gateway overlay district to improve pedestrian accommodations. The revitalization of Whitcomb Hall and Homestead Woolen Mills, as well as other underutilized buildings was the principal focus of the charette. The implementation of the revitalization strategies outlined in this document would have a significant impact on the transportation needs of West Swanzey Village.
Cutler Elementary Safe Routes to School Action Plan, 2016	This Action plan was created by SWRPC in conjunction with Cutler Elementary School as part of the Safe Routes to School program established by the FHWA in 2005. The plan evaluates the existing conditions for walking and biking to the school, presents survey results from students and parents to understand perceptions of walking or biking to school and presents a number of recommended projects to improve safety for Cutler Elementary School students. The study found that 10.5% of the school's student body lived west of NH 10, which does not have a marked crossing at the West Street intersection students use to get to school. In addition, during traffic reporting for the study it was found that at least 50% of vehicles exceeded the posted speed limit of 40 MPH by at least 5 MPH during school arrival and departure times. Subsequently, a major recommendation of the study was the development of a crossing guard program for NH 10, as well as working with NHDOT to address safety issues and the lack of a marked pedestrian crossing.
Capital Improvements Program Committee Recommendations for 2020 Capital Funding Summary and Detail Schedules, December 2019	This document is the most recent round of recommendations by Swanzey's Capital Improvements Committee for the capital improvement plan that spans from 2020 to 2027. The document is structured as a workbook which lists proposed projects by department scheduled from 2020 to 2027. There are a number of recommended projects that affect the NH 10 corridor. Several culvert replacements projects and repaving projects are recommended for roads adjacent to NH 10. Rail trail improvements for the Ashuelot Rail Trail are also recommended to improve bicycle and pedestrian access to West Swanzey Village, which would affect the number of bicyclists and pedestrians along the corridor.[4]
Swanzey Natural Resource Inventory, 2018, pgs 1-12, 21, 26	Swanzey's Natural Resource Inventory notes a number of ecologically significant resources along the NH 10 corridor. The land to the west of the corridor near the Keene town line is a large swath of unfragmented land which contains important wetlands and an important link for habitat connectivity. Across NH 10, much of the land east of the road and north of West Swanzey Village is held in private conservation by Yale University in what is known as the Yale-Toumey Forest. The Yale-Toumey Forest is also home to prime farmland soils. West Swanzey Village and the NH 10 corridor south of the Sawyers Crossing Road intersection also lie on top of important groundwater resources for the Town.

[3] The four proposed "gateways" to West Swanzey Village from NH 10 would be at Winchester Street (2), California Street, and West Street. The "gateways" would have simple and attractive signing and landscaping to set it apart from other signage on NH 10.

[4] Proposed projects of note include: the reconstruction of California Street, South & North Winchester Street, the east side of West Street, as well as the repaving of the west side of West Street and Westport Village Road. There are also $50,000 worth of unspecified Cheshire & Ashuelot Trail Improvements proposed for 2024 as a match to cover TAP Grant and fundraising.

Swanzey Master Plan Community Survey Data, 2020	Conducted as part of the 2020 Master Plan update for the Town of Swanzey, the online survey garnered 416 participants who responded to a variety of questions on land use, transportation, housing, and their experience living in Swanzey. The perceptions captured by the survey have a number of implications on the current and future use of the corridor. Of those who responded, 32% indicated that they worked in Keene, more than double the number of respondents who indicated they both lived and worked in Swanzey. Eighty-six respondents placed a lack of transportation in their top three choices of what they do not like about Swanzey. In terms of land-use, the survey captured a strong desire for additional retail development including small retail stores, restaurants and breweries. Two-thirds of respondents indicated that Swanzey should encourage multi-use developments within existing businesses and commercial zones, of which NH 10 would be considered a commercial zone for much of its length. However, respondents also indicated an aversion to density, with half of respondents indicating that Swanzey should increase building lot requirements, and two-thirds of respondents indicating that Swanzey should not encourage increased density in village centers. It is important to note that there was some demographics that were overrepresented among those who responded to the survey, particularly homeowners over the age of 55 who had lived in Swanzey for 20 or more years.
Source Water Protection Plan, 2017. Pgs 16, 17, 19 – 21, 33 – 41, 47	Developed for the Town of Swanzey's Drinking Water Committee, the plan addresses the need for protection of Swanzey's crucial groundwater resources as sources for drinking water. Swanzey is identified as being unique among NH communities for not having a central municipal water system or a wellhead protection ordinance but relying on a number of small private systems and public wells drawing from a productive stratified drift aquifer. Also included in this document is a comprehensive overview of Swanzey's water infrastructure. NH 10 is identified in the plan as being served by North Swanzey Water and Fire Precinct to the north, the West Swanzey Water Company in the vicinity of West Swanzey Village, and by several smaller systems for individual communities or neighborhoods in the southern half of the corridor. West Swanzey Village is also home to a number of public wells that provide drinking water, not part of any explicit water system. While the plan makes several recommendations for protecting Swanzey's groundwater resources, the most impactful would be the two proposed Wellhead Protection Areas (WHPAs) for the West Swanzey Water Company and the Pines Grove Co-op system. The West Swanzey Water Company WHPA would cover an over 200-acre area extending from roughly the Swanzey and California Street Intersection to Old Leonard Farm Road/West Street. The Pines Grove Co-op WHPA would cover a 40-acre area directly south of the Co-op. If enacted in ordinance, these WHPAs would have a significant impact on the nature and level of development of those two areas along the NH 10 corridor.
Yale School Forests Brochure, 2004	This brochure was produced by the Yale School of Forestry & Environmental studies to describe the activities and policies surrounding the use of Yale School Forests. This would also apply to the Yale-Toumey Forest, which straddles NH 10 south of the Market Basket Plaza. Yale Forests are used for a variety of research and educational programs for the College of Forestry, and generally are open to the public for non-motorized uses. The Yale-Toumey Forest has been utilized by a masters-level internship

	program and has been the site of a number of collaborative research projects with Keene State College, Antioch University and Franklin Pierce University. The Forest is managed by students and supervised by staff and faculty.
Town of Swanzey Rural Fire Water Resource Plan, May 2010, pgs 4, 15	Prepared by the NH Rural Fire Protection Initiative for the Town of Swanzey, this document outlines the water resource sites available in Swanzey for firefighting purposes. The plan includes a map of existing water resources for fire-fighting purposes, which demonstrates the majority of water resources along NH 10 are concentrated in West Swanzey Village and at the Sawyer's Crossing Road, Cobble Hill Road and Kempton Road intersections. There are also a number of mitigation recommendations for additional water resources, of which the NH 10 corridor at the Keene Town Line was listed as an "area of concern" for firefighting infrastructure.
Corridor Area Documents	
Route 10 Job Access Reverse Commute Study, 2008	The Route 10 Job Access Reverse Commute (JARC) study was completed by SWRPC in 2008 to evaluate the market and need for alternative transportation options for populations under 150% of the federal poverty level along NH 10. JARC was funded by a specific program from the Federal Transit Administration that focused on funding transportation services to employment related activities for low income people. The study found that there were significant concentrations of low-income populations along the corridor and the corridor served many commuters going to and from Keene for employment-related activities. Transportation costs were found to present a hardship for low income commuters along the corridor. In addition, Swanzey was identified as having significant employers and commuting employees into and from the community, second only to Keene. The ultimate conclusion of the study was that the NH 10 corridor was viable for a wide variety of transportation services ranging from fixed route commuter shuttles, demand response corridor paratransit service, emergency ride home services, to rideshare programs. The transportation options that could be implemented would ultimately be limited by the local funding sources available and the level of coordination reached between corridor stakeholders.
Keene Master Plan, 2010, Transportation Chapter. Pgs 84-86	The relevancy of Keene's 2010 Master Plan to the NH 10 corridor is how the plan addresses Keene's role as the region's transportation hub. Corridors such as NH 10 were identified as key gateways into the City which should be improved and managed to maintain the rural character of the region. The plan also highlights the need to improve and coordinate regional public transportation, including advocating for increased state and federal funding for transit. In terms of land use, the plan calls for high density commercial and industrial development along Winchester Street and south of the NH 101 traffic circle, a greater mix of uses in the Key Road area and the potential for a live/work area along NH 10 in Keene, all of which would likely affect the traffic demands for the NH 10 corridor through Swanzey.

Winchester Master Plan, 2017, V-4 – V-8, V-15, V-16, III-15	Winchester's most recent Master Plan was adopted in 2017 and provides some important information and recommendations for the NH 10 corridor. In Winchester, NH 10 is classified as a Class I Trunk Line Highway under the state classification system, and as a Minor Arterial under the federal classification system. The northern section of NH 10 in Winchester has the highest estimated average annual daily traffic count, particularly NH 10 at the Swanzey town line and NH 10 north of Mechanic Street. In the southern half of Winchester, NH 10 near Manning Hill is identified as a high priority area for investment due to safety concerns regarding the road's steep grades and curvy layout. In the transportation chapter of the plan, a specific recommendation is made to establish a commuter lot along the northern section of NH 10 near the Swanzey town line to encourage increased carpooling. The plan also references SWRPC's job access reverse commute study for the NH 10 corridor as it relates to the corridor's viability for supporting public transit. In the conclusion of the economic development chapter of the plan, NH 10 is identified as a corridor with the potential for future investments due to its high annual daily traffic count. Such investments could take the form of businesses designed to support Winchester's natural resources.
Regional Documents	
Coordinated Community Transportation Plan for the Monadnock Region, pgs 34 - 45	While not a document that recommends corridor-specific projects, the Coordinated Community Transportation Plan provides important details on the Monadnock Region Coordinating Council's role in community transportation. The plan also serves as a detailed breakdown of federal funding sources for community transportation and each funding program's requirements. Overall, nearly all of transit funding available to the region through the Coordinating Council is through some form of Federal Transit Administration (FTA) program. Currently, FTA 5310 is used heavily in the region for purchase of service trips related to medical appointments. Home Healthcare, Hospice & Community Services (HCS) also utilizes a number of FTA programs to operate their fixed route service in Keene. With many other plans referencing the potential for passenger transit along NH 10, the coordination and funding strategies outlined in the Coordinated Community Transportation Plan would be vital for the planning and implementation of expanded transportation options along the corridor.
Southwest Connects, 2015, pgs 69 - 80	*Southwest Connects* is the regional transportation plan developed by SWRPC as part of the Monadnock Region Future planning process. The plan details eight major corridors for the Southwest NH region, including NH 10 South from Keene to Winchester. The overview of NH 10 in *Southwest Connects* is extensive, and the document takes an expanded corridor approach to its analysis of NH 10, analyzing multi-modal transportation options as well as housing, economic development and demographics along the corridor. NH 10 was noted to have the highest proportion (20%) and total number of low-income populations out of the eight regional corridors identified in the plan. In addition, West Swanzey was found to have an above average proportion of single parent households, middle-aged populations, and youth 15 and under. Swanzey also had the highest number of employees commuting to Keene, more than twice the number commuting from Winchester. Because of these factors, NH 10 was identified as one of the most promising corridors in the region for passenger transit service. The route has also seen significant increases

	in traffic from the 2010 to 2015 period, and access management along NH 10 in West Swanzey was recognized as a challenge for the corridor.
Plan for Ashuelot Rail Trail, 2020 pgs 18-21	Completed by SWRPC in 2020, the plan is a comprehensive planning document for the trail. Similar to NH 10's role in providing vehicular access to West Swanzey Village, the Ashuelot Rail Trail provides an important corridor for pedestrians and bicyclists between West Swanzey Village and Keene and continues on to Hinsdale via Winchester. *The Plan for Ashuelot Rail Trail* also includes trail counts, quality assessment for the entire trail, a comprehensive review of guiding rail trail documents and plans, and project recommendations for the trail. There are 13 projects that are suggested for the trail within Swanzey town limits, including the installation of wayfinding signs, trail improvements, pedestrian accommodations on roadways which connect to the trail, as well as improvements on road crossings.[5] As the trail runs through West Swanzey Village and near NH 10, these improvements would alter the overall transportation network connecting to the NH 10 corridor. In both Winchester and Keene, there are recommended projects that directly affect NH 10 including wayfinding projects and road crossings.
Ashuelot Rail-Trail: The ART of Commuting, 2014 pgs. 58 - 66	Created as the result of a senior seminar for students at Keene State College, the study outlines the opportunities and barriers for the Ashuelot Rail Trail to serve as a potential commuter pathway for the region. The paper includes an outline of the communities served by the trail, as well as a literature review of rail trail documents and a quality index of the trail utilizing GPS technology. A bicycle traffic count was conducted for locations in Swanzey, Hinsdale and Winchester. The Swanzey location north of Sawyer's Crossing Road demonstrated the highest per day number cyclists, and highest total bicyclists. While the trail from Keene to Swanzey was cited to be in excellent condition, trail conditions south of West Swanzey Village were highly variable. Overall, a lack of wayfinding and recognition led to extremely limited commuter activity on the trail, compounded for communities south of Swanzey by trail quality issues.
Comprehensive Economic Development Strategy for Southwest New Hampshire, 2015, pgs 101-106	While the *Comprehensive Economic Development Strategy for Southwest New Hampshire* (CEDS) does not directly reference NH 10 or any projects along the corridor in Swanzey, many of the overall goals called for in the plan would impact development along the corridor. The CEDS calls for the establishing and supporting a system of diverse transportation modes by promoting bicycle and pedestrian improvements in roadway design as a medium-term goal. Most notably, the document calls for the development of a regional public transportation system as an economic development strategy. While not addressed in the CEDS, NH 10 would be a likely corridor for service in a regional public transportation system.

[5] Projects recommended within the .25-mile NH 10 study area include wayfinding signage at Riley Conservation Area and trail surface improvements at the Holbrook Avenue crossing near Woodale Avenue to the Swanzey-Winchester Town Line. Trail improvements suggested for the entire corridor include creating trail mileage markers, restoring railroad mile markers, and restoring original stone box culverts.

Southwest NH Natural Resources Plan, 2015, pgs 31, 39, 40, 41, 43, 48,	Created as a technical component of the 2015 Monadnock Region Future Plan, the *Southwest NH Natural Resources Plan* covers a wide variety of topics from energy to wildlife corridors. The Plan also provides a number of maps of that convey important information on the NH 10 corridor in Swanzey. In terms of ecological resources, the lands west of NH 10 near the Keene town line are designated as one of the "highest ranked habitat in NH". The plan also demonstrates the significance of the NH 10 corridor for water, sewer and aquifer resources in Swanzey. The West Swanzey Village area contains the majority of public wells along the corridor in Swanzey, and some of the only sewer infrastructure in Swanzey stretches from West Swanzey Village across NH 10 west to residential neighborhoods. A stratified drift aquifer, a valuable groundwater resource, runs under NH 10 south of the Sawyers Crossing Road intersection and through West Swanzey Village. However, there are also several points of potential groundwater contamination throughout the stratified drift aquifer. While the lands north of the Sawyers Crossing Road intersection represent some important ecological habitats, there are limited aquifer resources for public wells.
Southwest NH Broadband Plan, 2015, pgs 22, 25, 27	The *Southwest NH Broadband Plan* was created by Southwest Region Planning Commission and adopted in 2015 as part of the Monadnock Region Future planning effort. While the plan covers a wide range of topics on the forms of broadband available, levels of service and impact of broadband, a series of maps provide insight on the level of broadband service available along the NH 10 corridor in Swanzey. For the majority of the corridor, the maximum advertised speed is 50 megabits per second (Mbps), with the exception of the west side of the corridor from approximately the Ash Hill Road intersection to the North Winchester Street intersection. For that section of the corridor, the maximum advertised speed is between 25 Mbps and 50 Mbps. However, there was a broadband speed test survey as part of the planning efforts, which asked participants to test and report the download speed of their internet. On that survey, there were a number of responses in the southern half of the NH 10 corridor. Responses along the corridor ranged from over 6 Mbps to 1-3 Mbps speeds. The most common speeds along the corridor were either speeds in the 3-6 Mbps range or the 1-3 Mbps range. Generally, the plan categorizes households or businesses with download speeds under 6 Mbps to be "Underserved", which translates to the majority of respondents along the NH 10 corridor to be classified as "Underserved".
NHDOT/Statewide Documents	
New Hampshire State Trails Plan, 2005, pgs 33, 63-66	Created by NHDOT in 2005, this plan includes an inventory of state owned, abandoned rights of way in the State, as well as the summary of a public outreach process, design and construction guidelines for rail trails and summaries of rail trail planning from each of the state's nine regional planning commissions. The plan provides an overview of the Ashuelot Rail Trail as part of its inventory. During the public outreach process of the plan, the Southwest NH session in Keene had the highest attendance, and subsequently demonstrated strong support for improving the Ashuelot and Cheshire Rail Trails. Most trail users surveyed demonstrated a preference for using trails only for non-motorized uses.

NH Long Range Transportation Plan, 2010, pgs 3-6,	The *Long-Range Transportation Plan* outlines the goals and objectives for New Hampshire's transportation for a 20-year period from 2010 to 2030. The Plan describes a number of key initiatives for NHDOT's approach to New Hampshire's transportation system, many of which would serve as guiding principles for projects on NH 10. The key initiative of statewide corridor planning, for example, recommends the creation of corridor management plans for roads such as NH 10 that would cover a wide range of topics not explicitly limited to the use of the corridor as a transportation asset. Context Sensitive Solutions is another key initiative which outlines an approach to planning, design and construction that emphasizes transportation solutions that identify, promote and reinforce community values. Finally, this document outlines NHDOT's policy of "Preservation First", otherwise known as "keep good roads good", which prioritizes the maintenance of roads in good to fair quality over the reconstruction of poor-quality roads.
NH Department of Transportation Driveway Policy, 2000, pgs 7, 15-17	Adopted in March of 2000, this policy dictates the driveway application process required by the NHDOT for all driveways along state highways, including NH 10. The policy outlines a general application process where a standard form is submitted to the district engineer to apply for a driveway construction permit. Additional information such as traffic or drainage studies could be required due to the nature of the driveway and is coordinated with the district engineer. The policy states that a driveway construction permit will be issued if the application and supporting information demonstrates the travelling public will be protected after the construction of the driveway. In general, 1 to 3 driveways are permitted per parcel depending on the site lines and frontage the parcel has with the state highway.
NH Division of Forest & Lands GIS Map Viewer https://www.nh.gov/nhdfl/natural-heritage/state-forests-parks-interactive-map.htm	Produced by NH Division of Forest & Lands, the GIS Map Viewer is an online application that lists conservation lands throughout New Hampshire and the ownership and form of protection used to protect conservation lands. The applicability of the mapping application to the corridor is the information it provides on the Yale-Toumey Forest, a conservation area owned by Yale University which is the predominant land use for the corridor north of Sawyers Crossing Road. The map lists the lands as being held in conservation through "Fee Ownership", which means it is held in conservation by direct land ownership instead of through a conservation easement on the deed for the land.
NH Department of Transportation Bicycle and Pedestrian Statewide Plan, TBD	Placeholder

Southwest Region Planning Commission
37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Agenda Item III

Date: **June 4, 2020**
To: **Swanzey NH Route 10 Corridor Study Working Group**
From: **SWRPC Staff**

RE: **Overview & Findings from GIS Crash Analysis**

Background

SWRPC staff will present information that summarizes findings from an analysis of state crash data associated with NH Route 10 and made available by the NH Department of Safety and NH Department of Transportation. The data examines the Corridor study area for the period between 2007 and 2016.

During the June 4th meeting, SWRPC staff will be on hand to discuss the strengths and limitations of the data as well as findings and answer questions from the Working Group members.

Recommendation

For your information.

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Agenda Item IV

Date: June 4, 2020
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Feedback on Prioritization of In-Depth Review of Crash Locations

Background

SWRPC staff will lead a discussion with the Working Group about selecting three to five crash locations for further study. More in-depth study would include scheduling field reviews of crash locations and working with the Swanzey Police Department to review crash reports associated with these locations.

Item III of the June 4th meeting agenda about SWRPC's GIS crash analysis is expected to inform the discussion about where more in-depth crash location reviews should occur, but Working Group members are encouraged to come to the meeting with thoughts on what they perceive to be the more dangerous intersections or segments of highway in the study area.

Recommendation

Discuss and select 3-5 crash locations for further study.

Southwest Region Planning Commission
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Swanzey NH Route 10 Corridor Study Working Group

December 8, 2020
9:00 a.m.

Zoom Meeting Link:
https://bit.ly/Dec8NH10WG20
Call-in Number: 1 646-558-8656

Meeting ID: 894 4705 5105
Password: 837 047

Agenda

I. Welcome and Introductions

II. Overview of Traffic Research Effort

III. Overview & Findings from Field Review of NH 10 Intersections

IV. Overview & Findings from Access Management Analysis

V. Other Matters

VI. Next Meeting

VII. Adjourn

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37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Southwest Region Planning Commission

Swanzey NH Route 10 Corridor Study Working Group

Meeting Summary

June 4, 2020

Members Present: Matthew Bachler, *Planning and Economic Development* Director; Michael Branley, *Town Administrator;* Mike Gomarlo, *Economic Development Advisory Committee;* Gus Lerandeau, *SWRPC Transportation Advisory Committee;* Scott Self, *Planning Board, Sewer Commission.*

Staff members present: J. B. Mack, *Principal Planner;* Henry Underwood, *GIS Specialist/Planner,* James Weatherly, *Planning Technician.*

I. Welcome and Introductions

J. B. Mack called the meeting to order at approximately 8:30 a.m. and welcomed those in attendance.

II. Overview & Findings from Summary of Policies, Plans and Studies

James Weatherly announced that he has completed a final draft of the Summary of Policies, Plans, and Studies for the NH 10 Corridor. The document, which was submitted to the Swanzey NH Route 10 Corridor Study Working group, not only examined Swanzey-specific policies, plans and studies, but also relevant regional and statewide policies, plans and studies. He summarized the major findings of his analysis:

- Both Swanzey and its neighboring communities of Keene and Winchester recognize the importance of NH 10 as a corridor to support current and future development. In particular, all three communities recommend future commercial and industrial development to be promoted along the Corridor.
- The Ashuelot Rail Trail provides an opportunity to serve as a parallel pedestrian and bicycle facility to NH 10. In particular, the rail trail provides an important connection for bicycles and pedestrians between Keene and West Swanzey Village that runs parallel to NH 10, as well as connections farther south to Winchester and Hinsdale.
- West Swanzey Village has redevelopment potential that is encouraged both by the Town through an economic revitalization zone, in the Town's master plan, and through the results of the West Swanzey Village charette hosted by Plan NH. West Swanzey also represents a significant node of population density, and a concentration of low-income population along the Corridor. He noted that Plan NH recommendations include the idea of including four gateways which could have a bearing on NH 10.

- Because of the cost of transportation, the disproportionate number of low-income residents and ongoing predictable trip patterns between Keene, Swanzey and Winchester, NH 10 may be well suited for transportation modes beyond the personal motor vehicle. Such transportation would need to be a result of coordination between Swanzey and surrounding towns. Residents have also indicated that a lack of transportation options is a significant issue in Swanzey.
- Swanzey has indicated a strong desire for its transportation system to accommodate all transportation users, including bicyclists and pedestrians. NH 10 currently acts as a crossing barrier and there are safety issues for pedestrians and bicyclists, particularly in the West Swanzey Village area.
- The Corridor plays an important role in hazard mitigation as a primary evacuation route and a concentration of services and resources which would be needed in the event of a disaster. Populations along NH 10 south of West Swanzey Village are identified as being at risk of isolation in the case of a disaster.
- While the southern half of the NH 10 corridor within Swanzey overlies an important stratified drift aquifer which provides ample groundwater, the area north of West Swanzey Village possesses limited groundwater resources and water and wastewater infrastructure. This limits the development potential of the northern half of the NH 10 corridor.
- Collaboration between NHDOT and the Town of Swanzey is key for the NH 10 corridor to reflect the needs and wants of the Town. While NHDOT has established policies for corridor management, the Town of Swanzey through its complete streets policies and other studies has demonstrated that it has a distinct vision for the Corridor that may not be captured in current NHDOT policy.

Gus Lerandeau asked if there was information about traffic volumes on NH 10. J. B. Mack answered that SWRPC is collecting that information and will present that information along with other traffic data at the next meeting. James Weatherly responded that the *Southwest Connects* Regional Transportation Plan discusses traffic volumes on NH 10 and noted that the Plan states that NH 10 has seen higher increases in traffic volume compared to other corridors in the region.

Michael Branley asked James Weatherly to provide more information about his comment regarding a limitation of development opportunity on the northerly part of the corridor. James Weatherly responded that while there is a stratified drift aquifer that has significant capacity on the corridor, it is situated under the southern part of the corridor only. He also noted that most water infrastructure is decentralized on the corridor with many people relying on private wells. West Swanzey has a small water company, but as part of his research he didn't see any particular plans for expansion. He explained that if there are no major aquifers that are available on the northern half of the corridor, it would make it more difficult to develop that part of the corridor.

James Weatherly also noted that there was a question at the previous project working group meeting about the Yale Toumey Forest and whether or not it is conservation land. He explained that according to his research that land is under fee ownership and doesn't have any deed restrictions requiring the land be conserved. However, he noted that Yale maintains the property as a managed forest and has no plans to make any changes or sell the property.

J. B. Mack thanked James for his presentation and noted that the purpose of the document is to provide the project working group with base information about the NH 10 corridor, and to be aware of any existing goals, strategies, objectives or policies associated with the NH 10 Corridor. Michael Branley said he thought the document that James Weatherly prepared was concise and thorough and thanked him for his work. J. B. Mack said there might be other resources that we come across as we move forward

with the study, in which case we can add to the document later. He noted that the document will be included in the final report for the Swanzey NH 10 Corridor Study.

III. Overview & Findings from GIS Crash Analysis

Henry Underwood gave an overview of his preliminary analysis of crash data in the NH 10 study area, referring to a handout that was presented before the meeting. He explained that his analysis is based on Geographic Information System data made available by NHDOT. Some of the data he is presenting is based on a more rigorous statistical analysis previously conducted by NHDOT several years ago, and some of the data is an SWRPC analysis of "locatable" crash data from 2007-2016. He explained that data from 2016 is the most complete full-year of data available at this time. "Locatable" crashes refer to crashes in which NHDOT is fairly confident about a crash's actual location.

Henry Underwood explained that he has two sections of findings. The first is based on a statistical analysis developed by NHDOT several years ago that essentially looks at the poorest performing rural sections of roads and poorest performing rural intersections in New Hampshire. In the NH 10 study area, there were two parts of the corridor that were among NHDOT's 5% worst sections of road. One is the section between Sawyer's Crossing Road and North Winchester Street. The other is Base Hill Road and Whittemore Farm Road. Though the analysis is over five years old, the reason these statistical findings are helpful is that NHDOT's screening process tries to identify significant crash sites that would probably benefit from crash mitigation strategies. He also noted that the intersection that fell on the upper tier of the top 100 poorest performing rural intersection's list included the intersection of Base Hill Road and NH 10.

Henry Underwood discussed SWRPC's analysis of crashes between 2007 and 2016. He noted that town wide, crashes have been decreasing. In the NH 10 Study area, which includes NH 10 and ¼ of a mile on either side of NH 10, also shows a decreasing trend in overall crashes. He noted, however, that there are a lot fewer crashes in the database in the most recent 5 years. He explained that SWRPC doesn't have a definitive answer to why that is, but he noted that it may have to do with the State's data collection process. He explained that the State processes crashes with injuries and fatalities more quickly than property damage crashes. Although the data currently shows a decreasing trend, it may be the result of incomplete data. He noted that when looking at the injury data alone, there is no evidence of a decrease. Injury crashes include fatal, serious injury or minor injury crashes. Over the 10-year period there were 192 crashes including two fatalities in 2007 and one in 2011.

Henry Underwood summarized characteristics behind the 192 crashes. More crashes occurred on Friday and Saturday than any other day of the week. Most crashes involved other vehicles, happening along the road as opposed to at intersections or at access points. Most crashes occurred in dry and clear conditions during the daytime. He added that these trends coincide with the busiest times of day on the corridor. Of the 192 crashes, 499 people were involved. About one quarter of the injuries involved drivers and passengers not wearing seatbelts. As to the most common contributing factors reported by police, the most common was "no improper driving", however the next most common was "driver inattention" or "distracted driving."

IV. Feedback on Prioritization of In-Depth Review of Crash Locations

Henry Underwood explained that in addition to the crash analysis, he has provided some initial recommendations on possible locations to analyze more closely through field review. J. B. Mack added that in the Swanzey NH 10 Corridor Study scope of work, SWRPC set aside a small budget to conduct a closer examination of 3-5 areas with a history of crashes. He explained that the field review would be modeled after a scaled down version of a road safety audit. The project working group, NHDOT and

other important stakeholders would meet and inventory potential contributing factors to crashes relating to roadway geometry, traffic operations, road users, and environmental conditions. For example, the group might observe factors like lane widths, turning radii, sight distance, driver behavior, prominent land uses driving traffic in the area, street lights, shade trees, etc.
Michael Branley noted that the Town of Swanzey requested a few road safety audits a couple of years ago that NHDOT rejected that are on Henry Underwood's list. He asked if NHDOT was rejecting them because they didn't think there were any mitigation strategies to reduce crashes. Matthew Bachler added that the intersections were NH 10 and Hill Road, Sawyer's Crossing Road and N. Winchester Street. J. B. Mack responded that NHDOT's process for selecting locations for road safety audits is a very prescriptive, data driven process that requires identifying clear crash trends. The statewide screening process weeds out some of the candidate locations with smaller crash trends or no trends. He explained that just because the road safety audit application process doesn't select applications doesn't mean that there aren't countermeasures that could be looked at to decrease crashes at the locations listed in the handout.

Scott Self asked if anyone recalled when the Base Hill intersection was rebuilt. Perhaps that has affected crash trends. J. B. Mack said that they could check in with John Kallfelz to ascertain that information. Scott Self also asked if any side roads involved crashes or if the majority were located on NH 10. Henry Underwood confirmed that most were on NH 10. Scott Self asked if NHDOT doesn't see the need to look at specific intersections, does this mean that planners should direct development on other areas of the corridor. J. B. Mack said that although NHDOT's Highway Safety Improvement Program funds are not currently available for these intersections, there are other funding sources that could potentially address areas with safety hazards.

The project working group discussed potential candidates for field reviews, but determined at the conclusion of the discussion that it would be helpful for SWRPC to provide more information about crash trends at the various candidate locations as well as check in with NHDOT for their recommendations. It was decided that the selection of the field locations would be handled via e-mail, followed by coordination to schedule the field review and field review participants.

V. Other Matters

No other matters were discussed.

VI. Next Meeting

J. B. Mack said he would initiate a poll for the next meeting after SWRPC is able to get a better handle on crash trends at specific locations and speak with NHDOT about their recommendations.

VII. Adjourn

The meeting adjourned at 9:35 a.m.

Respectfully submitted,

J. B. Mack
Principal Planner

Southwest Region Planning Commission
37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Agenda Item II

Date: December 8, 2020
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Overview of Traffic Research Effort

Background

Over the summer and fall, SWRPC staff collected a variety of information relating to traffic operations on NH 10 in Swanzey including volume counts, vehicle classification analyses, speed analyses, and turning movement counts.

During the December 8th meeting, SWRPC staff will summarize its traffic research efforts and discuss major findings.

Recommendation

For your information.

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Agenda Item III

Date: December 8, 2020
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Overview & Findings from Field Review of NH 10 Intersections

Background

On November 4th, SWRPC and members of the Swanzey NH Route 10 Corridor Study Working Group performed a field review of four major intersections on the NH 10 Corridor including NH 10's intersection with Base Hill Road, Sawyer's Crossing Road, California Street and West Street.

Attached to this memo, please find draft field notes from the field review team. During the December 8th meeting, SWRPC will walk through the field notes highlighting major findings and recommendations.

Recommendation

For your information.

NH 10 (West Swanzey Road) at Base Hill Road

Crash data (2010-2019):

- Base Hill Road approach to NH 10 = 2 rear-end collisions (0 injuries)
- NH 10 northbound making left on Base Hill Road = 2 rear-end collisions (3 injuries)
- Crashes involving Citgo on NH 10 = 6 collisions (3 injuries) including 4 side swipes, 1 rear-end and 1 head-on collisions

Geometrics:

- On NH 10 travel lanes are 12 feet, left turn lane is 12 feet, shoulders are 10 feet, and 4 foot painted median in front of the Citgo
- On Base Hill Road, one eastbound right turn lane (12 feet), one eastbound left turn lane (12 feet) and one westbound lane (12 feet) with increased width at NH 10 to accommodate turns
- On NH 10 southbound approach to Base Hill Road there is no shoulder on the west side of highway due to the addition of a right hand turn lane for NH 10 southbound traffic making turn on Base Hill Road
- Conflicting vehicle movements crossing painted median in front of Citgo is where a number of accidents have occurred according to crash data
- Northern NH 10 curb cut at Citgo is not in line with current driveway permitting standards (corner clearance)
- From Base Hill Road, the sight distance to the south and north is likely to be at least 400 feet, however, there is a vertical and horizontal curve starting at about 600 feet north of the intersection

Operations:

- Dunkin Donuts drive thru customers tend to use either the Base Hill Road curb cut or the northerly NH 10 curb cut on NH 10 to enter the drive thru and tend to exit using the Base Hill Road curb cut or the southerly NH 10 curb cut.
- According to field team members, Dunkin Donuts drive through queue tends to back up all the way around the gas pumps on the north side of the parcel--almost to the northerly entrance on NH 10 during morning peak hour.
- SWRPC staff observed that prevailing traffic speeds passing by Citgo and intersection approached 50 mph in the 40 mph posted speed limit zone. Note: A 2019 traffic study conducted by SWRPC south of the Base Hill Road intersection on NH 10 indicated the operating speed of traffic (based on the 85% of speeds) to be approximately 47.9 mph (48.3 mph for southbound vehicles, 47.4 mph for northbound vehicles).
- For southbound NH 10 traffic indicating a right turn signal, it can be difficult for other motorists to anticipate if those vehicles are going to turn on to Base Hill Road or into one of Citgo NH 10 curb cuts
- For northbound NH 10 traffic indicating a left turn signal, it can be difficult for other motorists to anticipate if vehicles are going to turn into one of the Citgo's curb cuts or on Base Hill Road.
- It's unclear that a signal warrant would be needed for the intersection, but it's not likely according to John Kallfelz. Would need to evaluate with Mike Dugas and the Traffic Bureau. An August 2020 turning movement count showed there were 95 left hand turns from NH 10 to Base Hill Road during the morning peak hour (883 total volume) and 102 in the evening peak hour (1,216 total volume).
- The southbound right-hand turn lane effectively increases the speed of traffic approaching the intersection from the north. Use of the turn lane can also cause drivers to "lose" the view of vehicles in the through lane in some situations.

Road Users:

- According to team members, not many walkers pass through area, however occasional bicyclists have been observed

- People use Base Hill Road to go to and from:
  - Monadnock Shopping Plaza
  - To avoid the NH 10/12/101 roundabout
  - Vermont/NH 9
- Northbound trucks occasionally have been observed parking in the shoulder on the east side of the highway across from the Citgo
- Two road construction/maintenance firms have base of operations on Base Hill Road

Environment:

- No lighting at intersection; there is a light at the Citgo near Base Hill Road that may illuminate a part of the intersection
- No known snow or drainage issues
- No known glare issues
- No observed issues with signage or striping

Possible Interventions:

- Long term: Replace flush median with raised median in front of Citgo
  - This likely would be contested by current owner
  - Could happen during future change of use at the property
  - Raised median could be installed either full length of Citgo property or just along a portion so as to require right-in/right-out for the northerly curb cut.
- Long term: Install signal at Base Hill Road
  - Would need to determine if meets traffic signal warrant

Other Information:

- According to J. Kallfelz, the property was originally a gas station, but changed use in the 1990s upgrading to gas station plus drive thru. Typically, driveway configuration would be reassessed at the time of the change of use and the corner clearance would be improved, but this did not happen.
- Intersection was Road Safety Audit candidate in 2018, but was not approved by NHDOT Safety Engineer.

NH 10 (West Swanzey Road) at Sawyer's Crossing Road

Crash data (2010-2019):

- Sawyer's Crossing Road approach to NH 10 = 4 broadside collisions (1 injury)
- NH 10 southbound = 5 rear-end collisions and 1 overtaking sideswipe (0 injuries)

Geometrics:

- On NH 10, there are two 12 foot lanes and two 4 foot shoulders
- On Sawyer's Crossing Road, 10 foot lanes with probably 4-5 foot shoulders.
- For NH 10 southbound traffic there is no left turn lane
- Sawyer's Crossing Road approach to NH 10 is a Y shape; J. Kallfelz explained that NHDOT tries to T off its Y intersections if possible
- For westbound Sawyer's Crossing Road making left to go southbound on NH 10, the lane is skewed northwards resulting in a difficult left hand turn

Operations:

- For southbound NH 10 traffic, SWRPC observed relatively sharp left hand turn on Sawyer's Crossing Road for southbound NH 10 traffic requiring quite a bit of braking on NH 10 before making turn.
- No stop bar for Sawyer's Crossing Road approach to NH 10
- No yield sign for northbound NH 10 traffic making right on Sawyer's Crossing Road and merging with eastbound Sawyer's Crossing Road traffic
- Existing "Deceleration area" for northbound NH 10 traffic making right on Sawyer's Crossing Road is probably needed due to prevailing speed of traffic on NH 10
- Drivers making a left turn from Sawyers Crossing Road to head southbound on NH 10 partially block the turning radius of NH 10 southbound left turns.
- An August 2020 turning movement count showed there were only 7 left hand turns from NH 10 to Sawyers Crossing Road during the morning peak hour (811 total volume) and 3 in the evening peak hour (1,042 total volume).

Road Users:

- There are two nearby businesses on Sawyers Crossing Road that use trucks: Rhymes and Keene Gas
- People use Sawyer's Crossing Road to reach Ash Hill Road, Matthews Road, and Swanzey Center
- S & S Painting on west side of intersection

Environment:

- There is guard rail and steep slopes on western side of intersection and southeast side of intersection (drainage, wetland and river on other sides of guardrail).
- The utility line across Y intersection extends for long distance and hangs down (no utility pole in Y island, and limited room for utility poles due to steep slopes and guardrails in the area).
- No lighting at intersection
- No known snow or drainage issues
- No known glare issues
- Tall unmowed grass in Y island, but doesn't appear to impact sight distance; no utility pole in island allows for clear sight line

Possible Interventions:

- Short term: Yield sign for northbound NH 10 traffic turning right on Sawyer's Crossing Road and merging with eastbound Sawyer's Crossing Road traffic (or yield sign for eastbound Sawyer's Crossing Road?)

- Medium term: Not clear if completely T'ing intersection is best approach because of high speed in area and narrow shoulders on NH 10, but northerly Sawyer's Crossing Road curb cut approach could probably be more of a 90 degree angle to NH 10
- Long term: Increase NH 10 shoulder widths to improve safety and/or add southbound left turn lane; note that this would require significant earthwork and environmental permitting due to wet areas and steep slopes in the area.

Other Information:

- Intersection was Road Safety Audit candidate in 2018, but was not approved by NHDOT.

DRAFT

NH 10 (West Swanzey Road) at California Street

Crash data (2010-2019):

- No crash trends involving vehicles from west side of intersection except 1 crash involving vehicle crossing westbound straight across NH 10 and colliding with NH 10 southbound traffic = 1 broadside collision (3 injuries)
- California Street westbound approach to NH 10 = 3 broadside collisions (1 injury)
- NH 10 southbound = 1 rear-end collision (1 injury), snow involved
- NH 10 northbound = 2 rear-end collisions (1 injury)

Geometrics:

- NH 10 on northside approach to intersection looks to be four 11 foot lanes (going southbound one right turn lane, one thru lane, one left turn lane) a 2 foot shoulder going southbound and a 4 foot shoulder going northbound
- NH 10 on southside approach to intersection looks to be three 12 foot lanes (going northbound one left turn lane and one thru lane) and two four foot shoulders
- California Street approaches appear to be 11 foot lanes with 2 foot shoulders
- Road pavement on California Street on the west side of the intersection continues into Larry's Homestead Garage parking lot with shoulder line; virtually no corner clearance from NH 10 for Larry's Homestead Garage curb cut

Operations:

- No center line or shoulder lines painted on California Street
- No stop bars for either approach on California Street

Road Users:

- There is a large residential subdivision that uses California Street on the western side of the highway; many cross the highway to the other side of California Street
- Many Swanzey residents use east California Street to go into West Swanzey and to reach the Swanzey Recycling Center

Environment:

- 2 LED streetlights at intersection owned and maintained by the Town of Swanzey
- Site distance impeded looking south from westbound California Street approach due to heavy tree growth and brush
- Utility pole on the northwest corner of the intersection impedes sight distance a little

Possible Interventions:

- Short term: Cut brush/tree growth on the southeastern side of the intersection for westbound California Street traffic
- Short term: Paint center and shoulder lines as well as stop bars on California Street (is it possible to paint approaches only?)
- Long term: During change of use or site plan review, try to move curb cut at Larry's Homestead Garage farther west.
- Long term: Employ traffic calming measures including narrowing of highway

Other Information:

- According to John Kallfelz, site distance from municipal roads looking onto State roads is the municipality's responsibility; Simple send letter to District IV requesting permission to determine right-of-way and request permission to trim back trees/brush in the State's right-of-way
- Striping that is present in this area of NH 10 was first painted in 2013.

DRAFT

NH 10 (West Swanzey Road) at West Street

Crash data (2010-2019):

- No crash trends involving vehicles from west side of intersection
- NH 10 southbound = one overtaking crash (0 injuries) and two broadside crashes involving westbound West Street traffic (5 injuries)

Geometrics:

- NH 10 looks to have a 12 foot two hand turn lane, 2 11 foot thru lanes and 4 foot shoulders
- California Street approaches appear to be 11 foot lanes with 2 foot shoulders

Operations:

- Flashing yellow (NH 10 approaches) and red (West Street approaches) beacon at intersection; NHDOT has taken many of these down due to poor cost/benefit
- No center line or shoulder lines painted on West Street
- No stop bars for either approach on West Street
- Center turn lanes first painted in 2013
- Wide road appears to encourage speeding. Note: A 2020 traffic study conducted by SWRPC south of the West Street intersection on NH 10 indicated the operating speed of traffic (based on the 85% of speeds) to be approximately 49.6 mph. The posted speed limit in this area is 40 mph.

Road Users:

- Single family homes on the west side of West Street
- Homestead Woolen Mill on east side of West Street along with Moldpro Manufacturing leads to truck traffic
- Denman Thompson bridge over Ashuelot River on east side leads to some trucks using West Street to turn around
- Cutler School on east side (though it appears that the school will be closing); Sidewalks on north side of West Street on either side of intersection but no crosswalk
- RV traffic sometimes uses east side of West Street to reach Swanzey Lake Campground
- Sidewalk on east side of NH 10 and saw pedestrians using sidewalk

Environment:

- Team members have observed standing water on east side of highway
- Field on west side of highway gets very wet
- Drainage goes from east to west side of highway despite Ashuelot River being on east side of highway
- West Street eastbound traffic on west side of intersection sight distance blocked to the south by vehicle in driveway pulling out on to NH 10

Possible Interventions:

- Medium term: Drainage swale on west side of highway
- Long term: Employ traffic calming measures including narrowing of highway and improve pedestrian crossing at West Street with possible median and RRFB?

Other Information:

- Swanzey will be reconstructing east West Street including sidewalks. Reconstruction is currently scheduled for 2021.

Southwest Region Planning Commission
37 Ashuelot Street, Keene, NH 03431 603-357-0557 Voice 603-357-7440 Fax

Agenda Item IV

Date: December 8, 2020
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Overview & Findings from Access Management Analysis

Background

SWRPC has completed an analysis of access management on the NH 10 Corridor including an inventory of on-road access management features and an assessment of curb cuts that do not conform with state or local driveway permit regulations.

Attached to this memo, please find the access management analysis. During the December 8th meeting, SWRPC will highlight its major findings and recommendations.

Recommendation

For your information.

Access Management Considerations

Introduction

"Access management" describes the systematic control of the location, spacing, design and operations of all access points to a roadway including driveways, medians, and intersections[1]. Well-coordinated access management is essential to extending the life of public infrastructure, increasing highway safety, reducing congestion, and preserving and improving the built environment. All users of a roadway, from pedestrians and cyclists to motorists and the freight industry, benefit from effective access management. In addition, the issues caused by a lack of well-coordinated access management can be expensive and difficult to solve and can adversely impact local homes and businesses.

As part of this study, SWRPC staff conducted an analysis of access management along the NH 10 corridor in Swanzey by identifying suspected nonconformities with current state and local access management regulations and inventorying access management features on the roadway itself. This analysis aims to provide insight into where attention and effort should be directed by local officials in coordination with the NH Department of Transportation (NHDOT) to improve access management when opportunities arise, such as in the case of properties changing their use. Effective access management will require local and state coordination and should include the careful management of both the transportation system as well as abutting land uses to the highway. Where NHDOT has authority over extensive portions of the transportation system, local government has regulatory authority over land use and the ability to implement a community vision for future land use. Strong partnership between the two is key to maximizing the efficiency and effectiveness of an access management program.

Methodology

SWRPC staff utilized data from the NH Department of Transportation (NHDOT), the Town of Swanzey, and NH GRANIT to conduct an analysis of access management features and potential nonconformities along the NH 10 corridor in Swanzey. Analysis of aerial imagery and digitization via the use of ArcGIS Online was the primary method used to analyze current conditions along the Corridor. Suspected corner clearance and driveway width violations are identified through the use of the measuring tool in ArcGIS Online in combination with 2015 areal imagery. Other nonconformities, such as miscellaneous objects in the right of way and nonpermitted access points, are identified through visual review of aerial imagery. On-road access management features are digitized also using 2015 imagery, and cross referenced with the most recent Google Maps imagery for the NH 10 corridor.

[1] Transportation Research Board, *Access Management Manual,* 2003

Driveway Permitting Process

As established by NH RSA 236:13 and adopted through NHDOT policy in March of 2000, NH DOT has a well-defined driveway permitting process for state-owned roads. According to the policy, landowners much first apply for a permit for the construction or alteration (including change of use) of a driveway, entrance, exit, or approach that will access any state-maintained highway. In the study area, NH DOT owns and maintains NH 10, Sawyers Crossing Road, and the southern portion of Westport Crossing Road.

Driveway applications that are proposed on any of the three state-owned roads within the study area are reviewed by the NH DOT District 4 office. All landowners wishing to construct a driveway accessing a state-maintained highway are required to complete a driveway permit application and submit it to the district engineer, which includes information about the proposed driveway, the landowner, and parcel history. For driveways that serve a higher number of trips per day, defined by NH DOT as major entrances, there is a much more involved application process which may require site plans, traffic studies, traffic control studies, or information depending on the complexity of existing conditions and the anticipated traffic to be generated. The table below summarizes some of the main design requirements established by NH DOT's driveway policy.

*Table 1: NH DOT Driveway Permit Design Standards**

	NH DOT Jurisdiction Design Standards	Citation	Exceptions granted
1	No more than one access point if less than 400 feet all season sight distance both directions	Policy 8 (a)	No
2	If frontage on highway is 500 feet or less, no more than 2 access points	Policy 8 (b)	No
3	No more than 3 access points for frontage exceeding 500 feet	Policy 8 (c)	Yes, Policy 8 (d)
4	No parking, loading, vending or servicing vehicles on highway or ROW	Policy 9 (a)	No
5	Miscellaneous items not permitted on, over or under state highway or ROW	Policy 9 (b)	No
6	Access to highway from parcel other than permitted driveway is prohibited	Policy 9(c)	No
7	Except Major entrance exceptions, maximum width of driveway 50 feet wide	Policy 10 (a)	Yes, Policy 10 (b)
8	In rural areas, 200 feet corner clearance. In urban areas, 100 feet corner clearance.	Policy 10 (c)	Yes, Policy 10 (c)
9	Intersection of driveway to highway no less than 60 degrees unless "right turn only"	Policy 10 (d)	No
10	Radius may not extend beyond applicant's frontage without permission of abutter	Policy 10 (e)	No
11	5% slope for car length and vehicle storage incline or decline (20'-25' in length)	Policy 10 (f)	No
12	Maximum grade for major driveway is 8%, Maximum for driveway 15%, algaebraic difference between any 2 grades shall not exceed 10%	Policy 10 (g)	Yes, Policy 10 (g)
13	Gradual slopes on side of driveway	Policy 10 (h)	No

*This Table is meant to summarize design standard components of the NH DOT Driveway permit. Please consult NH DOT policy for more detail.

The Town of Swanzey also has their own well-established driveway permitting process[2] for landowners wishing to construct, relocate or alter (including change of use) any driveway with access to Town managed roads. The Swanzey Public Works Director approves and issues all driveway permits, and driveway permits are required for the building permits of new structures. There are two sets of driveway regulations which govern the driveway permitting and design regulations in Swanzey. Driveway regulations apply to 1- and 2-family dwellings as well as non-commercial properties. Access management regulations apply to multi-family dwellings and commercial uses. As with the NH DOT policy, each set of driveway and access management regulations for Town-owned highways in Swanzey has its own design requirements.

Frontage & Access Points

For the purpose of this analysis, staff looked at the frontage of properties along NH 10 and the number of access points to each property. The total number of access points attributed to a parcel did not include suspected nonpermitted access points. Properties of concern identified in this analysis include parcels with under 500 feet of NH 10 frontage and more than 2 access points as well as parcels with over 500 feet of NH 10 frontage and 3 or more access points. These metrics are derived from NHDOT's driveway policies, particularly Policy 8 (b) and (c). As of this analysis, there are two properties with more than 2 access points and under 500 feet of frontage along NH 10, and no properties with 4 or more access points and over 500 feet of NH 10 frontage.

Table 2: Properties with potential frontage violations

Parcel Address	Parcel Map Number	Type of Violation	Parcel Land Use
765 West Swanzey Road	72-98-1	Under 500 ft., 3 or more access points	Commercial/Industrial
919 West Swanzey Road	71-11	Under 500 ft., 3 or more access points	Commercial/Industrial

Corner Clearance

An important focus of this analysis was documenting driveways that do not conform with either NHDOT or the Town of Swanzey's corner clearance policies. Corner clearance is defined as the distance between a driveway or access to a right-of-way and the nearest corner of an intersecting street. Inadequate corner clearances can result in problems with traffic operations, safety, and capacity. In the study area, the most likely consequence of corner clearance violations are conflicting and confusing turns at intersections.[3] It is important to note that the second highest category of locatable crashes in the study area are "at intersection" or "along road at driveway access".

For driveways along NH 10 and other state-owned roads in the study area, the rural standard of 200 feet between the driveway and intersecting road set forth in Policy 10 (c) was utilized to define corner clearance violations. Corner clearance violations for driveways located within the study area with access to Town-owned roads are defined by the commercial and residential driveway guidelines adopted by the Swanzey

[2] Swanzey's driveway guidelines are administered by their Planning Board, and derives its authority from RSA 674:35 and RSA 236:13

[3] Transportation Research Board, *Access Management Manual*, 2003

Planning Board. For residential driveways, the guidelines dictate a minimum spacing of 100 feet from an intersecting road which was adopted for this analysis. For commercial driveways, generally the guidelines dictated a minimum required distance of 150 feet from intersecting roads. Only corner clearance violations that involved the intersecting road of NH 10 or other state-owned roads are recorded.

Overall, corner clearance violations represented the most common form of nonconformity in driveways within the study area. From our analysis, there are 19 properties within the study area that directly border either NH 10 or another state-owned road that have an access point which does not conform with either state or local regulations. Primarily, the properties that have corner clearance nonconformities are commercial or industrial land uses near intersections. However, for access points subject to NHDOT policies it is important to note that exceptions can be made for driveways which do not meet the standard corner clearance requirements.

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Table 3: Parcels with suspected corner clearance nonconformities

Parcel Address	Parcel Map Number	Intersection Requiring Clearance	Parcel Land Use	Governing Design Guidelines
189 West Swanzey Road	52-1	West Swanzey Road/Base Hill Road & West Swanzey Road/Whittmore Farm Road	Commercial/Industrial	NHDOT
599 Sawyers Crossing Road	55-2	West Swanzey Road/Sawyers Crossing Road	Commercial/Industrial	NHDOT
3 Forest Avenue	56-8	West Swanzey Road/Forest Avenue	Single Family/Duplex	Town of Swanzey
90 North Winchester Street	57-39	West Swanzey Road/North Winchester Street	Commercial/Industrial	Town of Swanzey
647 West Swanzey Road	73-26	West Swanzey Road/California Street	Commercial/Industrial	NHDOT
665 West Swanzey Road	73-13-1	West Swanzey Road/California Road	Commercial/Industrial	NHDOT
704 West Swanzey Road	72-85	West Swanzey Road/West Street	Commercial/Industrial	NHDOT
705 West Swanzey Road	72-99	West Swanzey Road/West Street	Single Family/Duplex	NHDOT
735 West Swanzey Road	72-98-2	West Swanzey Road/Perry Lane	Commercial/Industrial	Town of Swanzey
27 Cobble Hill Road	72-55	West Swanzey Road/Cobble Hill Road	Single Family/Duplex	NHDOT & Town of Swanzey (Two Access Points)
787 West Swanzey Road	72-93	West Swanzey Road/Cobble Hill Road	Commercial/Industrial	NHDOT
147 South Winchester Street	72-50	West Swanzey Road/South Winchester Street	Commercial/Industrial	Town of Swanzey
150 South Winchester Street	72-49	West Swanzey Road/South Winchester Street	Other Multifamily	Town of Swanzey
832 West Swanzey Road	71-4	West Swanzey Road/South Winchester Street	Single Family/Duplex	NHDOT
836 West Swanzey Road	71-4-1	West Swanzey Road/South Winchester Street	Other Multifamily	NHDOT
919 West Swanzey Road	71-11	West Swanzey Road/Anthony Lane	Commercial/Industrial	NHDOT
968 West Swanzey Road	70-34	West Swanzey Road/Westport Village Road	Commercial/Industrial	NHDOT
23 Kempton Road	70-29-2	West Swanzey Road/Kempton Road	Commercial/Industrial	Town of Swanzey
1026 West Swanzey Road	70-23	West Swanzey Road/Kempton Road	Single Family/Duplex	NHDOT & Town of Swanzey (Two Access Points)

Driveway Width

NH DOT Driveway policies lists that apart from exceptions made with major entrances, the maximum width of driveways is 50 feet. Because of this, our analysis flagged any driveway greater than 50 feet as an area of concern. Excessive driveway width is the second most common form of nonconformity for properties along NH 10 in the study area, with a total of 9 properties identified. The majority of these properties are commercial or industrial in nature, and many of the driveways in violation of the 50 foot standard are unpaved.

Table 4: Parcels with suspected driveway width infractions

Parcel Address	Parcel Map Number	Paved/Unpaved Access	Parcel Land Use
133 West Swanzey Road	52-26	Paved	Commercial/Industrial
608 West Swanzey Road	57-2	Unpaved	Commercial Industrial
617 West Swanzey Road	73-29	Unpaved	Single Family/Duplex
627 West Swanzey Road	73-28	Unpaved	Commercial/Industrial
765 West Swanzey Road	72-98-1	Paved	Commercial Industrial
898 West Swanzey Road	71-9	Unpaved	Single Family/Duplex
919 West Swanzey Road	71-11	Paved	Commercial/Industrial
968 West Swanzey Road	70-34	Paved	Commercial/Industrial
972 West Swanzey Road	70-33	Paved	Commercial/Industrial

Non-Permitted Access

For the purpose of this study, non-permitted access points are defined by NHDOT driveway design policy 9(c), "Access to the state highway from the parcel other than by a permitted driveway(s) shall be prohibited". Although SWRPC is not aware of a complete dataset of permitted driveways, efforts are made during the review of aerial imagery in the study area to identify potential non-permitted access points. Properties with access points that appear to be nonpermitted are labeled as "suspect". In total, seven properties along the corridor are identified as having potentially non-permitted access. Generally, driveways are identified as potentially non-permitted if they are not the primary access to the parcel, are unpaved, appeared to have intermittent or infrequent use, or appeared to violate other design standards such as slope, grade, corner clearance, or degree of intersection with the highway. Of properties identified as suspect for non-permitted access, 6 of the 7 are residential in nature and one is commercial or industrial in

nature. Non permitted access points compromise the system of access management along NH 10, and can cause safety issues as well as disruptions in service, greater delays, and lowered capacity.

Table 5: Parcels with suspected non-permitted access

Parcel Address	Parcel Map Number	Parcel Land Use
529 West Swanzey Road	56-10	Single Family/Duplex
888 West Swanzey Road	71-8	Single Family/Duplex
920 West Swanzey Road	71-10	Commercial/Industrial
1026 West Swanzey Road	70-23	Single Family/Duplex
1035 West Swanzey Road	70-24	Single Family/Duplex
59 Westport Village Road	88-14-2	Single Family/Duplex
102 Westport Village Road	88-30	Single Family/Duplex

Miscellaneous Objects & Loading Infractions

Two other categories of nonconformity include miscellaneous objects in the right of way and nonpermitted loading in the right of way. Miscellaneous objects violations are defined by design guideline 5 of NH DOT's driveway policy, and loading infractions are defined in design guideline 4 of the policy. Both are difficult to discern without a site visit, but using aerial imagery, eight properties are identified as being suspect for miscellaneous objects nonconformities and three are found to be suspect for loading nonconformities. The majority of properties with suspected miscellaneous objects are commercial or industrial in nature.

Table 6: Parcels with suspected miscellaneous objects in the NH 10 right-of-way

Parcel Address	Parcel Map Number	Parcel Land Use
10 West Swanzey Road	38-2	Other Multifamily
189 West Swanzey Road	52-1	Commercial/Industrial
487 West Swanzey Road	55-5	Single Family/Duplex
608 West Swanzey Road	57-2	Commercial/Industrial
627 West Swanzey Road	73-28	Commercial/Industrial
639 West Swanzey Road	73-26-1	Commercial/Industrial
- West Swanzey Road	72-98	Commercial/Industrial
876 West Swanzey Road	71-7	Commercial/Industrial

Table 7: Parcels with suspected vehicles parking, loading, vending or servicing in the NH 10 right-of-way

Parcel Address	Parcel Map Number	Parcel Land Use
529 West Swanzey Road	56-10	Single Family/Duplex
617 West Swanzey Road	73-29	Single Family/Duplex
59 Westport Village Road	88-14-2	Single Family/Duplex

On-Road Access Management Features

Critical to understanding potential access management issues along the Corridor is gauging the current conditions of on-road access management features along NH 10. In this analysis, on-road access management features include left-hand turn lanes, right-hand turn lanes, flush or painted medians, stop signs, and two-way left turn lanes. Out of any of the features above, two-way left turn lanes comprise the predominate form of on-road access management in the Corridor. There is approximately one half-mile of two-way left turn lanes on NH 10 in the study area. This represents approximately 9% of the total length of NH 10 through Swanzey. Two-way left turning lanes provide safety benefits through a reduction in crashes, increased capacity, and reduced delays. However, they also create the potential for overlapping left turn movements, can encourage strip commercial development, and provide minimal safety benefits to pedestrians and bicycles with the exception of reducing left-turn conflicts. Left- and right-hand turn lanes are present at the intersections of Base Hill Road, Ash Hill Road, North Winchester Street, and California Street. Two-way left turn lanes provide storage for turning vehicles in the stretch of NH 10 in the vicinity of Gomarlo's Shop and Save Supermarket, Perry Lane and West Street. Multiple turn lanes provide access to Market Basket at 11 West Swanzey Road, and a left-hand turn lane provides storage for vehicles turning into the Tire Warehouse at 1050 West Swanzey Road. The turn lanes serving the Ash Hill Road and Base Hill Road intersections are by far the longest along the corridor, at 300 and 400 feet respectively, while the turn lanes at the intersections of North Winchester Street and California Street are relatively short at approximately 100 feet each. A comprehensive map series of the on-road access management features can be found in Appendix A.

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Appendix A: On-Road Access Management Features & Nonconformities Map Series

Note: Map series begins at the Keene town line and ends at the Winchester town line.



Page 1 of 5

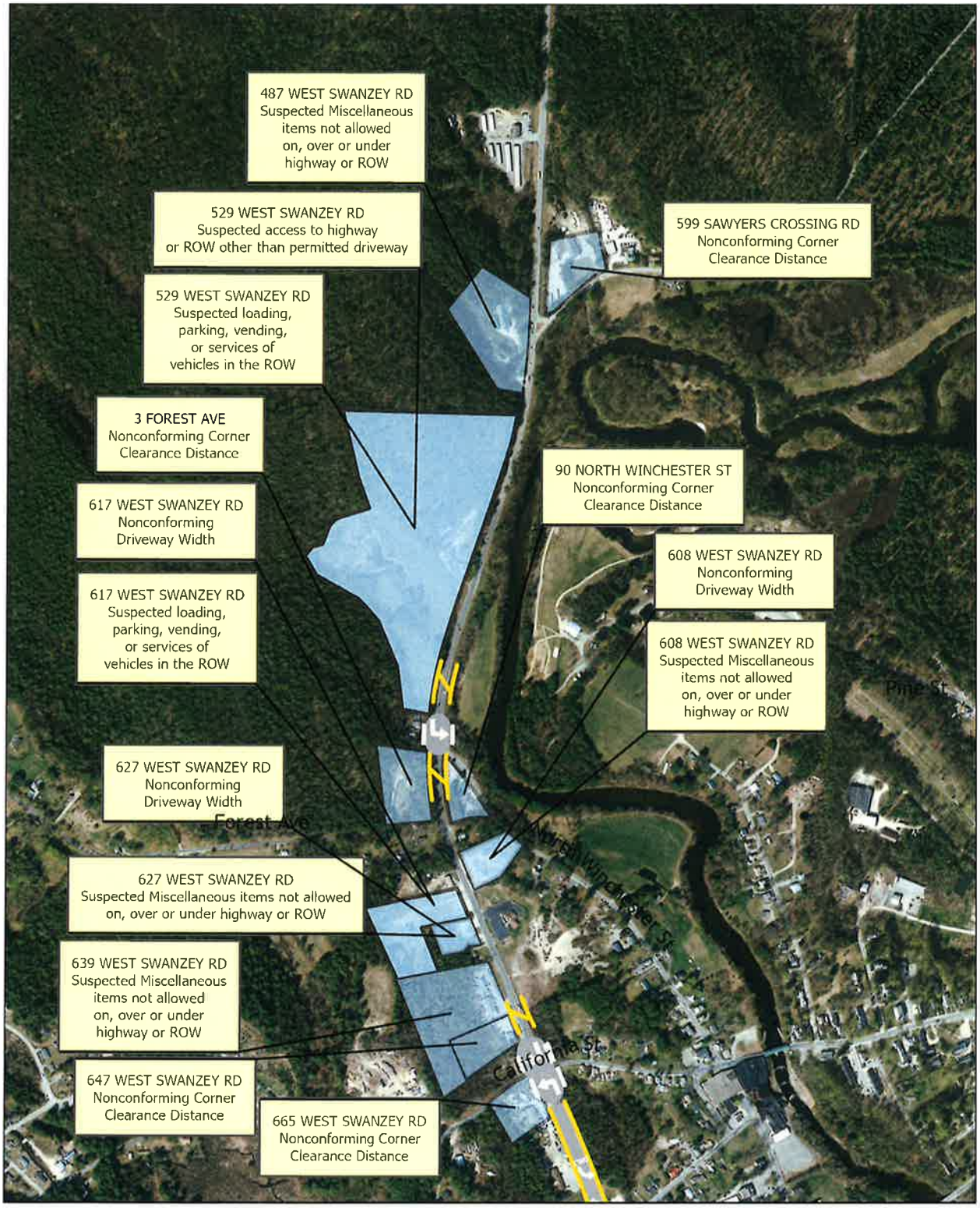


NH 10 Access Management Features

N

0 500 US Feet

Turn Lanes
Two Way Left Turn Lane
Flush Median
Nonconforming Parcels
Width
Width



NH 10 Access Management Features

N

0 500 US Feet

Turn Lanes

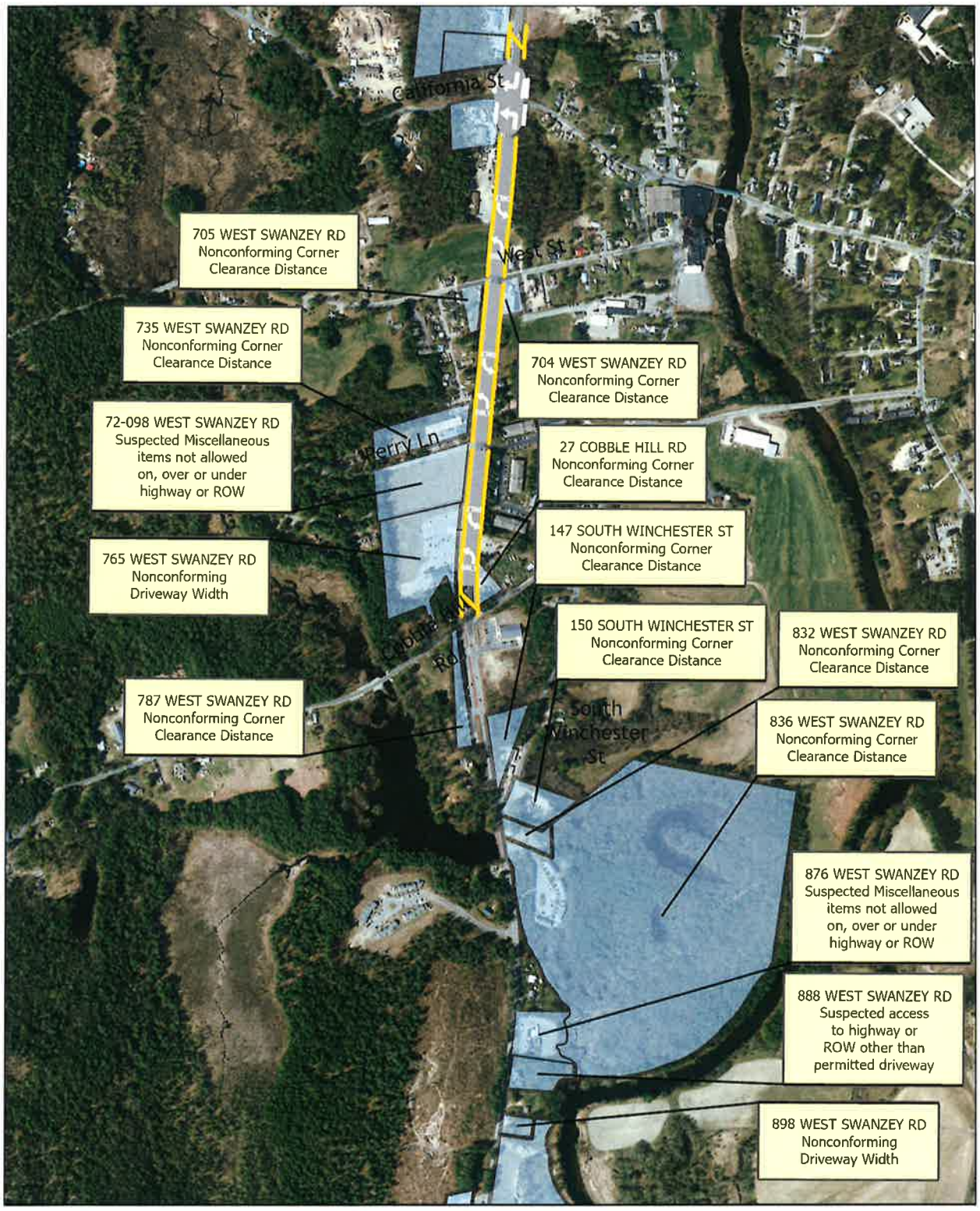
Two Way Left Turn Lane

Flush Median

Nonconforming Parcels

Width

Width



N

0 500 US Feet

NH 10 Access Management Features

Turn Lanes

Two Way Left Turn Lane

Flush Median

Nonconforming Parcels

Width

Width



NH 10 Access Management Features

N

0 500 US Feet

Turn Lanes

Two Way Left Turn Lane

Flush Median

Nonconforming Parcels

Width

Width

Swanzey NH 10 Corridor Study

Swanzey NH 10 Corridor Study Working Group

December 8, 2020

Today's Presentation

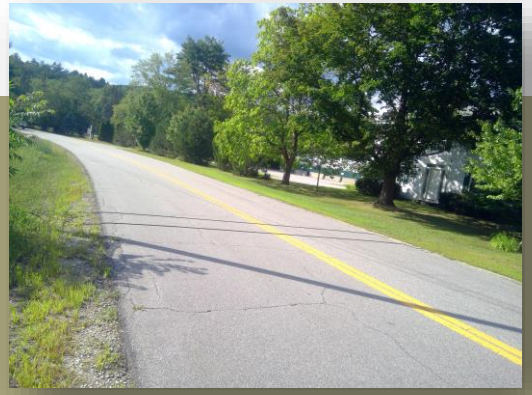
- Overview of Traffic Research Effort
- Overview & Findings from Field Review of NH 10 Intersections
- Overview & Findings from Access Management Analysis



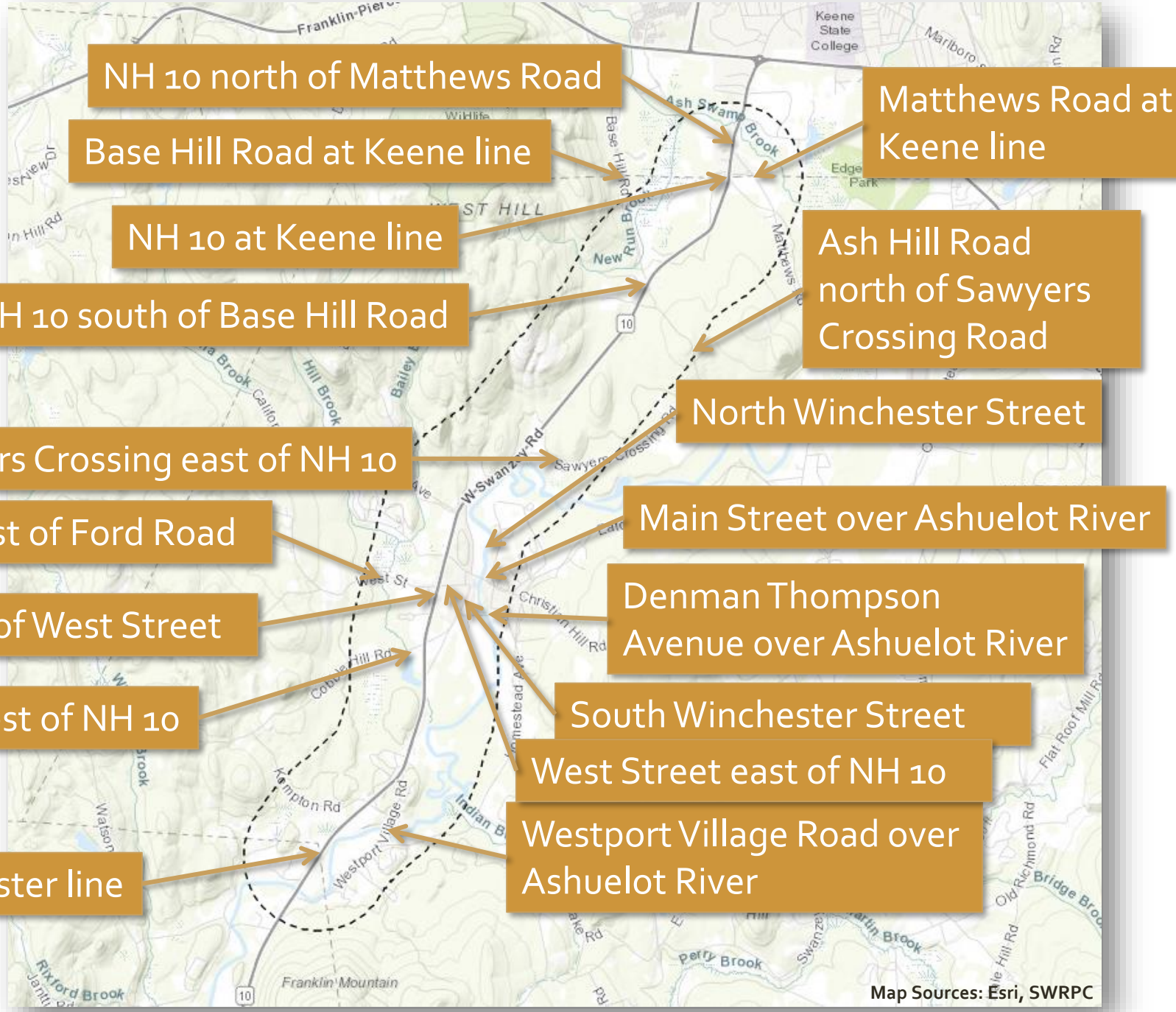
Overview of Traffic Research Effort

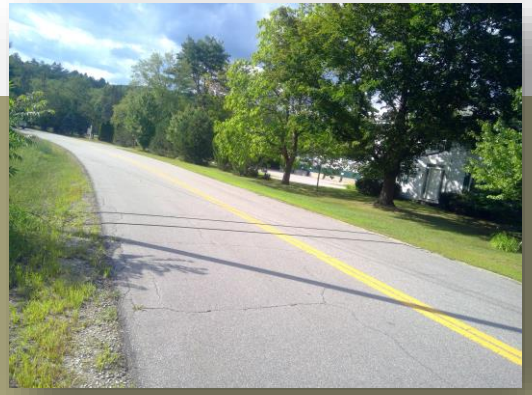
Topic Overview

- Automatic Traffic Recorder (ATR) Studies (SWRPC)
  - Volume
  - Classification
  - Speed
  - Gaps
- Turning Movement Studies (SWRPC)
- Rideshare Studies (SWRPC)
- Walking and Biking
  - Ashuelot Rail Trail
  - Strava Global Heatmap, Strava Metro

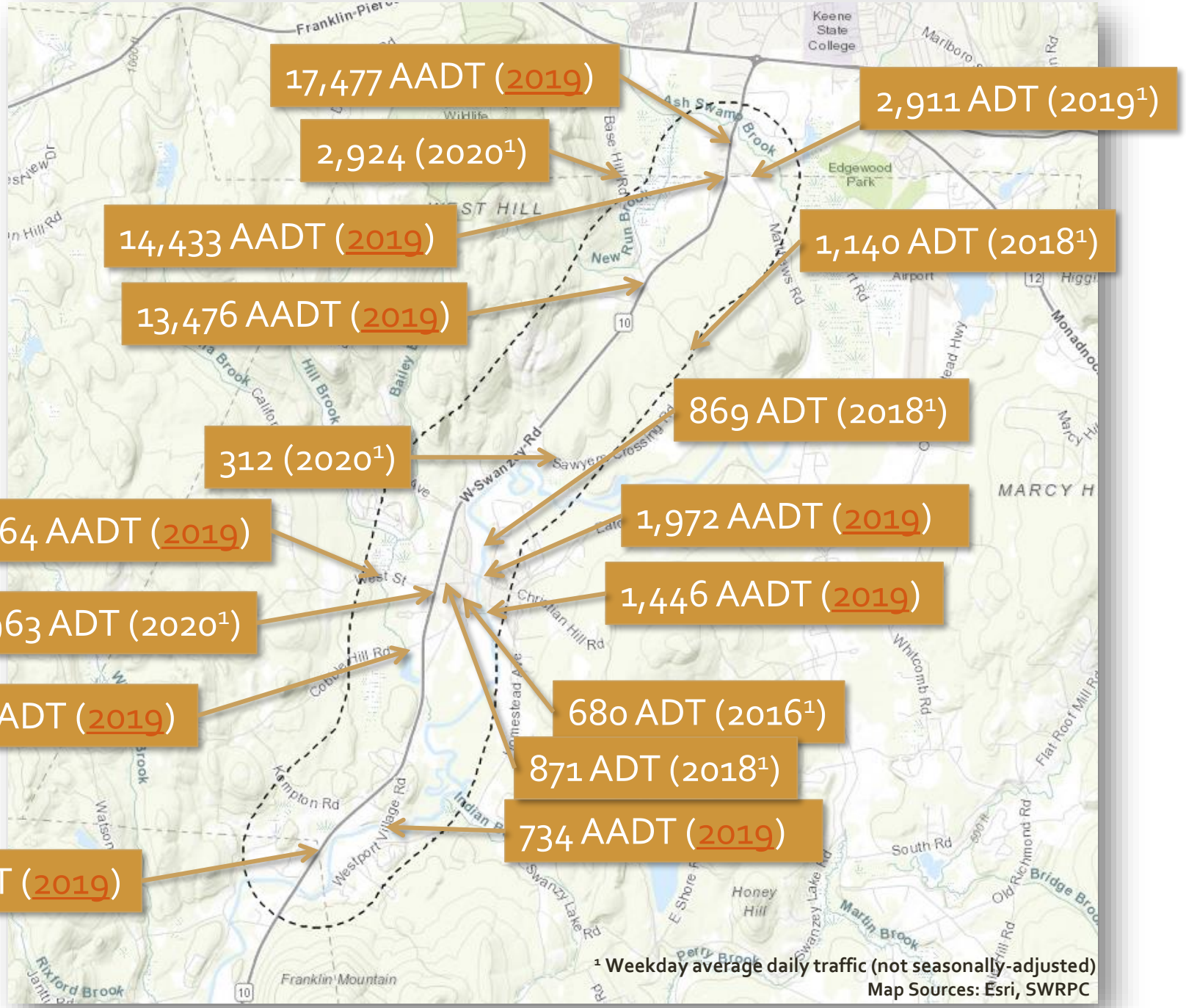


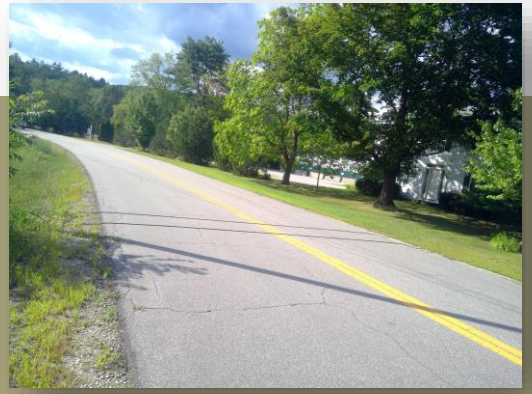
ATR Studies Locations



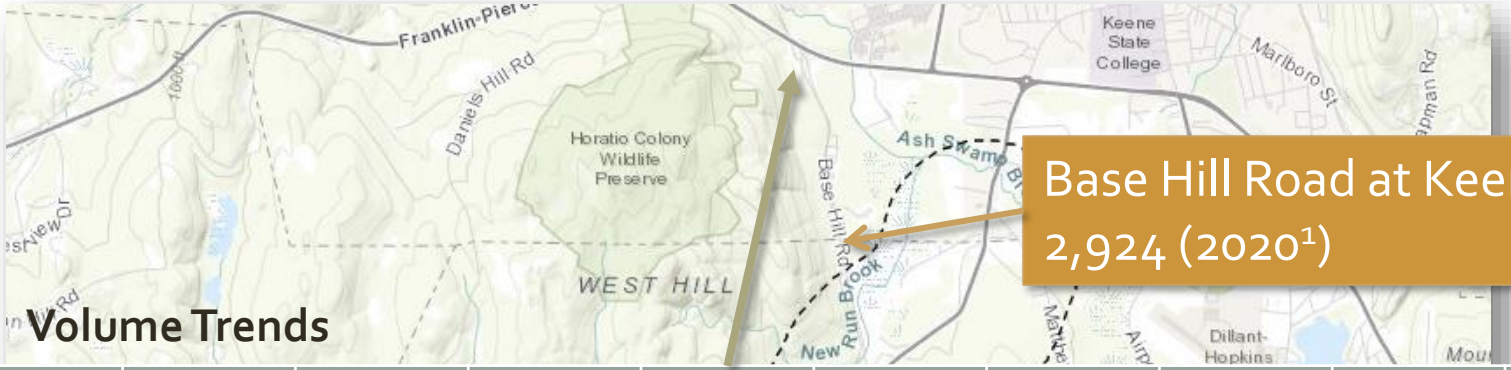


ATR Studies Volumes





ATR Studies Selected Findings



Volume Trends

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
3,600	-	-	3,100	-	-	3,689	-	-	3,231	-

Classification

	Average Weekday Volume	%
Passenger Cars & Trucks	2,836	97.0
Medium-Duty Trucks	77	2.6
Heavy Duty Trucks	11	0.4

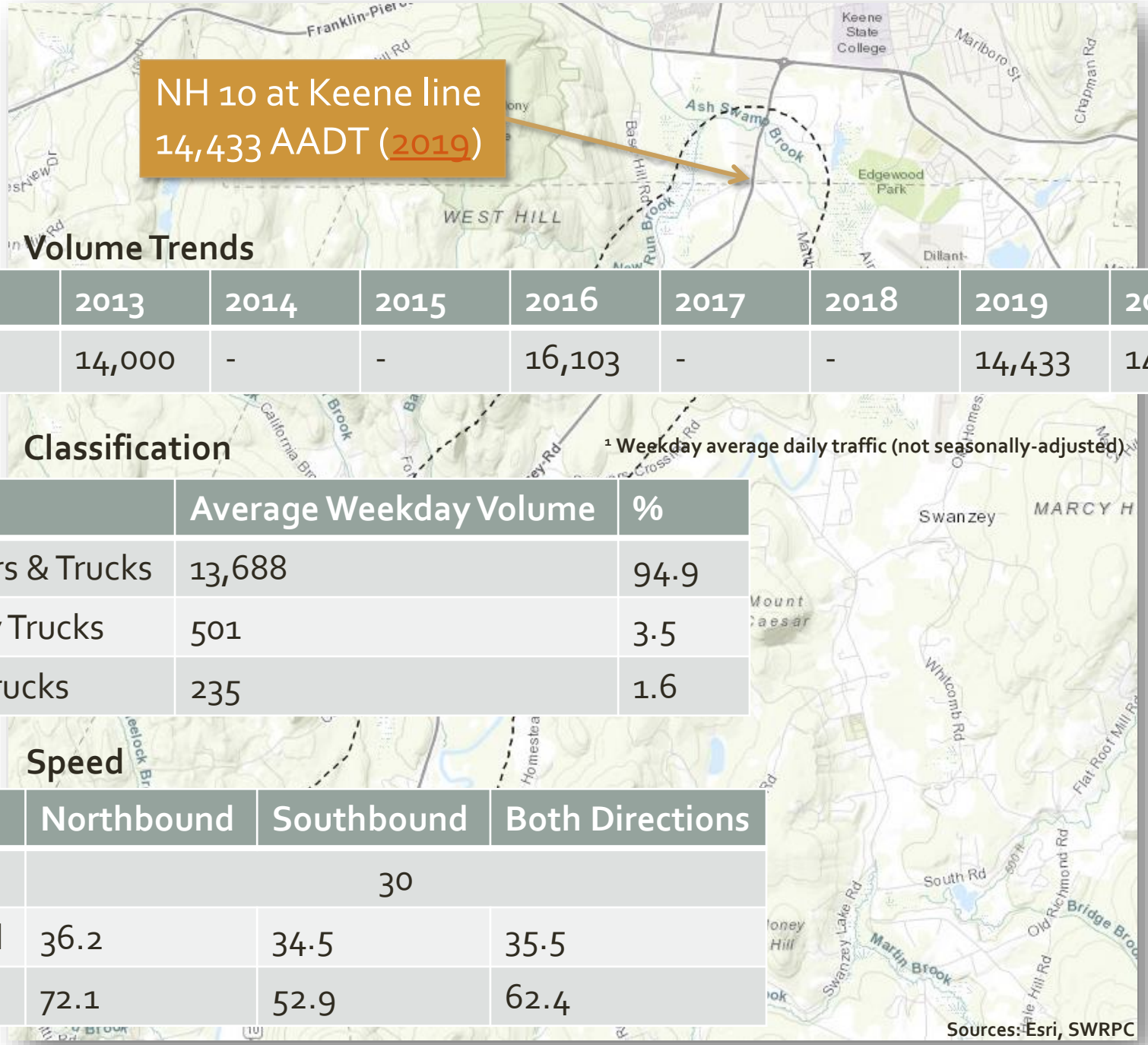
Speed

	Northbound	Southbound	Both Directions
Posted Speed Limit	30 mph		
85th Percentile Speed	41.3	42.1	41.6
Percent Exceeding	94.5	94.6	94.5

t seasonally-adjusted)
Sources: Esri, SWRPC



ATR Studies Selected Findings



Volume Trends

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
13,000	-	-	14,000	-	-	16,103	-	-	14,433	14. 424[1]

[1] Weekday average daily traffic (not seasonally-adjusted)

Classification

	Average Weekday Volume	%
Passenger Cars & Trucks	13,688	94.9
Medium-Duty Trucks	501	3.5
Heavy Duty Trucks	235	1.6

Speed

	Northbound	Southbound	Both Directions
Posted Speed Limit	30		
85th Percentile Speed	36.2	34.5	35.5
Percent Exceeding	72.1	52.9	62.4



ATR Studies Selected Findings

Volume Trends

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
13,000	-	-	14,000	-	-	13,043	-	-	13,476	-

NH 10 south of Base Hill Road
13,476 AADT (2019)

Classification

	Average Weekday Volume	%
Passenger Cars & Trucks	13,709	94.7
Medium-Duty Trucks	622	4.3
Heavy Duty Trucks	140	1.0

Speed

	Northbound	Southbound	Both Directions
Posted Speed Limit	40		
85th Percentile Speed	44.0	48.4	46.9
Percent Exceeding	40.8	72.2	56.5

Sources: Esri, SWRPC



ATR Studies Selected Findings

Volume Trends

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
-	-	-	-	-	-	-	-	-	-	312[1]

[1] Weekday average daily traffic (not seasonally-adjusted)

Sawyers Crossing east of NH 10
312 (2020[1])

Classification

	Average Weekday Volume	%
Passenger Cars & Trucks	301	96.6
Medium-Duty Trucks	10	3.2
Heavy Duty Trucks	1	0.2

Speed

	Westbound	Eastbound	Both Directions
Posted Speed Limit	30		
85th Percentile Speed	39.9	39.4	39.5
Percent Exceeding	79.7	79.4	79.6

Sources: Esri, SWRPC



ATR Studies Selected Findings

Volume Trends

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
-	-	-	-	-	-	10,806[1]	-	-	-	9,963[1]

[1] Weekday average daily traffic (not seasonally-adjusted)

Classification

	Average Weekday Volume	%
Passenger Cars & Trucks	9,244	92.8
Medium-Duty Trucks	500	5.0
Heavy Duty Trucks	220	2.2

NH 10 south of West Street
9,963 ADT (2020[1])

Speed

	Northbound	Southbound	Both Directions
Posted Speed Limit	40		
85th Percentile Speed	48.9	48.8	48.9
Percent Exceeding	84.3	87.8	86.0

Sources: Esri, SWRPC



ATR Studies Selected Findings

Volume Trends

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
7,000	-	-	7,300	-	-	7,981	-	-	7,358	7,661[1]

[1] Weekday average daily traffic (not seasonally-adjusted)

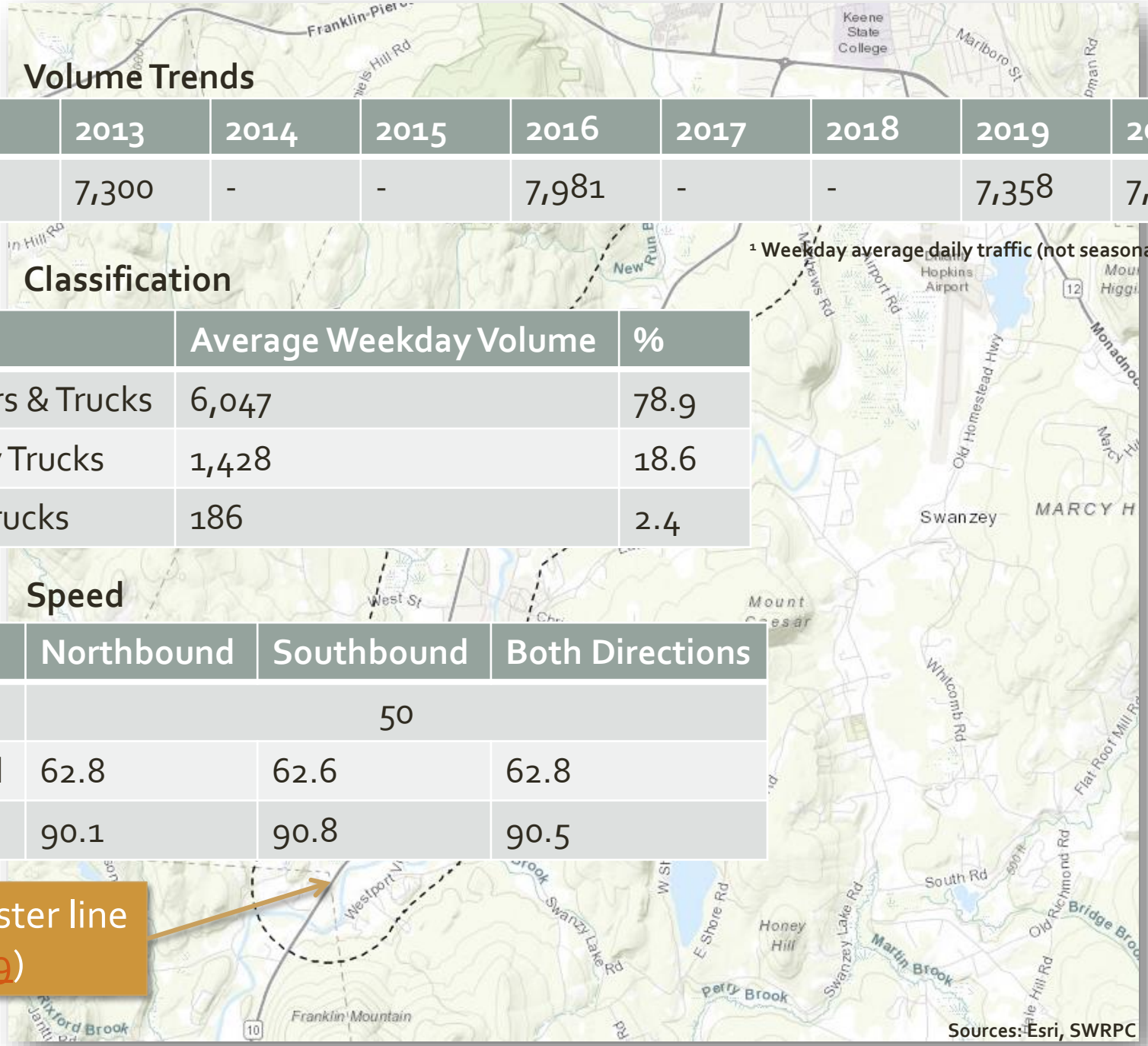
Classification

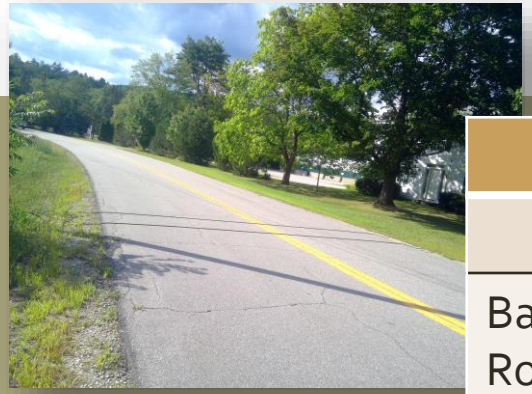
	Average Weekday Volume	%
Passenger Cars & Trucks	6,047	78.9
Medium-Duty Trucks	1,428	18.6
Heavy Duty Trucks	186	2.4

Speed

	Northbound	Southbound	Both Directions
Posted Speed Limit	50		
85th Percentile Speed	62.8	62.6	62.8
Percent Exceeding	90.1	90.8	90.5

NH 10 at Winchester line
7,358 AADT (2019)





ATR Studies Separation Statistics

		Ave.	6.5 sec. +		8.25 sec. +		8.5 sec. +		10 sec. +	
		Sec.	Gaps	%	Gaps	%	Gaps	%	Gaps	%
Base Hill Road at Keene line	Peak a.m. (8-9)	51.2	373	81.6	362	79.2	361	79.0	350	76.6
	Peak p.m. (4-5)	31.6	563	72.6	532	68.6	530	68.3	508	65.5
NH 10 at Keene line	Peak a.m. (8-9)	12.9	1604	41.3	1402	36.1	1365	35.2	1216	31.3
	Peak p.m. (4-5)	9.6	1593	26.0	1276	20.8	1241	20.2	1014	16.2
NH 10 south of Base Hill Road	Peak a.m. (7-8)	8.6	943	27.6	757	22.2	736	21.6	630	18.5
	Peak p.m. (5-6)	6.0	926	25.6	702	19.4	682	18.8	576	15.9
NH 10 south of West Street	Peak a.m. (7-8)	17.9	1087	47.6	964	42.2	946	41.4	861	37.7
	Peak p.m. (4-5)	12.9	1337	37.9	1126	31.9	1106	31.3	945	26.8
NH 10 at Winchester line	Peak a.m. (7-8)	17.6	899	55.6	841	52.0	827	51.1	760	47.0
	Peak p.m. (4-5)	12.8	1175	42.6	1035	37.5	1017	36.8	898	32.5

Fitzpatrick, K. (1991). GAPS ACCEPTED AT STOP-CONTROLLED INTERSECTIONS. Transportation Research Record.

Walking & Biking: SWRPC Ashuelot Rail Trail Counts

Southwest Regi
37 Ashuelot Street Keene, N

DATE: June 28, 2019

TO: Plan for Ashuelot Rail Trail Project

FROM: SWRPC Staff

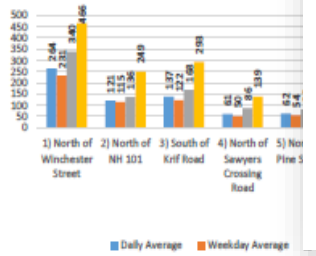
RE: Existing Conditions Assessment – Bi

During 2018, SWRPC conducted nine bicycle and pede
infrared sensors (Table 1, Figure 2). The purpose of thi
at each location (Figure 1). Reports that differentiate be
are forthcoming. The data depicted below represent co
are attached. SWRPC has planned a recount for 2019 a

Table 1 - List of Ashuelot Rail Automatic Count Locatio

#	Municipality	Description
1	Keene	North of Winchester Street
2	Keene	North of NH 101
3	Keene	South of Krif Road
4	Swanzey	North of Sawyers Crossing R
5	Swanzey	North of Pine Street
6	Winchester	North of Elm Street
7	Winchester	East of Gunn Mountain Road
8	Winchester	East of Recycle Way
9	Hinsdale	East of Depot Street

Figure 1 - Count Location Summary (Trips per Day)

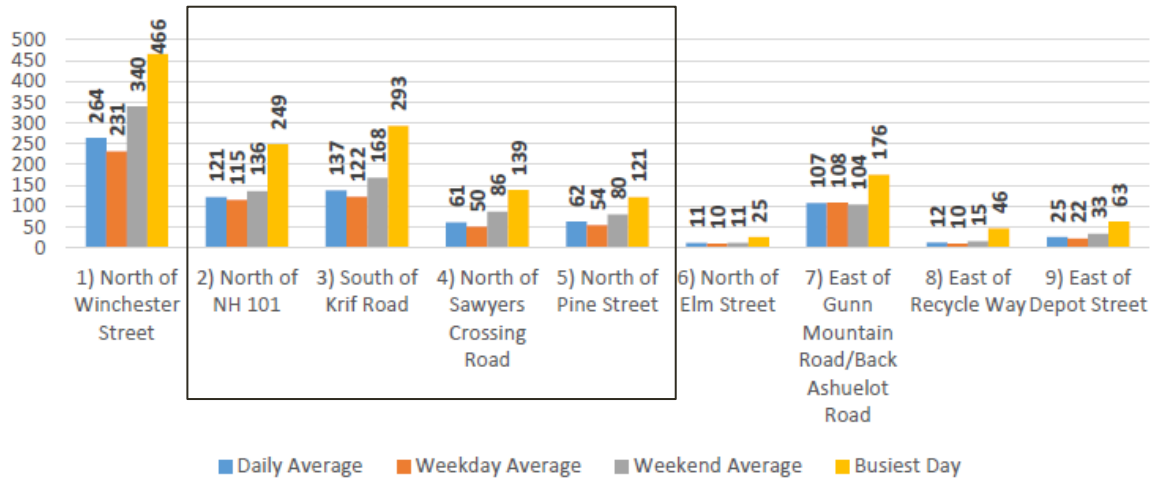


Z:\Transportation\UPWP 2018-2019\200_Policy&Planning\211_Bike\Ped\Planning\Rail Trail Planning\Task 3 - Existing Conditions Assessment\Task 3.4 - Bicycle_Pedestrian Counts\Technical Memo\Memo.docx 1

Table 1 - List of Ashuelot Rail Automatic Count Locations

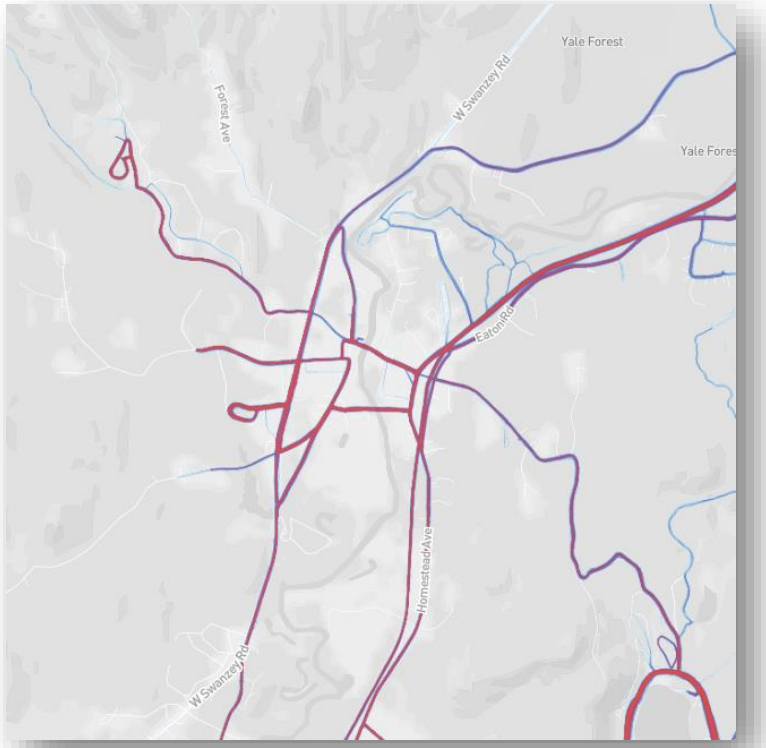
#	Municipality	Description	Study Start	Study End
1	Keene	North of Winchester Street	6/1/2018	6/20/2018
2	Keene	North of NH 101	6/22/2018	7/10/2018
3	Keene	South of Krif Road	8/4/2018	9/12/2018
4	Swanzey	North of Sawyers Crossing Road	7/12/2018	7/31/2018
5	Swanzey	North of Pine Street	6/1/2018	6/20/2018
6	Winchester	North of Elm Street	6/1/2018	6/20/2018
7	Winchester	East of Gunn Mountain Road/Back Ashuelot Road	7/31/2018	9/16/2018
8	Winchester	East of Recycle Way	8/2/2018	9/16/2018
9	Hinsdale	East of Depot Street	7/12/2018	7/31/2018

Figure 1 - Count Location Summary (Trips per Day)

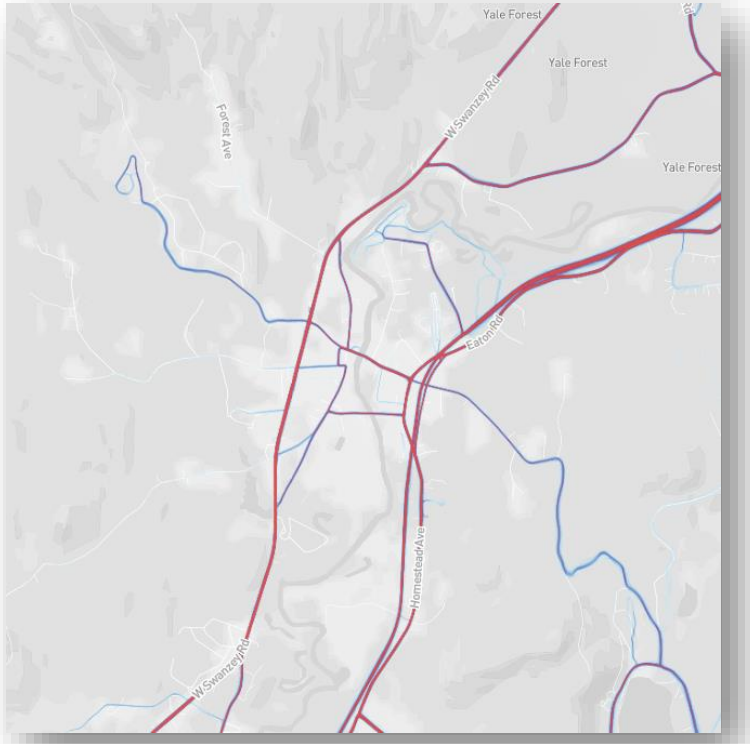


Walking & Biking: Strava Global Heatmap

Walking



Biking



Source: https://www.strava.com/heatmap#13.87/-72.33712/42.87246/bluered/ride

Carpooling

Southwest Region Planning Commission
37 Ashuelot Street
Keene, NH 03431

Swanzey, NH
NH 10 South of Base Hill Road
Average Price of Gas $2.65

Groups Printed- Unshifted

	NH 10 south of Base Hill Road From North				NH 10 south of Base Hill Road From South				
Start Time	1 Person	2 People	3 People	3 + People	1 Person	2 People	3 People	3 + People	Int. Total
07:30 AM	61	5	0	0	182	18	0	0	266
07:45 AM	56	9	0	0	151	20	1	1	238
Total	117	14	0	0	333	38	1	1	504
08:00 AM	56	7	0	0	121	15	0	0	199
08:15 AM	53	8	0	0	134	17	1	0	213
Grand Total	226	29	0	0	588	70	2	1	916

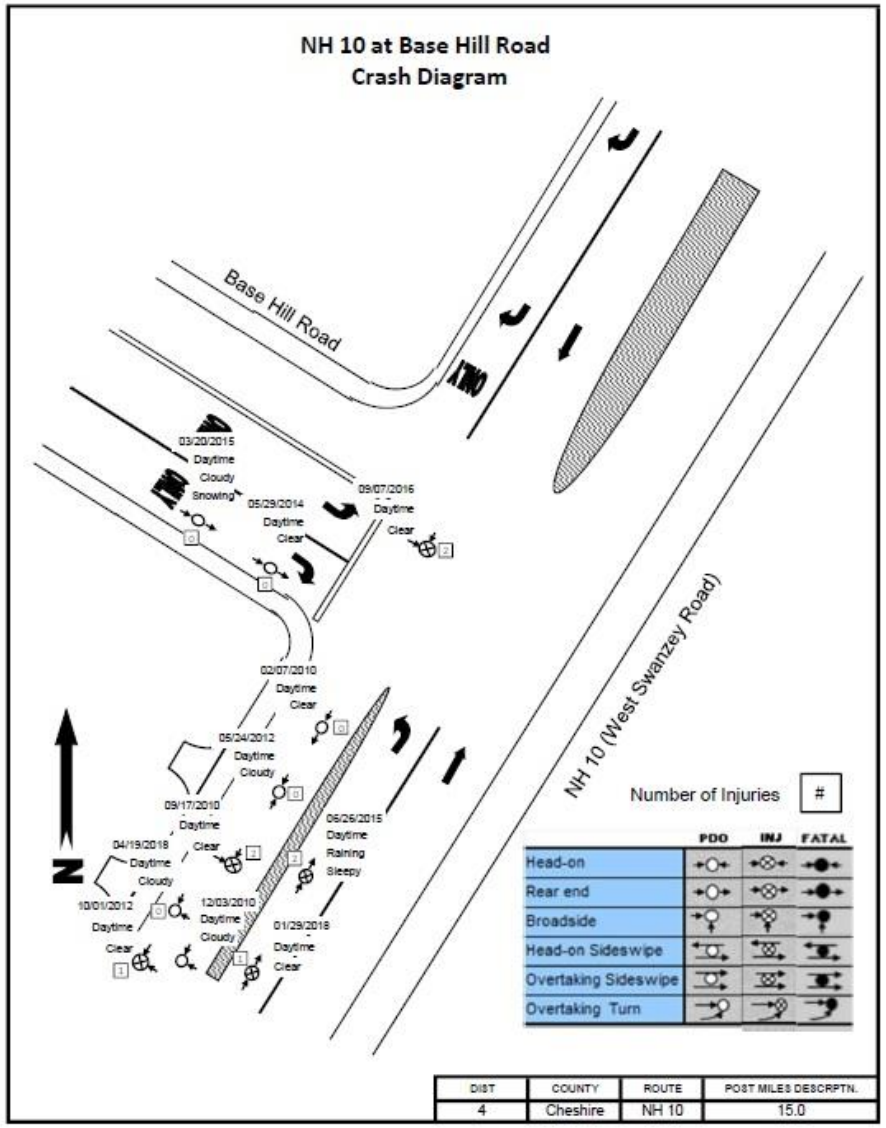
Groups Printed- Unshifted

	NH 10 south of Base Hill Road From North				NH 10 south of Base Hill Road From South				
Start Time	1 Person	2 People	3 People	4+ People	1 Person	2 People	3 People	4+ People	Int. Total
07:30 AM	61	5	0	0	182	18	0	0	266
07:45 AM	56	9	0	0	151	20	1	1	238
Total	117	14	0	0	333	38	1	1	504
08:00 AM	56	7	0	0	121	15	0	0	199
08:15 AM	53	8	0	0	134	17	1	0	213
Grand Total	226	29	0	0	588	70	2	1	916
Apprch %	88.6	11.4	0	0	89	10.6	0.3	0.2	
Total %	24.7	3.2	0	0	64.2	7.8	0.2	0.1	

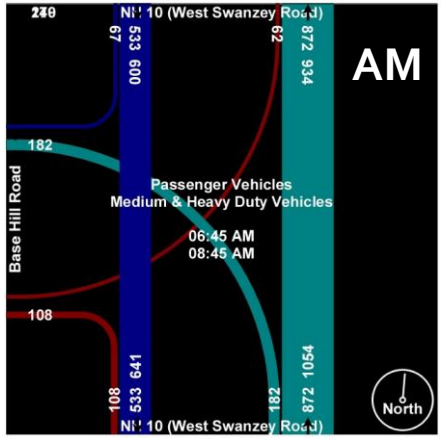


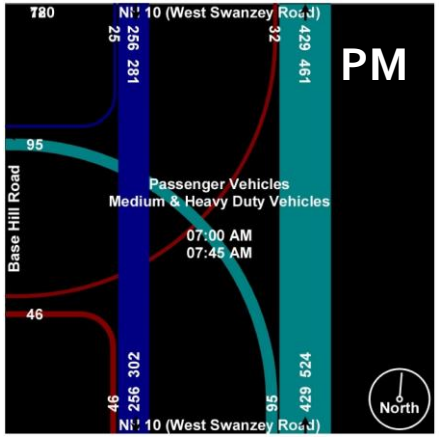
Overview & Findings from Field Review of NH 10 Intersections

NH 10 & Base Hill Road Intersec-tion



- Base Hill Road approach to NH 10 = 2 rear-end collisions (0 injuries)
- NH 10 northbound approach making left on Base Hill Road = 2 rear-end collisions (3 injuries)
- Crashes involving Citgo on NH 10 = 6 collisions (3 injuries) including 4 side swipes, 1 rear-end and 1 head-on collisions
- NH 10 South of Base Hill Road AADT = 13,476 (2019)
- Base Hill Road AADT = 2,924 (2020)







Geometrics

- No shoulder on part of the west side of highway
- Northern NH 10 curb cut at Citgo is not in line with current driveway permitting standards (corner clearance)
- From Base Hill Road, the sight line to the south

Operations

- Painted median
- Dunkin Donuts drive thru
- Speeding
- Driver confusion with turn signals
- Southbound right-turn lane

Road Users

- Not many walkers, occasional bicyclists
- Base Hill Road alternate route
- NB trucks occasionally seen parking in shoulder

Environment

- No lighting at intersection
- No known snow or drainage issues
- No known glare issues
- No issues with signage or striping



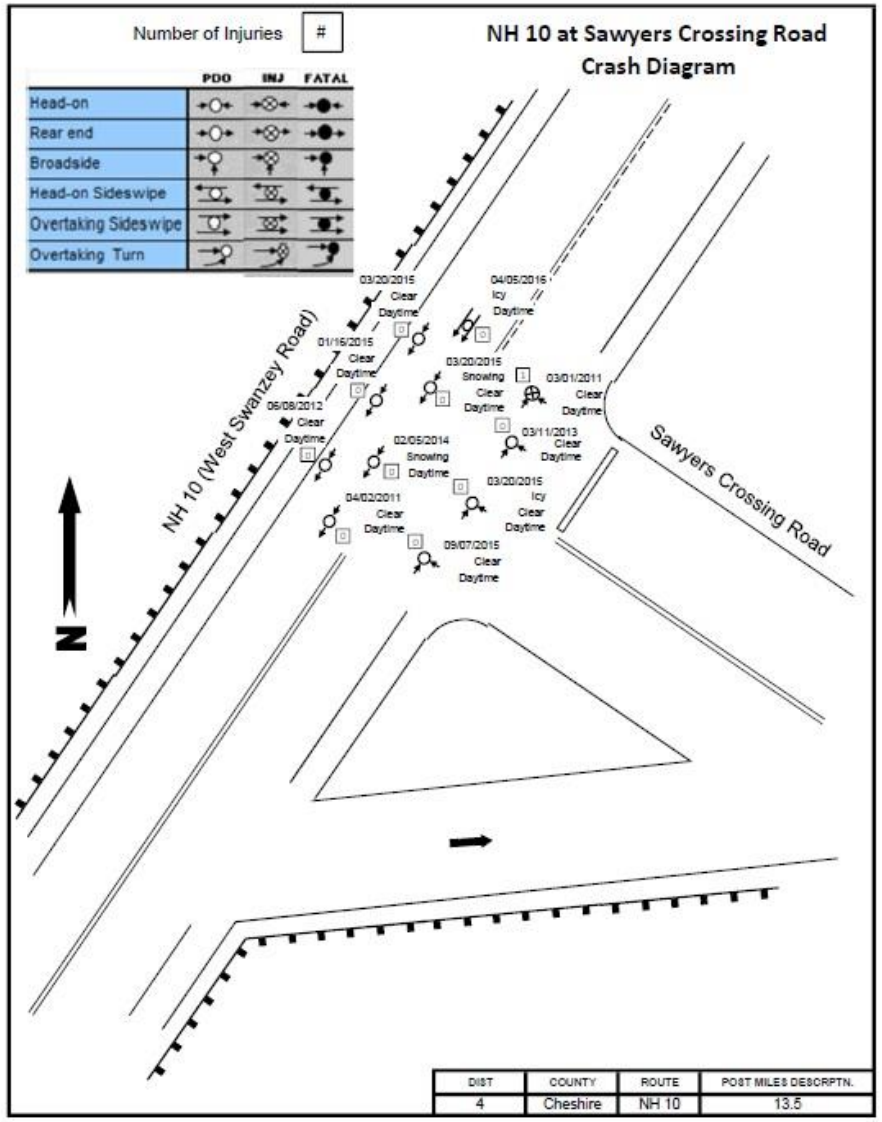
Long term:
Replace flush median with raised median in front of Citgo

- This likely would be contested by current owner
- Could happen during future change of use at the property
- Raised median could be installed either full length of Citgo property or just along a portion so as to require right-in/right-out for the northerly curb cut.

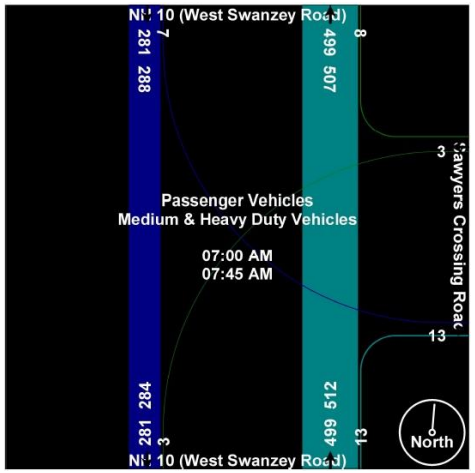
Long term:
Install signal at Base Hill Road

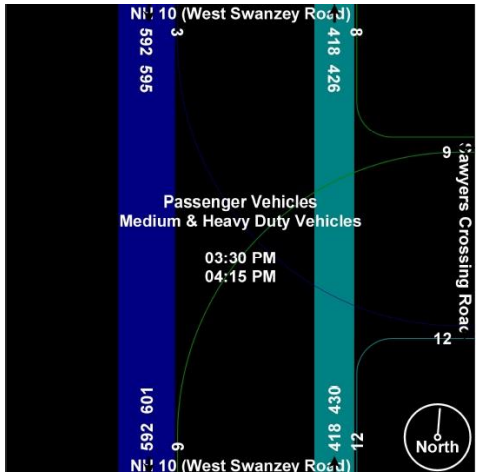
- Would need to determine if meets traffic signal warrant

NH 10 & Sawyer's Crossing Road Intersec-tion



- Sawyer's Crossing Road approach to NH 10 = 4 broadside collisions (1 injury)
- NH 10 southbound = 5 rear-end collisions and 1 overtaking sideswipe (0 injuries)
- NH 10 South of Base Hill Road AADT = 13,476 (2019)
- Base Hill Road AADT = 312 (2020)







Geometrics

- Narrow shoulders on NH 10
- NH 10 SB, no left turn lane
- Y shaped intersection
- Lane skewed for Sawyers Crossing turning left

Operations

- Relatively sharp left hand turn on Sawyer’s Crossing Road for southbound NH 10
- No stop bar
- No yield sign
- Deceleration area probably needed

Road Users

- Rhymes, Keene Gas and S&S Painting
- Used as route to Ash Hill Road, Matthews Road, and Swanzey Center

Environment

- Guardrail everywhere, steep slopes, and water nearby
- No lighting
- No known glare issues
- Tall grass in island, but no utility pole



Short term:

Yield sign for northbound NH 10 traffic turning right on Sawyer's Crossing Road and merging with eastbound Sawyer's Crossing Road traffic (or yield sign for eastbound Sawyer's Crossing Road?)

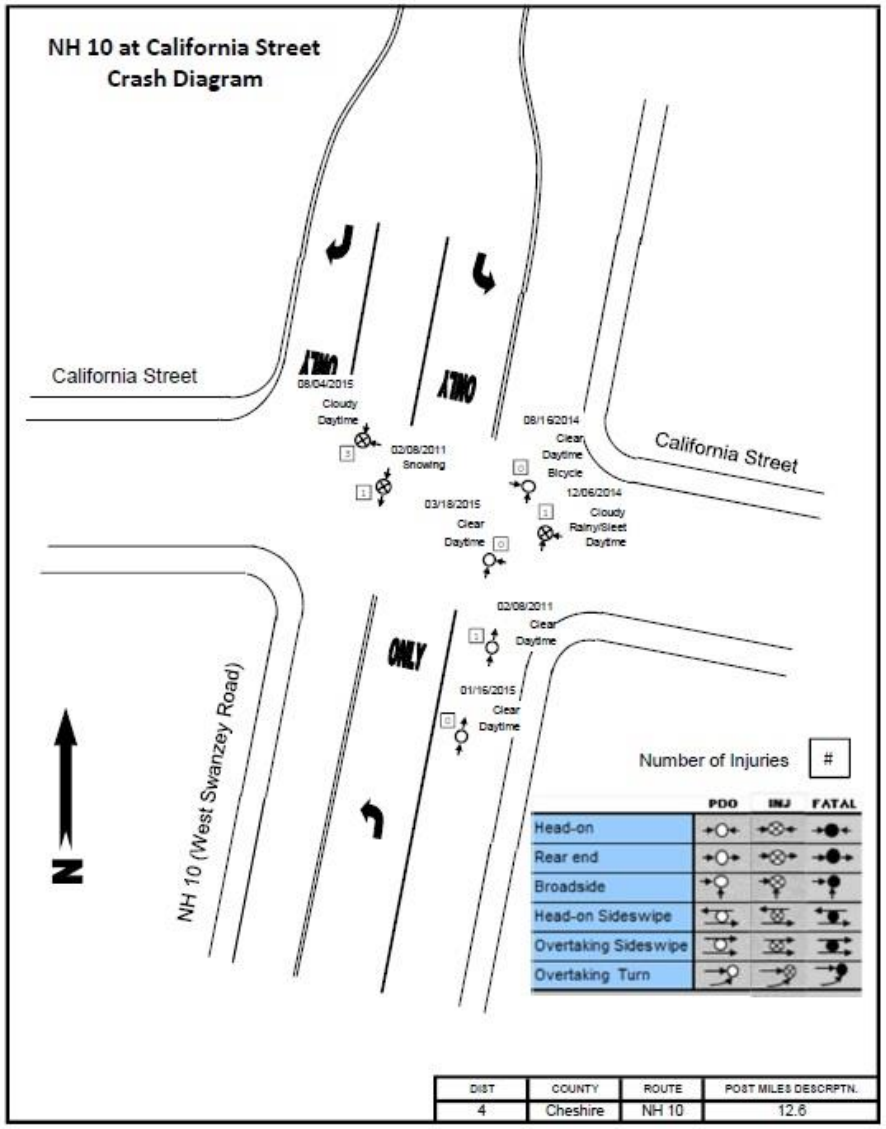
Medium term:

Not clear if completely T'ing intersection is best approach because of high speed in area and narrow shoulders on NH 10, but northerly Sawyer's Crossing Road curb cut approach could probably be more of a 90 degree angle to NH 10

Long term:

Increase NH 10 shoulder widths to improve safety and/or add southbound left turn lane; note that this would require significant earthwork and environmental permitting due to wet areas and steep slopes in the area.

NH 10 & California Street Intersec-tion



- No crash trends involving vehicles from west side of intersection except 1 crash involving vehicle crossing westbound straight across NH 10 and colliding with NH 10 southbound traffic = 1 broadside collision (3 injuries)
- California Street westbound approach to NH 10 = 3 broadside collisions (1 injury)
- NH 10 southbound = 1 rear-end collision (1 injury), snow involved
- NH 10 northbound = 2 rear-end collisions (1 injury)
- NH 10 South of West Street AADT = 9,971 (2020)
- Main Street over Ashuelot River AADT = 1,972 (2019)

NH 10 South of West Street peak hours:
- 7:30 a.m. to 8:30 a.m. – **590** vehicles
- 11:45 a.m. to 12:45 p.m. – **715** vehicles
- 4:30 p.m. to 5:30 p.m. – **894** vehicles



Geometrics

- Lane striping (width) changes on either side of intersection on NH 10
- Road pavement on California Street on the west side
- Virtually no corner clearance from NH 10 for Larry's Homestead Garage curb cut

Operations

- No center line or shoulder lines painted on California Street
- No stop bars for either approach on California Street
- 2 LED streetlights at intersection

Road Users

- Residential subdivision
- Used as route to to go into West Swanzey and to reach the Swanzey Recycling Center

Environment

- Tree and brush sight distance on for California Street on west side looking south
- Utility pole on northwest corner impedes some sight distance



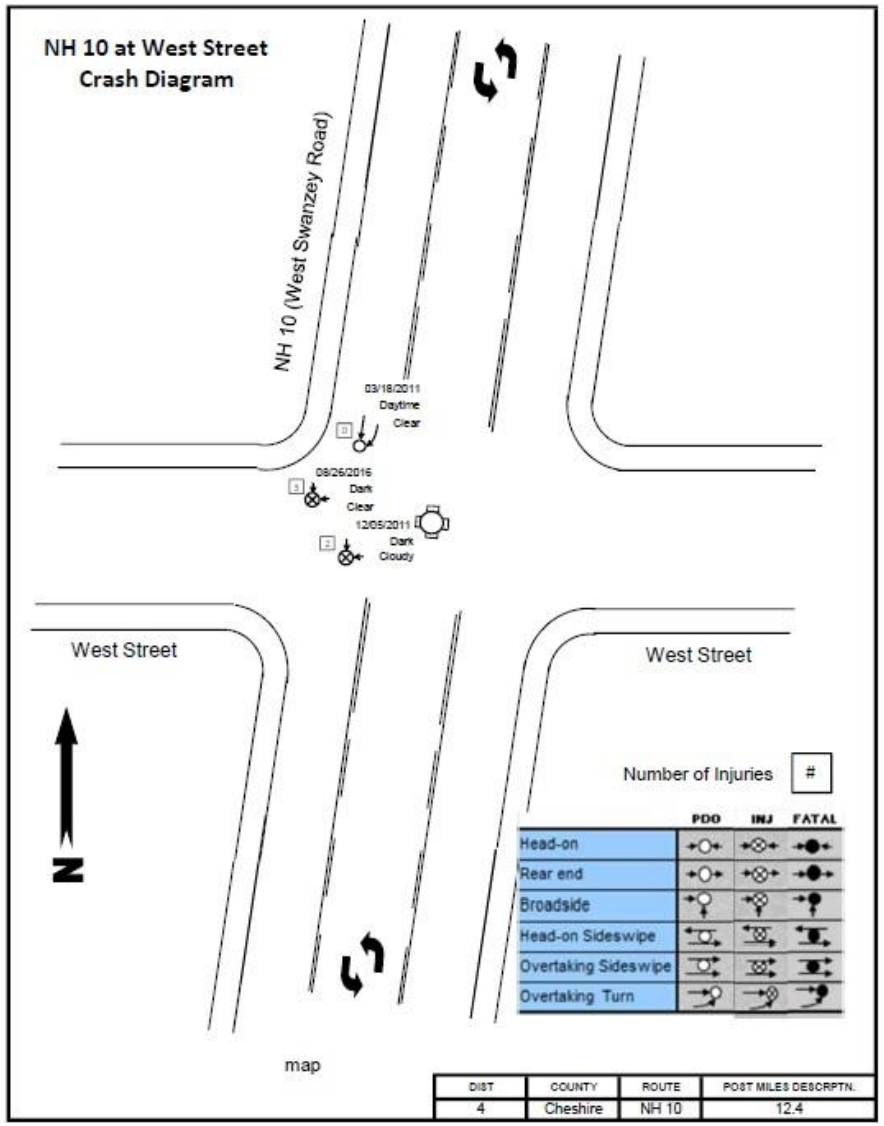
Short term:

- Cut brush/tree growth on the southeastern side of the intersection for westbound California Street traffic
- Paint center and shoulder lines as well as stop bars on California Street (is it possible to paint approaches only?)

Long term

- During change of use or site plan review, try to move curb cut at Larry's Homestead Garage farther west.
- Employ traffic calming measures including narrowing of highway

NH 10 & West Street Intersec-tion



- No crash trends involving vehicles from west side of intersection
- NH 10 southbound = one overtaking crash (0 injuries) and two broadside crashes involving westbound West Street traffic (5 injuries)
- NH 10 south of West Street AADT: **9,971** vehicles (2020).
- West Street east of NH 10 AADT: 894 (2018)

NH 10 South of West Street peak hours:
- 7:30 a.m. to 8:30 a.m. – **590** vehicles
- 11:45 a.m. to 12:45 p.m. – **715** vehicles
- 4:30 p.m. to 5:30 p.m. – **894** vehicles

West Street east of NH 10 peak hours:
- AM peak hour: 7:45 a.m. to 8:45 a.m. – **93** vehicles
- PM peak hour: 2:45 p.m. to 3:45 p.m. – **96** vehicles



Geometrics

- No highlights noted

Operations

- Flashing yellow and red beacon
- No center or shoulder lines
- No stop bars
- Wide road appears to encourage speeding

Road Users

- Single family homes on West side
- Homestead Woolen Mill on east side of West Street along with Moldpro Manufacturing
- Denman Thompson bridge over Ashuelot River
- Sidewalk along east side of NH 10 and on both sides of West Street

Environment

- Standing water on east side of highway
- Field on west side of highway gets very wet
- West Street eastbound traffic on west side of intersection sight distance issue



Medium term:

Drainage swale on west side of highway

Long term:

Employ traffic calming measures including narrowing of highway and improve pedestrian crossing at West Street with possible median and RRFB?

Overview & Findings from Access Management Analysis

Access Management: Definition

*Access Management is the **systematic control** of the location, spacing, design and operations of all points to a roadway including driveways, medians, and intersections*

-Access Management Manual: Transportation Research Board, Washington, D.C. 2003

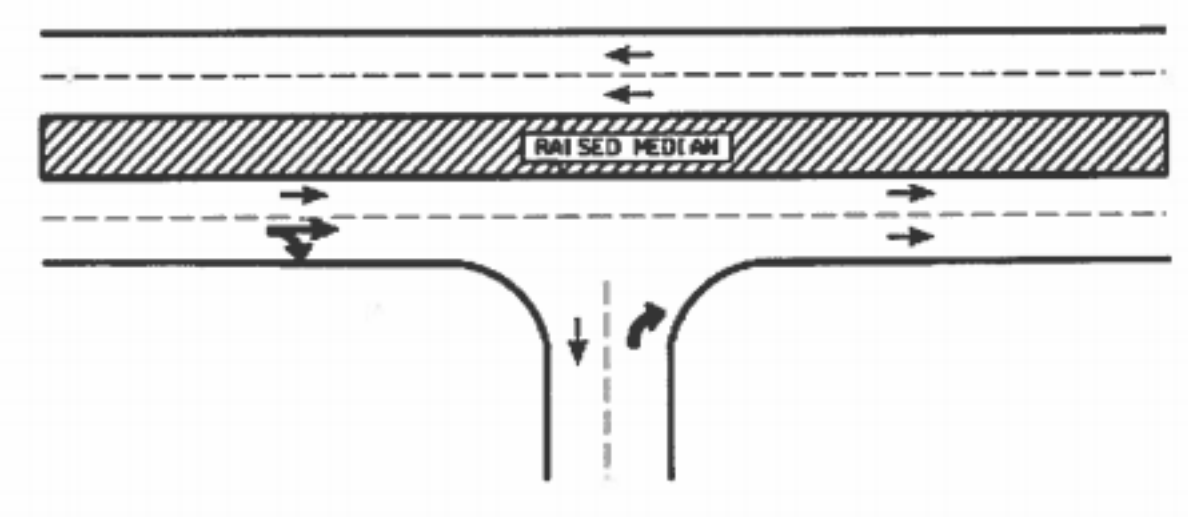
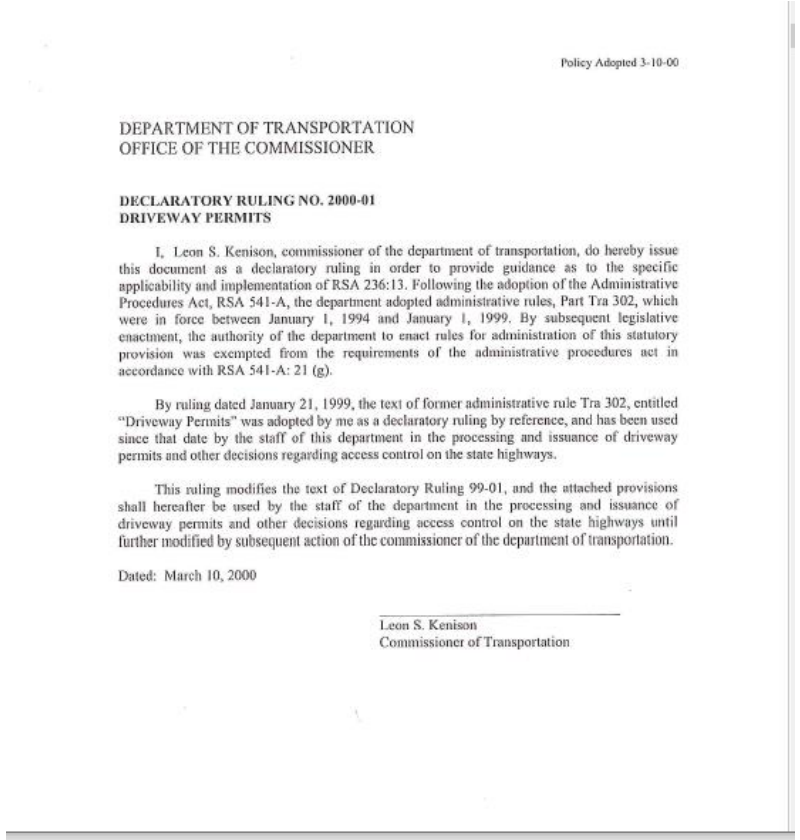


Image Courtesy of NH DOT

Additional Context

- NH DOT adopted a well-defined policy for driveway permitting on state owned roads in March of 2000, as established by NH RSA 236:13
- Landowners seeking to construct driveways accessing state-owned roads must first apply for a permit for construction or alteration, including change of use.
- Separate from NH DOT driveway policies, the Town of Swanzey has adopted two sets of driveway regulations, last updated in 2011. The two driveway policies are:
  - Driveway regulations for 1- and 2-family and non-commercial uses.
  - Access Management Regulations for multi-family and commercial uses.



Policy Adopted 3-10-00

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE COMMISSIONER

DECLARATORY RULING NO. 2000-01
DRIVEWAY PERMITS

I, Leon S. Kenison, commissioner of the department of transportation, do hereby issue this document as a declaratory ruling in order to provide guidance as to the specific applicability and implementation of RSA 236:13. Following the adoption of the Administrative Procedures Act, RSA 541-A, the department adopted administrative rules, Part Tra 302, which were in force between January 1, 1994 and January 1, 1999. By subsequent legislative enactment, the authority of the department to enact rules for administration of this statutory provision was exempted from the requirements of the administrative procedures act in accordance with RSA 541-A: 21 (g).

By ruling dated January 21, 1999, the text of former administrative rule Tra 302, entitled "Driveway Permits" was adopted by me as a declaratory ruling by reference, and has been used since that date by the staff of this department in the processing and issuance of driveway permits and other decisions regarding access control on the state highways.

This ruling modifies the text of Declaratory Ruling 99-01, and the attached provisions shall hereafter be used by the staff of the department in the processing and issuance of driveway permits and other decisions regarding access control on the state highways until further modified by subsequent action of the commissioner of the department of transportation.

Dated: March 10, 2000

Leon S. Kenison
Commissioner of Transportation

Scope of Analysis

1. Conformity with State and Local driveway permitting and design guidelines.
2. On-road features shaping access to land uses along the corridor
3. GIS analysis and mapping activities

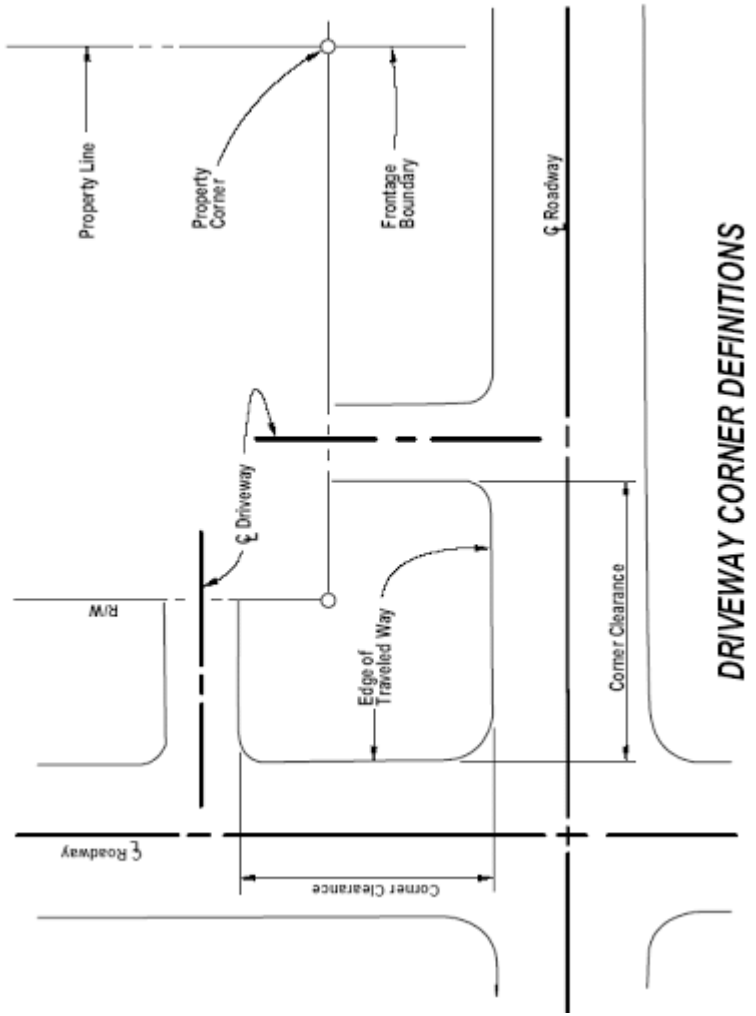


Image Courtesy of Alaska DOT

Nonconformities

NH DOT Jurisdiction Design Standards	Citation	Exceptions granted
If frontage on highway is 500 feet or less, no more than 2 access points	Policy 8 (b)	No
No more than 3 access points for frontage exceeding 500 feet	Policy 8 (c)	Yes, Policy 8 (d)
No parking, loading, vending or servicing vehicles on highway or ROW	Policy 9 (a)	No
Miscellaneous items not permitted on, over or under state highway or ROW	Policy 9 (b)	No
Access to highway from parcel other than permitted driveway is prohibited	Policy 9(c)	No
Except Major entrance exceptions, maximum width of driveway 50 feet wide	Policy 10 (a)	Yes, Policy 10 (b)
In rural areas, 200 feet corner clearance. In urban areas, 100 feet corner clearance.	Policy 10 (c)	Yes, Policy 10 (c)
No more than one access point if less than 400 feet all season sight distance both directions	Policy 8 (a)	No
Intersection of driveway to highway no less than 60 degrees unless "right turn only"	Policy 10 (d)	No
Radius may not extend beyond applicant's frontage without permission of abutter	Policy 10 (e)	No
5% slope for car length and vehicle storage incline or decline (20'-25' in length)	Policy 10 (f)	No
Maximum grade for major driveway is 8%, Maximum for driveway 15%, algaebraic difference between any 2 grades shall not exceed 10%	Policy 10 (g)	Yes, Policy 10 (g)
Gradual slopes on side of driveway	Policy 10 (h)	No

Nonconformities

- Corner Clearance (NH DOT & Town of Swanzey):
  - 19 parcels, 11 under NH DOT guidelines, 6 under Town of Swanzey guidelines, 2 under both NH DOT and Town of Swanzey guidelines.
- Driveway Width (NH DOT & Town of Swanzey):
  - 9 parcels, 7 of which are commercial/industrial properties.
- Access Points and Frontage (NH DOT):
  - 2 parcels, both with over 3 access points and 500 feet of frontage.
- Suspected Loading Violations:
  - 3 parcels, all single-family or duplex properties.
- Suspected Miscellaneous Objects:
  - 8 parcels, primarily commercial/industrial properties.
- Suspected Non-permitted Access:
  - 7 parcels, primarily single-family residential or duplex land use.

On-Road Access Management Features

- There are approximately one-half mile of two-way left-hand turn lanes in the Study Area, representing almost 9% of the length of NH 10 in Swanzey. Two-way left-hand turn lanes provide storage for turning vehicles at:
  - West Street
  - Gomarlo's Shop and Save Supermarket
  - Perry Lane
- Left and right-hand turn lanes serve the intersections of:
  - Base Hill Road
  - Ash Hill Road
  - California Street
- Left-hand turn lanes also provide access to:
  - North Winchester Street
  - Market Basket
  - Tire Warehouse

On-Road Access Management Features (Continued)

- Only painted/flush medians were found on the corridor, no raised medians.
  - The lack of raised medians may contribute to crashes along some parts of the corridor, including those highlighted earlier in the presentation.
  - Other forms of on-road access management features may provide greater levels on traffic calming



Mapping/GIS


Winchester St
Matthews Rd
Buff Um Rd
Base Hill Rd
Ash Hill Rd
10 WEST SWANZEY RD
Suspected Miscellaneous items not allowed on, over or under highway or ROW
133 WEST SWANZEY RD
Nonconforming Driveway Width
189 WEST SWANZEY RD
Suspected Miscellaneous items not allowed on, over or under highway or ROW
189 WEST SWANZEY RD
Nonconforming Corner Clearance Distance
N
0
500 US Feet
NH 10 Access Management Features
Turn Lanes
Two Way Left Turn Lane
Flush Median
Nonconforming Parcels
Width
Width
Page 1 of 5

Key Findings/ Recommendations

Key Findings

- Corner clearance represents the most pervasive form of nonconformity
- Nonconformities exist with both NH DOT and Town of Swanzey policies
- Driveway widths above NH DOT/Town of Swanzey guidelines are 2nd most common nonconformity
- Commercial/Industrial properties made up the majority of parcels with potential corner clearance and driveway width nonconformities.
- Low-density residential properties made up the majority of suspected non-permitted access to NH 10.

Recommendations

- Continue to monitor properties with suspected access management issues
- Collaboration between NH DOT and the Town of Swanzey to remedy nonconformities upon changes in use
- Enforcement of Town and State policies to ensure systemic control of access management
- Engage with landowners with nonconforming access to Town and State-owned roads to address access management issues proactively
- Conduct an audit of driveway permit terms for any driveways with current nonconformities

Southwest Region Planning Commission
37 Ashuelot Street Keene, NH 03431 603-357-0557 Fax 357-7440

Swanzey NH Route 10 Corridor Study Working Group

March 12, 2021
10:00 a.m.

Zoom Meeting Link:
http://bit.ly/Mar12SNH10WG21

Call-in Number: 1 646-558-8656

Meeting ID: **894 4896 7411**
Password: **969356**

Agenda

I. Welcome and Introductions

II. Overview and Findings from Land Use and Economic Analysis

III. Discussion: Survey or Stakeholder Interviews

IV. Discussion: Findings and Recommendations

V. Other Matters

VI. Next Meeting

VII. Adjourn

Southwest Region Planning Commission
37 Ashuelot Street Keene, NH 03431 603-357-0557 Fax 357-7440

Southwest Region Planning Commission

Swanzey NH Route 10 Corridor Study Working Group

Meeting Summary

December 8, 2020

Members Present: Matthew Bachler, *Planning and Economic Development* Director; Mike Gomarlo, *Economic Development Advisory Committee;* John Kallfelz, *NHDOT District 4;* Scott Self, *Planning Board, Sewer Commission.*

Staff members present: J. B. Mack, *Principal Planner;* Henry Underwood, *GIS Specialist/Planner,* James Weatherly, *Planning Technician.*

I. Welcome and Introductions

J. B. Mack called the meeting to order at approximately 9:00 a.m. and welcomed those in attendance. He said that staff would summarize work completed over the summer and fall.

II. Overview of Traffic Research Effort

Henry Underwood provided an overview of SWRPC's traffic data collection efforts, which occurred primarily over the summer, but also includes relevant data collected in the last few years. He informed the group that there was a great deal of data to draw from, and he would only highlight some of the most noteworthy studies. He explained that there are hyperlinks associated with each traffic study throughout the slide deck that can be consulted in the future if the Working Group wants access to additional detail. He summarized four types of studies:

Automatic Traffic Recorder Studies

Henry Underwood said that ATR or automatic traffic recorder studies were short-term (defined as at least three weekdays and one weekend), continuous counts of vehicles to provide information about traffic volume, speed, vehicle type, and information about the gaps between vehicles. The corridor study area included approximately 17 such studies that were conducted at the request of the Town or New Hampshire Department of Transportation (NHDOT) Bureau of Traffic. They ranged from over 17,000 vehicles per day north of Matthews Road in Keene to about 7,000 vehicles per day at the Winchester town line. He said today's summary would focus primarily on the main NH 10 corridor and key State-owned connecting highways. Information for six sites including volume trends over a 10-year period, the composition of cars versus trucks and operating speeds in comparison to the posted speed limit. He explained that studies conducted during the summer of 2020 may not be comparable to previous years of data due to decreased traffic volumes as a result of the on-going pandemic. He informed the group that the NHDOT Bureau of Traffic observed a maximum decrease in travel around April 2020 followed by a steady recovery. However, the status of the recovery through the summer was not available for the presentation. The study results were summarized as follows:

Table 1 - ATR Study Results (north to south)

Site	Latest Volume (vehicles per day)	Daily Tractor-trailers (vehicles per day/%)	Posted Speed Limit / Operating Speed (85th Percentile)
Base Hill Road at Keene line	2,924 in 2020	11 / 0.4	30 mph / 41.6 mph
NH 10 at Keene line	14,424 in 2020	235 / 1.6	30 mph / 35.5 mph
NH 10 south of Base Hill Road	13,476 in 2019	140 / 1.0	40 mph / 46.9 mph
Sawyers Crossing east of NH 10	312 in 2020	1 / 0.2	30 mph / 39.5 mph
NH 10 south of West Street	9,963 in 2020	220 / 2.2	40 mph / 48.9 mph
NH 10 at Winchester line	7,661 in 2020	186 / 2.4	50 mph / 62.8 mph

Henry Underwood noted that he suspects an error in the number of medium-duty trucks at the Winchester town line study site (not shown in the table above) which will be addressed in a future report to the Working Group.

J. B. Mack pointed out that the issue of consistently high operating speeds was one he would like more input on from the Working Group. The subject was also brought up during the field reviews, particularly in the California Street and West Street areas.

Separation Statistics

Henry Underwood said that statistics about the spacing of vehicles (also called separation or gaps) are used by transportation professionals to understand how easily and how frequently vehicles can enter the roadway from connecting streets. He cited statistics tied to key gap widths used by passenger cars and trucks (in seconds) based on a 1991 Transportation Research Board study. Statistics on the peak morning and evening periods were presented. NH 10 south of Base Hill Road was highlighted as the section of highway with the smallest number of gaps during both a.m. and p.m. periods. J. B. Mack reminded the group that the low frequency of gaps was one of the contributing factors for making a decision to install a traffic signal at the Market Basket development. He noted that this low frequency of gaps probably contributes to the higher than normal crash rate at the Citgo store located at the corner of Base Hill Road and NH 10.

Turning Movement Studies

Henry Underwood explained that turning movement studies were conducted at peak periods of the day at both the Base Hill Road and Sawyers Crossing Road intersections to understand the volume of various movements. He said that detailed information about the studies was shared with the Working Group as part of the field review packet when a field review was conducted at four intersections on NH 10 on November 4, 2020.

Walking and Biking Studies

Henry Underwood stated that no new walking and biking studies were conducted by SWRPC for the project. However, he informed the group of previous work related to the Ashuelot Rail Trail (just outside

and running parallel to the study area) that observed between 61 and 121 trips per day. He also reviewed the Strava Global "heatmap" (showing relative popularity of various roads and trails) with the Working Group.

Rideshare Studies

Henry Underwood explained the results of a peak hour (morning) vehicle occupancy study conducted near Base Hill Road that found about 89% of vehicles had no passengers.

Matthew Bachler asked if the Cutler Elementary School Safe Routes to School Action Plan and surveys were considered as a source for additional data about biking and walking. J. B. Mack confirmed that the data could be used to make assumptions about routes. The project also included observational data. Working Group members were unsure if Cutler Elementary School would be closed in the future.

Mike Gomarlo provided feedback on the field review content and land use data provided by SWRPC staff in advance of the meeting:

- The house nearest to the NH 10/West Street intersection was struck on more than one occasion by vehicles. He was not clear if these incidents were identified in the materials provided and suggested the intersection may not be as safe as they think it is.
- The direction of drainage from the west side of the road in the West Street intersection area was in fact west (towards California Brook).
- The largest number of recreational vehicles in the area are more likely to be headed towards Ashuelot River Campgrounds (off Pine Street) as opposed to Swanzey Lake.
- The frontage distance for the Gomarlo Supermarket (less than 400 feet) was not accurate and is in fact over 700 feet.
- Town staff and officials have discussed the desire to make the east side of California Street an entrance to West Swanzey and for it to be renamed as Main Street to assist navigation and advertise the historic West Swanzey area.

III. Overview & Findings from Field Review of NH 10 Intersections

J. B. Mack reported on the four field reviews held on November 4, 2020 with John Kallfelz, Gus Lerandeau, Matthew Bachler, and Henry Underwood attending. The field reviews focused on four areas where there were noticeable crash patterns that appeared to be related to the intersection itself based on crash records from 2010 to 2019.

Base Hill Road Intersection

J. B. Mack summarized the crash types and number of injuries. He said the bulk of the crashes were associated with the gas station curb cuts off NH 10. He pointed out that this was due in part because there is a painted median at this location and it is not effective at preventing people from making a northbound left turn into the gas station – sometimes in the path of southbound vehicles on NH 10. He summarized the results of peak a.m. and p.m. turning movements via a diagram. He said that all sites included observations organized in four categories: geometrics (design of road), operations (how drivers use the road), road users (who is using the intersection) and environment (lighting, weather, etc.). He pointed out various issues in these categories via a PowerPoint slide. One particular "Operations" issue was the southbound right-turn lane, while allowing space for deceleration of turning vehicles, it limits the shoulder width. Additionally, occupancy of this lane sometimes obstructs the view of southbound vehicles on NH 10 to drivers waiting to turn from Base Hill Road. J. B. Mack summarized long-term

findings and recommendations for the intersection, including a recommendation for a raised median to replace the painted median. There was also a recommendation to investigate if the intersection volume warrants a traffic signal.

Matthew Bachler asked whether or not NHDOT had the ability to make changes to the road other than when a change of use was proposed for the property. J. B. Mack said this was a question for NHDOT.

Sawyers Crossing Road Intersection

J. B. Mack provided a summary of crash trends at the intersection. The Y-shaped intersection, which includes narrow shoulders and no turn lanes, creates difficulties for turning vehicles. He summarized other comments from the field review including considerable environmental constraints. Potential area improvements for the short, medium, and long term included signage, creating a "T-shaped" intersection and widening shoulder width, as well as adding a southbound left turn lane.

Mike Gomarlo commented that the origin of the unusual configuration was the fact that Sawyers Crossing Road was formerly NH 10.

California Street Intersection

J. B. Mack provided a summary of the 10-year crash history and traffic volumes. The field review identified a number of issues including corner clearance issues at Larry's Homestead Garage, sight line issues, and the absence of stop bars, center or shoulder lines on California Street approaches. He said that during the field review, John Kallfelz noted that it is the State's policy that if there is a sight distance issue from a town road, a municipality can contact the Maintenance District for permission to trim right-of-ways on the State Road if trees or shrubs are blocking sight distance.

Matthew Bachler clarified an incomplete note on one of the slides relating to geometric issues. He pointed out that California Street has narrow travel lanes (11 feet with not a lot of shoulder space). This creates issues when a vehicle needs to turn onto California Street while another vehicle is also waiting to enter NH 10. He added that the Town plans to reconstruct California Street within the next 5 years.

Scott Self asked if speed was a major factor related to the crashes at this location. J. B. Mack said another look at the crash reports would be needed to answer the question.

West Street

J. B. Mack commented that there were fewer crashes overall compared to the other locations and less of a crash pattern. Two injury crashes involved a southbound vehicle on NH 10 striking a vehicle crossing NH 10 from the east. One long term recommendation is to improve safety for pedestrians using the intersection via the sidewalks on either side of NH 10 such as through a refuge median and/or pedestrian-activated beacon. Scott Self asked if there were any hypotheses about the difference in the number of crashes between the West Street and California Street intersections (other than the volume of traffic) since they had a similar configuration. J. B. Mack said one similarity was broadside collisions, which could be addressed by slowing traffic. An important difference at the California Street intersection was the sight distance issue. Scott Self pointed out that there was an uphill slope from West Street to NH 10 as an additional geometric issue.

IV. Overview & Findings from Access Management Analysis

James Weatherly defined access management based on the Access Management Manual (2003) as "…the systematic control of the location, spacing, design, and operations of all points to a roadway including driveways, medians, and intersections." He provided an overview of the March 2000 NHDOT policy around driveway permitting, and the two types of driveways that are regulated: minor and major. He also spoke about the Town of Swanzey's driveway regulations, which were last updated in 2011 and made the distinction between commercial/multi-family and non-commercial use. He said that the purpose of the analysis was to inventory on-road access management features in a geographic information system (GIS) and perform a "desktop analysis" of the conformity of a parcel with State and local permitting and design guidelines. He pointed out that the essential tool used for analysis (aerial photos) was not suitable for analyzing some regulatory issues dealing with grade, sight distance and other issues.
A total of 6 points of non-conformity were reviewed and mapped:

- Corner Clearance:
  - 19 parcels, 11 under NHDOT guidelines, 6 under Town of Swanzey guidelines, 2 under both NHDOT and Town of Swanzey guidelines.
- Driveway Width:
  - 9 parcels, 7 of which are commercial/industrial properties.
- Access Points and Frontage:
  - 2 parcels, both with over 3 access points and 500 feet of frontage.
- Suspected Loading Violations:
  - 3 parcels, all single-family or duplex properties.
- Suspected Miscellaneous Objects:
  - 8 parcels, primarily commercial/industrial properties.
- Suspected Non-permitted Access:
  - 7 parcels, primarily single-family residential or duplex land use.

With the exception of the area near Market Basket in the northerly part of the study area, the analysis references NHDOT's 200-foot corner clearance requirement used in all rural areas. James Weatherly also added that in the case of commercial properties going through "major" permitting with NHDOT, some driveways mentioned above may actually be in conformance with current standards.

Matthew Bachler asked if NHDOT classified Swanzey as urban or rural and how that is distinguished. J. B. Mack said he had asked District 4 the question in the past and said it was up to their discretion.

J. B. Mack pointed out that a non-conformity may not actually be a violation of the NHDOT driveway permitting regulations. For example, a property permitted prior to current regulations that is not currently conforming would not be a violation. However, pointing out these nonconformities would be an opportunity to address an issue in the future (such as during site plan review). Matthew Bachler suggested making this clear in the report to prevent confusion, particularly among property owners.

James Weatherly summarized on-road access management features, the most predominant being two-way left lanes, about 9% of the corridor length. There are currently no raised medians that act as a barrier to turns along the corridor (only painted/flush medians). The presentation was concluded with an orientation to the map component of the inventory and a review of key findings and recommendations.

Matthew Bachler observed there appears to be a concentration of non-conformity issues near West Swanzey village.

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Web site: www.swrpc.org

V. Other Matters

J. B. Mack said there was other work underway by SWRPC including a land use and economic development analysis to understand the relationship between the goals of the Town and the highway. He said a draft would be completed sometime in January. A demographic analysis of the people living and working on the corridor would be presented alongside the economic analysis at the next meeting. Finally, he said there was a small budget to complete stakeholder interviews or a survey. Following the completion of these tasks, the Working Group will develop goals, objectives and strategies.

VI. Next Meeting

J. B. Mack said the next meeting would occur in January or February, 2021.

VII. Adjourn

The meeting adjourned at approximately 10:30 a.m.

Respectfully submitted,

Henry Underwood
GIS Specialist/Planner

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Agenda Item II

Date: March 12, 2021
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Overview and Findings of Land Use and Zoning and Demographic and Economic Analyses

Background

SWRPC staff recently completed its comprehensive analysis of land use and economic development themes associated with the NH Route 10 Corridor study area including information about existing and future land uses, zoning, development constraints, demographic information, commuting information, housing, and other key information. A copy of the draft Land Use and Economic Analysis is attached.

During the March 12th meeting, SWRPC staff will review results of its research and discuss findings. **Working Group members are encouraged to read the document prior to the meeting and ask any questions that they have regarding the Summary.**

Recommendation

For your information.

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Swanzey NH 10 Land Use & Zoning Analysis

Traffic patterns, as well as transportation needs and infrastructure are driven by land use activities. A single-family home generates different traffic patterns than a supermarket, which in turn generates different traffic patterns when compared to a small-scale manufacturing plant. Therefore, land use regulations determined by municipalities shape both current and future land uses, and the current and future traffic impacts that they place on local roads and regional highways. This section analyzes the existing land uses and the municipal regulations that the Town of Swanzey permits in the NH 10 study area including future land uses. Analysis of future land use in this section includes community planning efforts that may inform future land use regulations, as well as the constraints are likely to shape the spatial distribution of future development. Finally, this section provides an analysis of the transportation impacts of both current and future land uses represented by estimated trip generation for different types of land use.

Existing Land Uses

The Land Use Study Area, which includes parcels within ¼ mile radius of NH Route 10, contains 527 parcels in total, the majority of which are single-family homes, and commercial and industrial properties. Map 1 depicts parcel-level data based on existing land uses and provides a sense of the total land area each land use represents in the study area as well as land use patterns along the corridor.[1]

Land uses within the NH 10 study area are primarily low density. In the northern half of the study area land use is predominately forests managed by Yale University, but there are also a number of low density commercial or industrial properties, and low-density residential properties. Land uses within the southern half of the study area are more diverse, with a mix of both single family and multi-family residential, commercial properties, unmanaged forests and farmland.

Table 1 lists land uses that appear within the Land Use Study Area, with land use codes combined in the same manner as Map 1. Single-family residential properties are the most prevalent land use by number of parcels (355) and acres (451) within the Land Use Study Area. In terms of acreage, commercial/industrial (386) and managed forest (341) lands make up the other two predominant forms of land use within the Land Use Study Area. Managed forest accounts for the largest parcels within the Land Use Study Area, with only 19 parcels accounting for 341 acres of land within the corridor. Much of the managed forest land is contained within the Yale-Toumey forest, which is protected through Yale University as part of their forestry program.

[1] To simplify the visualization of land use information in this report, some similar land use codes are grouped together. For example, there are numerous parcels of forest within the land use codes that have been grouped into managed and unmanaged Forests. Land use codes are derived from GIS assessing data provided by the Town of Swanzey.

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MAP 1: Land Use Map of the Study Area

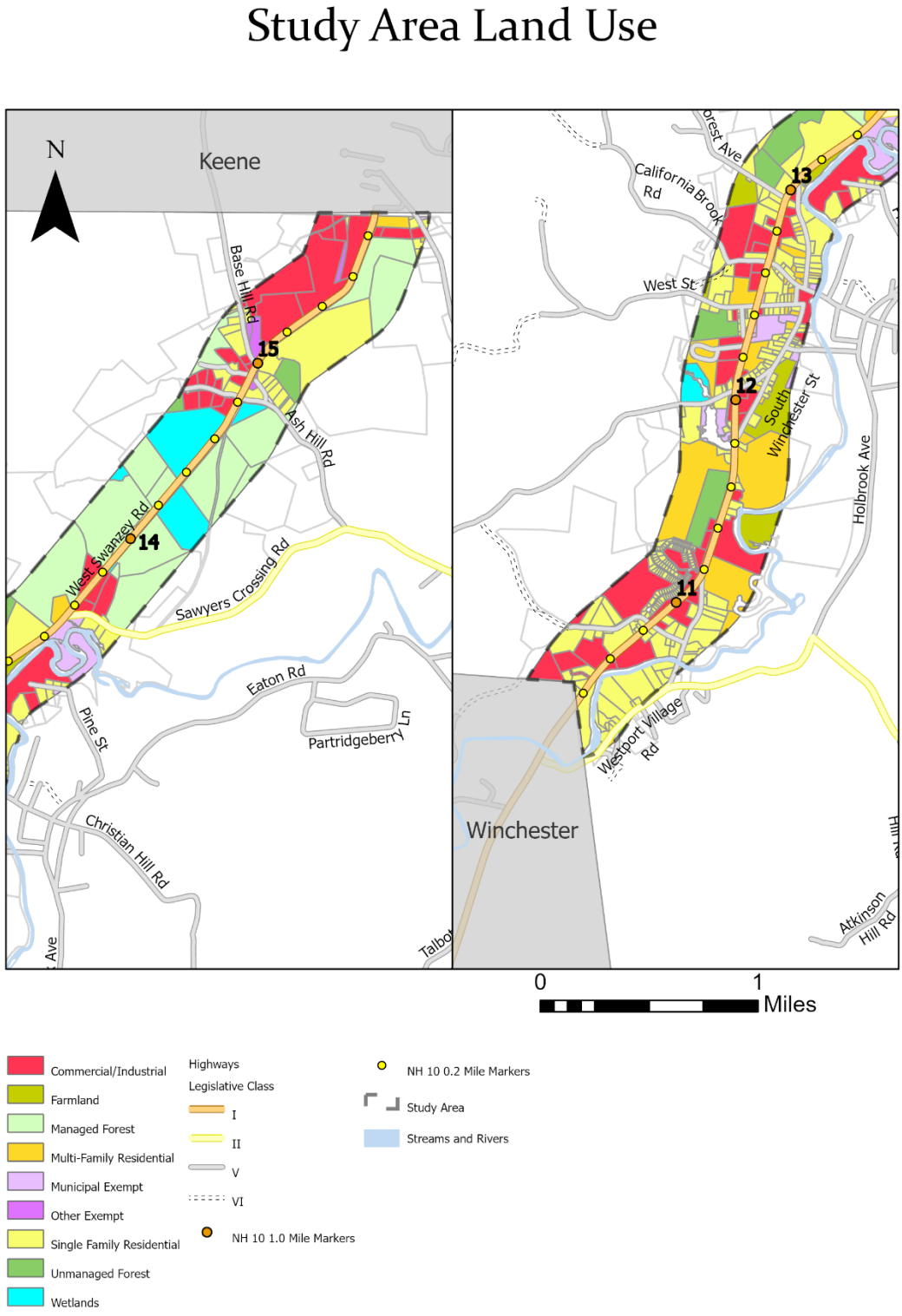


TABLE 1: Table of land uses broken down by type, number, acres and percentage of study area

Land Use Type	Parcels	Acres	Acreage as Percent of Total Study Area
Single Family Residential	355	451	27%
Multi-Family Residential	30	167	10%
Commercial/Industrial	77	386	23%
Municipal Exempt	19	42	1%
Other Exempt	4	11	4%
Farmland	5	58	4%
Managed Forest	19	341	21%
Unmanaged Forest	8	86	5%
Wetlands	10	90	5%
Total	**527**	**1632**	**100%**

Source: Town of Swanzey Assessing Data

Zoning

Zoning in Swanzey is divided into seven zoning districts, with four additional overlay zones. Only five of these zones are present in the Zoning Study area, which is defined here as land that is a quarter mile radius from NH 10. Zoning districts define the permitted uses for parcels within that zone along with other regulations such as parking requirements, setback requirements, and maximum building heights. Overlay districts, as the name implies, overlays on parcels and institute an additional set of land use regulations for parcels within that district. Overlay district requirements can include additional design or setback regulations or additional processes required to develop in that district, such as additional permitting rules required in floodplains. Three overlay districts apply to the Study Area, which are the Wetlands Conservation District, Shoreland Protection District and the Flood Plain District. The Wetlands Conservation District applies to scattered sites within the Study Area where wetlands are found, while the Shoreland Protection District applies to the Ashuelot River. The Flood Plain District applies to those areas within the Study Area which lie within a FEMA designated flood hazard area, further described in "Future Land Uses" later in this document. In combination with subdivision and site plan regulations, zoning plays a major driving force in driving land use decisions over time.

Within the Zoning Study Area, the vast majority of land with direct frontage to NH 10 is zoned either Business or Commercial/Industrial. The parcels with direct frontage to NH 10 in the northern half of the corridor are primarily zoned Commercial/Industrial, while the primary zone in the southern half of the corridor is Business. Between Anthony Circle and Kempton Road on the west side of NH 10 there is a stretch of parcels that are zoned Residence. The most diverse mix of zoning within the study area is in West Swanzey village, where there is a mix of parcels zoned Residence and Village Business I and Village Business II. Of particular note is the zoning of the former Homestead Mills site as Village Business II. Overall, the Town of Swanzey's zoning regulations encourage low-density development, as the three most prominent zoning districts of Business, Commercial/Industrial and Residence require a minimum lot size of one acre. Often, lots even larger than 1 acre are required in the case of properties within the Commercial/Industrial districts with direct frontage to NH 10 or multifamily properties not connected to public sewer.

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TABLE 2: Zones and Dimensional Requirements

Dimensional Requirements	Rural/Agricultural District	Residence District	Business District	Commercial/Industrial District	Village Business District I	Village Business District II
Minimum Lot Size	3 acres	1 acre	1 acre	3 acres (Route 10) 1 acre (Feeder Road)	0.5 acres	0.5 acres
Minimum Frontage	225 feet	150 feet	125 feet	400 feet (Route 10) 125 feet (Feeder Road)	100 feet	100 feet
Front Setback	30 feet	30 feet	75 feet	75 feet	30 feet	30 feet
Side Setback	20 feet	20 feet	20 feet	20 feet	20 feet	20 feet
Rear Setback	20 feet	20 feet	20 feet	20 feet	20 feet	20 feet

Source: Swanzey Zoning Ordinance

TABLE 3: Acreage by Zoning

Zoning District Name	**Total Area (Acres)**	**Acres as Percent of Total Study Area**
Rural/Agricultural	133.7	8.2%
Business	475.7	29.2%
Commercial/Industrial	834	51.1%
Residence	173.3	10.6%
Village Business I	10.2	0.6%
Village Business II	5.2	0.3%
Total	**1632**	**100%**

Source: Town of Swanzey

Traffic Impacts from Existing Land Uses

As noted above, the predominant land use in the Study Area today is the single family home. According to the Institute for Traffic Engineers, traffic generation for single family homes is on average about 10 trips per day on weekdays (5 trips leaving the home and 5 trips returning home) and slightly less on Saturdays and Sundays (7 and 6 trips respectively). Although single family homes have a.m. and p.m. peak hour traffic, this only accounts for about 2 of the 10 trips per day on average during the weekdays, so single family homes tend to generate 80% of their other traffic at other times of day. Among the 371 single family homes, they are estimated to generate about 3,550 trips per day within the corridor area per day on a typical weekday. Multifamily units, on average, generate less traffic than single family homes, averaging about 7 trips per day on all days of the week, Saturdays and Sundays included. Multifamily unit a.m. and p.m. peak hour traffic tends to be less than single family homes ranging from .5 to .6 trips per day respectively, again showing that the majority of residential traffic doesn't occur during the peak hour. The 273 multifamily units in the study area are estimated to generate almost than 1,800 trips per day on a typical weekday. Combined, housing on the corridor is expected to generate about 5,350 trips on the corridor.

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Though sophisticated traffic modeling is beyond the scope of the study, the 5,350 trips per day is an insightful, though rough and imperfect metric for understanding the residential related traffic generation on the corridor. Though housing is distributed along the corridor (and much more housing using the NH 10 Corridor is outside the boundaries of the Study Area), one can apply a "back of the napkin" estimate to the AADT measured on the Corridor which ranges from 7,359 AADT in the southern part of the Corridor (NH 10 at the Winchester town line) to 14,443 in the northern part of the Corridor (NH 10 at the Keene town line). 5,350 trips are equivalent to approximately 76% of the net traffic between the two count sites (7,084 trips). Findings from later sections of the report, namely, 1) that most commuters gravitate towards Keene either to work there or go to pass through the Keene area to other destinations[2] and 2) the majority of housing in the study area is in West Swanzey, suggest that residential traffic from the Study Area is likely to contribute a great deal of traffic demand on the Corridor today. However, the capacity for the road to accommodate the traffic is far from congested. The standard reference for maximum saturation flow per lane is 1,900 vehicles per hour[3] and the area with the highest peak hour on the Corridor reaches about 1,470 vehicles for two opposing lanes combined.[4]

The next most common land use in the Study Area are commercial/industrial land uses. Traffic generation for commercial and industrial land uses can vary widely (see Table 4 below).

TABLE 4: Common Land Uses Found in the Study Area Today and ADT Weekday Traffic

Land Use	Unit of Measure	ADT Weekday
Single Family	Per Dwelling Unit	9.57
Multi-Family	Per Occupied Dwelling Unit	6.59
Grocery Store	1,000 sq. ft. gross floor area	102.24
Free-standing Discount Store	1,000 sq. ft. gross floor area	57.24
Restaurant: Sit-Down	1,000 sq. ft. gross floor area	127.15
Restaurant: Fast Food without Drive-Through	1,000 sq. ft. gross floor area	716.00
Business and Professional Office	1,000 sq. ft. gross floor area	11.01
Convenience Store with Gasoline Pumps	1,000 sq. ft. gross floor area	845.60
Gasoline, Car Wash, with Convenience Store	1,000 sq. ft. gross floor area	152.84
Coffee Shop with Drive-Through, no Seating	1,000 sq. ft. gross floor area	1,800.00
Auto Sales and Service	1,000 sq. ft. gross floor area	33.34
Manufacturing	1,000 sq. ft. gross floor area	3.82
Wholesale, Warehouse, Storage Facility	1,000 sq. ft. gross floor area	3.65
Recreational Facility	1,000 sq. ft. gross floor area	22.88

Source: Institute for Traffic Engineers Trip Generation Manual, 8th Edition, 2008.

For reference, the Swanzey Market Basket has 97,397 square feet of gross floor area. As a Grocery Store trip generation could be as much as 9,957 trips per day with up to 1,150 vehicles per p.m. peak hour[5].

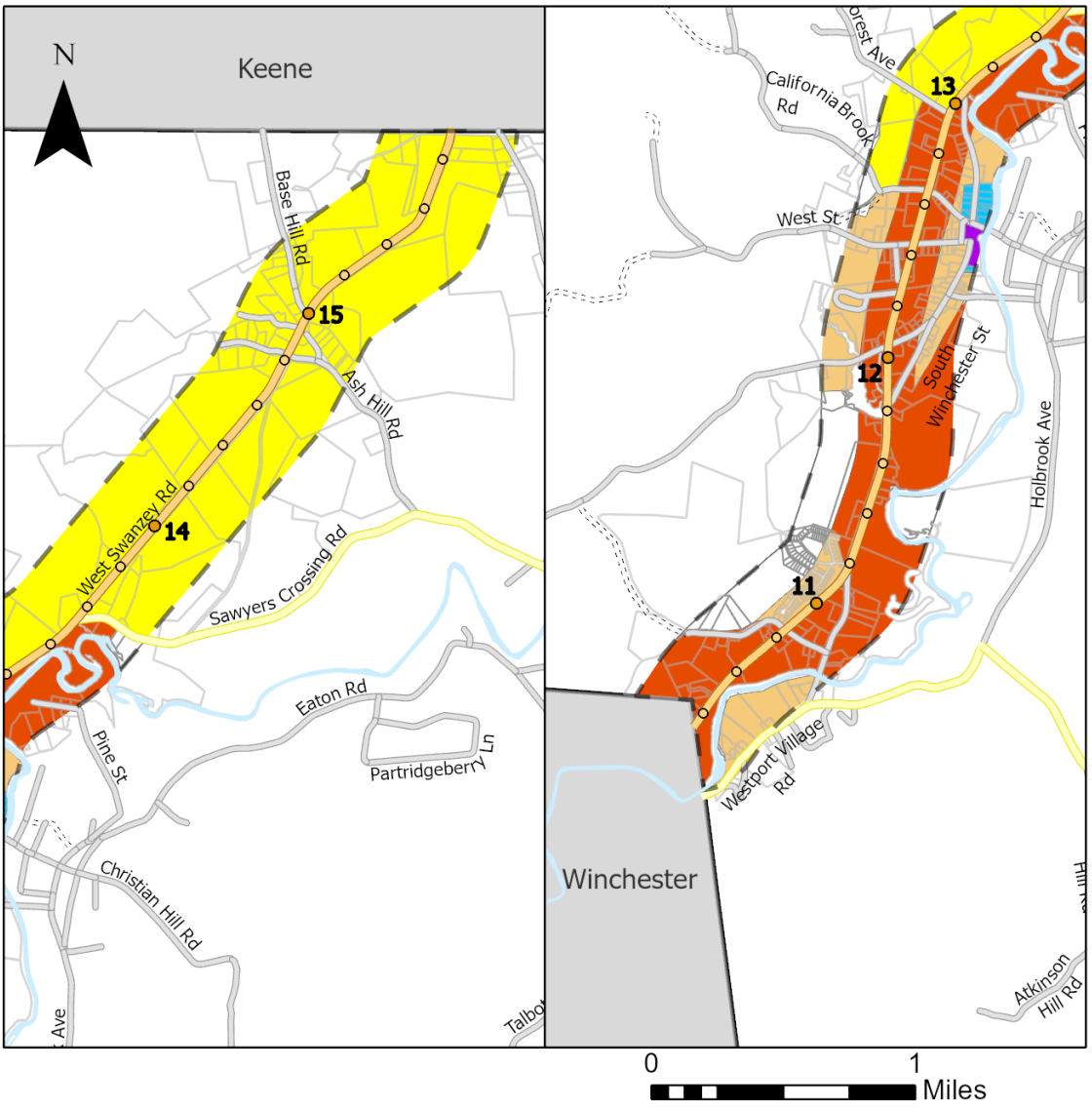
[2] Keene is also an important shopping, medical and government services destination.
[3] Highway Capacity Manual, 6th edition, Transportation Research Board, 2015.
[4] SWRPC 2019 p.m. peak hour count at NH 10 at the Swanzey/Keene town line.
[5] The gross floor area is not entirely dedicated to Market Basket, but for simple illustration the Grocery Store land use code is used.

The Citgo Gas Station, which at 189 West Swanzey Road is 3.520 square feet could generate approximately 2,976 trips per day as a gas station alone with up to 220 vehicles in the p.m. peak hour. Applying only 1/5th of the gross floor area to the store's Coffee Shop/Drive-Through operation is equivalent to 1,267 vehicles per day and approximately 218 vehicles in the a.m. peak hour. A third example used for illustration purposes is the currently closed Nick's Seafood Restaurant, which is 4,624 square feet. If the restaurant opens again, it is likely to attract about 588 trips per day with about 85 vehicles during the p.m. peak hour. As a final example, traffic generation for the Dollar General at 786 West Swanzey Road, which is 9,100 square feet in area, is estimated to generate about 520 trips per day with about 51 trips generated in the p.m. peak hour.

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MAP 2: Existing Zoning Map

Study Area Zoning



Zoning Districts
- Rural/Agricultural
- Business District
- Commercial/Industrial District
- Residence District
- Village Business I District
- Village Business II District

Highways
Legislative Classification
- 0
- I
- II
- V
- VI

- NH 10 1.0 Mile Markers
- NH 10 0.2 Mile Markers
- Streams & Rivers
- Study Area (.25 Mile NH 10 Buffer)
- Swanzey Town Boundary

Source: Town of Swanzey

Key Existing Land Use and Zoning Findings

- Every property along NH 10 north of Forest Avenue on the west side of the corridor and north of Sawyers Crossing Road on the east side of the corridor is zoned Commercial/Industrial. Commercial/Industrial is also exclusive to the NH 10 corridor within Swanzey and does not cover any parcels outside of the ¼ mile Zoning Study Area. No form of housing is allowed in this zone.
- The intent of the Commercial/Industrial district is to "minimize strip development and encourage off road development on portions of Route 10". The district promotes this goal by requiring a 3-acre minimum lot size for properties utilizing access to NH 10 while only requiring a 1-acre minimum lot size for parcels using access to "feeder roads". Reduced lot size and frontage requirements within the Commercial/Industrial district were used in the development of businesses along Whittemore Farm Road in the 1980's, which currently is home to several commercial uses. The Town of Swanzey Planning and Economic Development Department is not aware of any other development proposals taking advantage of this zoning flexibility.
- With the exception of Village Business Districts I and II, minimum lot sizes in all other zones are at least 1 or 3 acres. Both the Village Business District I & II have a minimum lot size of one-half acre, with the exception of a 1-acre requirement for multifamily properties within Village Business District I.
- West Swanzey Village includes a mix of Residence, Village Business I & II, and Commercial/Industrial zoning.
- For sections of the Land Use Study Area, particularly West Swanzey Village, current zoning dimensional requirements do not align with existing land use patterns. For example, in West Swanzey Village the majority of parcels are zoned either Residential or Commercial/Industrial, both of which have a minimum lot size of 1 acre. An analysis of parcel sizes in West Swanzey village identified at least 73 parcels of just over 100 that are under 1 acre in size. In addition, 31 parcels are under half an acre, which is the minimum lot size requirement for the Village Business District I & II. This indicates that there is an existing pattern of development in West Swanzey Village that is not allowable under current zoning regulations.
- Village Business II is a zone almost exclusively applying to the Homestead Woolen Mills properties, while the Village Business I district applies to the properties directly north and south of the Mills.
- Multifamily housing is allowed only by special exception in the Business, Village Business I and Residence districts but is allowed by-right within the Village Business II district.
- A minimum setback of 75 feet from the NH 10 right-of-way is required for parcels within the Business district.
- There are a number of land uses within the corridor that are nonconforming with existing zoning regulations. For example, the vast majority of the northern half of the Study Area is zoned Commercial/Industrial which does not include any residential uses as a permitted use. However, there are several single-family and a few multi-family properties within the northern half of the Study Area. One-family dwellings are also not permitted in the Business District, but several single-family properties are intermixed with commercial or industrial uses in that District.
- While 80% of the Study Area is comprised of just two zoning districts that focus mostly on business related uses, the Business and Commercial/Industrial zones, existing land uses within the Study Area are diverse.
- There is no aquifer protection district in the Study area.

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- Existing land uses in the Study area generate different types of traffic during peak hours and over the course of the day. Existing housing in the study area is expected to generate up to 5,350 trips per day on NH 10. The land use with the greatest single contribution of trips in the Study Area is the likely to be the Market Basket store.
- The capacity for the road to accommodate more traffic is far from congested. The standard reference for maximum saturation flow per lane is 1,900 vehicles per hour[6] and the area with the highest peak hour on the Corridor reaches about 1,470 vehicles for two opposing lanes combined.

Future Land Uses

Similar to how existing land use shapes the current transportation needs within the Study Area, future development patterns will drive the transportation needs of the corridor and subsequent changes to NH 10. In the sections below, future land uses are assessed from both a regulatory and physical perspective, particularly natural resource constraints.

Traffic Impacts from Future Land Uses

There are a several types of land uses allowed on the Corridor that can potentially represent noticeable traffic impacts on the Corridor, however, the impacts are likely to have more of a local impact than a regional impact due to available vehicle capacity on NH 10 currently. Some land uses that currently do not appear on the Corridor today, but are allowed uses are show in the table below. Many of these would have their largest peak hour traffic on weekends.

TABLE 5: Select Land Uses Allowed in the Study Area and ADT Weekday and Highest Peak Hour Traffic

Land Use	Unit of Measure	ADT Weekday	Highest Peak Hour
Religious Institution	1,000 sq. ft. gross floor area	9.11	11.76, Sunday
Nursery	1,000 sq. ft. gross floor area	36.08	11.00, Saturday
Daycare	1,000 sq. ft. gross floor area	79.26	13.91, Weekday p.m.
Motel	Per Guest Room	9.11	0.76, Saturday
Hotel	Per Guest Room	8.17	0.72, Saturday
Bank with Drive-Through	1,000 sq. ft. gross floor area	148.15	31.90, Sunday

Source: Institute for Traffic Engineers Trip Generation Manual, 8th Edition, 2008.

Drive-through restaurants, coffee shops and banks are among the land uses that tend to have the highest local traffic impacts. In the existing Zoning Ordinance, there is no reference to drive-through uses, but Swanzey does have at least two drive through establishments in Town (both Dunkin Donuts drive throughs). Some of the types of allowed land uses that tend to include drive-through provisions are not included in the definitions section of the Swanzey Zoning Ordinance including Coffee Shops, Restaurants and Banks. The lack of definition may result in a situation in which a court interprets drive-throughs as an allowed land use if there is a conflict in interpretation between the Town of Swanzey and a land owner or developer.

[6] Highway Capacity Manual, 6th edition, Transportation Research Board, 2015.

Community Planning

Similar to how zoning and other regulations shape the existing land use conditions of the study area, community planning efforts can shape the future land use conditions of the study area. The preeminent community planning document that guides future zoning, and subsequently future land use, is a community's Master Plan. As established in NH RSA 674:18 and 674:2, a municipality must adopt a Master Plan prior to adopting a zoning ordinance, and Master Plans must "set down as clearly and practically as possible the best and most appropriate future development of the area under the jurisdiction of the planning board". The Town of Swanzey last adopted an update to their Master Plan in 2003, and the Town is currently in the process of updating the Plan.

In the 2003 update of Swanzey's Master Plan, NH 10 is prominently featured in the land use chapter. A specific goal cited for future land use within the Plan is to encourage commercial and retail growth along NH 10. In addition, the land use chapter includes a specific recommendation to encourage higher density development in West Swanzey Village and North Swanzey, both of which are part of the study area. In addition, the land use chapter recommends "discourag[ing] new residential development in the existing Commercial/Industrial and Business Zoning Districts." Since the vast majority of the study area is zoned Commercial/Industrial or Business, this effectively translates to a recommendation to discourage housing development in the majority of the study area. That being said, provisions for housing are made outside of the study area, for land fronting West Street, Forest Avenue, Main Street, and Westport Village Road which are primarily zoned Residence. For parcels not directly fronting those streets, the vast majority of land immediately outside of the Zoning Study Area is zoned Rural/Agricultural which allows single family housing by right and two family housing by special exception.

Finally, listed below are specific strategies outlined by the 2003 Plan that directly speak to the study area:

- "Recognizing that water frontage along the South Branch and Ashuelot Rivers will become more valuable, determine what steps will best protect the public's aesthetic and recreational access to these areas."
- "Future development of Yale Forest lands may be detrimental to the underlying high yield aquifer. Determine how to protect the Town's interest in this area, including consideration of an aquifer protection district."[7]
- "Promote the installation of sewer lines for the Wilson Pond area and North Swanzey. Promote upgrading of the roads and drainage system and water system in this area as part of the sewer line installation."[8]

While the transportation chapter is critical to understanding the future goals for NH 10, the route is not directly mentioned in the goals and objectives of the chapter. The overall goal for Swanzey's transportation system was to "provide for a safe, efficient and diversified transportation system that is sensitive to the Town's rural character". The transportation chapter of the Plan also outlines a strong emphasis on access management in coordination with NHDOT, as well as continual assessment of the impact of land use development on the transportation system and the coordination of land use and transportation decisions.

[7] This aquifer protection district has not yet been established.
[8] This has occurred since the 2003 update.

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The Plan also contains a chapter on utilities, which can have a significant impact on land use within the study area. A major goal of the utilities chapter is the continued expansion of sewage treatment facilities in West Swanzey Village and North Swanzey. As of writing, the recommendations made for improvement of sewer infrastructure in West Swanzey Village and North Swanzey were implemented, which has expanded capacity on North Swanzey and ensured continued operation of the system in West Swanzey Village. However, the major goal in the utilities chapter of the Plan, to combine all community water services into one Town Water Department, has not yet occurred, which is a major limitation to the effective coordination and potential expansion of water infrastructure within the study area.

While not a document with regulatory authority, a *West Swanzey Charrette* report was produced by Plan New Hampshire documenting a design charette with local stakeholders on land use within West Swanzey Village. The charette took place in November of 2012, and envisioned potential future outcomes for West Swanzey Village. Through two listening sessions, a desired outcome that was highlighted was the redevelopment of Homestead Woolen Mills and the establishment of a more vibrant, walkable village with the growth of commercial uses along Main Street in West Swanzey Village. The report also specifically recommends the expansion of the Village Business I and II Districts as well as expanding the uses allowed in Village Business I & II Districts. In addition, the listening sessions indicated a desire to improve the connection between NH 10 and West Swanzey Village center. Specifically, four "gateways" were proposed along NH 10 to create a visual connection to the Village and provide additional wayfinding. Since the publication of the report, the recommendation to allow multifamily housing as an accessory use has been incorporated into Swanzey's zoning code. While the *West Swanzey Charette* report is produced by a third-party entity and does not hold regulatory authority, it indicates a community desire for a major change in the character of the land use within West Swanzey Village. Any significant land use change in West Swanzey Village would change the relationship between NH 10 and the Village, as well as the transportation needs of the corridor.

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Economic Revitalization Zone

Detailed by NH RSA 162-N:6, the Economic Revitalization Zone (ERZ) is a short-term business tax credit program established to stimulate economic redevelopment, expand the commercial and industrial base, create new jobs, reduce sprawl, and increase tax revenues within the state. The State of New Hampshire allocates approximately $850,000 annually in tax credits through the ERZ program. Eligible areas for ERZs are unused or underutilized industrial parks as well as vacant land or structures previously used for industrial, commercial, or retail purposes that represent a contiguous area. A community can apply for the establishment of an ERZ to the NH Department of Business and Economic Affairs. When established, businesses can apply for tax credits based on the creation of jobs within the ERZ. Currently, Swanzey has three established ERZs. Within the study area, Swanzey has one ERZ, the Homestead Woolen Mills District established in 2010, which covers the Homestead Woolen Mills property as well as parcels directly North on both sides of North Winchester Street as well as several parcels extending East along Main Street. Currently, there have not been any businesses that have taken advantage of the job creation tax credits offered by the Homestead Woolen Mills ERZ.

Development Constraints

As much as community planning shapes development and growth, natural conditions and the availability of water and sewer infrastructure also play a key role in future land use development along the corridor. This study provides an analysis of water and sewer availability and natural resource constraints taking a closer look at conservation and protected lands, problematic and sensitive soils, and Federal Emergency Management Agency (FEMA) designated flood zones.

Water and Sewer Availability

Within the Study Area, water and sewer availability is almost entirely limited to the West Swanzey Village area. North Winchester Street and Main Street east of the Swanzey Street intersection are provided sewer by the Town of Swanzey and water by a series of public wells. Town sewer service extends to much of West Swanzey Village just outside of the Study Area across the Ashuelot River. South Winchester Street and West Street from South Winchester Street to approximately Aylward Avenue is provided both water by the West Swanzey Water Company and sewer from the Town of Swanzey. West Street and part of California Brook Road west of NH 10 is also served water by the West Swanzey Water Company. Sewer is provided partially along NH 10 by the Town of Swanzey from West Street to Perry Lane. The Pine Grove Mobile Home Park Cooperative operates a water system which serves their community. In the very northern section of the Study Area adjacent to the Keene town line, North Water and Fire Precinct provides water service along Matthews Road.

Access to public sewer is critical for achieving density for residential development. In the Residence, Business and Village Business District I districts two-family and multifamily properties have reduced lot size requirements for parcels connected to public sewer. In the Residence District, multifamily buildings have a minimum lot size of 1 acre if connected to public sewer, as opposed to one acre for the first unit and one-half acre for each additional unit. In addition, in Village Business Districts II and I, two-family and multi-family properties are subject to one-half acre and one acre minimum lot sizes, respectively, as

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opposed to one and one-half acre for a two-family residence without public sewer access and one acre plus one-half acre for each unit in a multifamily property without sewer access.

Natural Resource Constraints

Conservation and Protected Lands

Conserved and protected land serves as an important control on development, deflecting pressure away from certain parcels within the study area. Data from NH GRANIT representing natural areas in the State of New Hampshire over two acres show that approximately 587 acres of natural land lie within the Study Area. Conservation land is distributed among 37 properties, all of which except one are protected through fee ownership, which means that protection is secured through direct ownership by an organization with the mission of conservation. The majority of conservation lands in fee ownership (26 out of 35) are owned by Yale University as part of the Yale-Toumey forest, which is protected and managed as an active part of their forestry program. The rest of the properties under fee ownership are either owned by the Town of Swanzey or the Monadnock Humane Society with the exception of one property owned by an entity identified as "Robjohn LLC". Only one property, which does not have a street address but is located off of the southern end of Winchester Street, is protected through a conservation easement on the property. The property has the tax ID of 72-43 and is used as farmland by Windyhurst Farm. The vast majority of conservation lands in the study area are owned by Yale University as part of the Yale-Toumey Forest, which comprises 24 of 37 protected parcels and 505 of the 587 acres of conservation land within the study area. The Yale-Toumey forest is used for the University's Forestry program and is the site of active educational and research activities, including collaboration with institutes of higher education within the Monadnock Region. However, Yale-Toumey forest is protected through fee ownership, and does not have a deed restriction or conservation easement on the lands within the study area.

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TABLE 6: List of conserved and protected lands within the study area, by parcel and type of conservation or protection method.

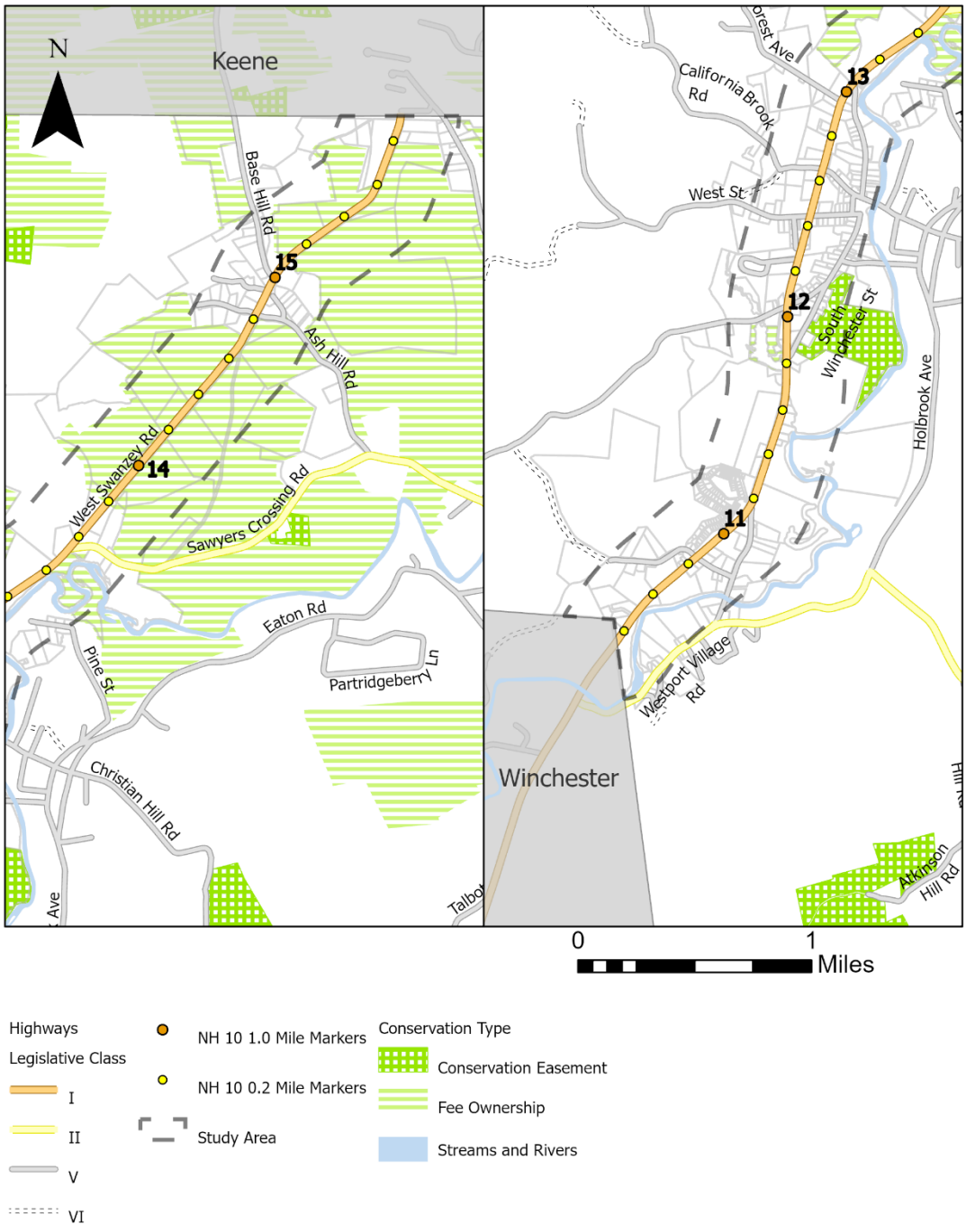
Parcel Tax Map ID	Street	Owner	Protection Type
71-17	COBBLE HILL RD	SWANZEY, TOWN OF	Fee Ownership
71-17	COBBLE HILL RD	SWANZEY, TOWN OF	Fee Ownership
72-43	WINCHESTER ST	WINDYHURST FARM PARTNERSHIP	Conservation Easement
56-4	SAWYERS CROSSING RD	SWANZEY, TOWN OF	Fee Ownership
57-124	PINE ST	SWANZEY, TOWN OF	Fee Ownership
56-4	SAWYERS CROSSING RD	SWANZEY, TOWN OF	Fee Ownership
56-4	SAWYERS CROSSING RD	SWANZEY, TOWN OF	Fee Ownership
50-4	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-14	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-13	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-3	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-12	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-2	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-11	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-1	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-3	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-13	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
55-7	FOREST AVE	HUMANE SOCIETY OF THE US	Fee Ownership
51-12	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-6	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-5	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-4	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-9	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-1	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-9	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-11	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-11	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-11	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-7	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-1-8	WHITTEMORE FARM RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
38-5	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
52-26	WEST SWANZEY RD	ROBJOHN LLC	Fee Ownership
38-8	MATTHEWS RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
38-4	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
52-27	WEST SWANZEY RD	MONADNOCK HUMANE SOCIETY	Fee Ownership
38-22	MATTHEWS RD	SWANZEY, TOWN OF	Fee Ownership
52-9	BASE HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership

Source: Town of Swanzey

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MAP 3: Study Area Conservation Lands

Study Area Conservation Lands



Problematic and Sensitive Soils

Shallow Depth to Bedrock

Bedrock near the soil surface can pose construction difficulties. Pouring foundations, excavating basements, or installing utilities can be complicated or rendered prohibitively expensive. For the purpose of this analysis, soils with less than 100 centimeters depth from surface to bedrock were considered a natural constraint.[9]

Within the study area, there were two clusters of soils with shallow depth to bedrock which affect a total of 60 parcels. The first cluster is located roughly between Sawyers Crossing Road and Ash Hill Road and does not affect properties with direct frontage to NH 10. The second cluster affects several properties near the northern part of Westport Village Road and affects properties with frontage on Westport Village Road and NH 10. The parcels lie within the Business and Residence Districts.

Poorly Drained Soils

Poorly drained soils can constrain development because they can raise site work costs and/or risk of flooding during extreme precipitation events. They also frequently coincide with designated wetlands, presenting regulatory hurdles.

Poorly drained soils impact a total of 121 parcels within the study area across a number of scattered locations throughout the corridor. Several parcels between Sawyers Crossing Road and Ash Hill road are affected, as well as several parcels north of Base Hill Road, all of which are zoned Business. Much of the current land use in these areas is undeveloped forest. SWRPC observed a handful of already developed commercial and industrial properties fronting Whittemore Farm Road that consist of poorly drained soils. Areas with poorly drained soils north of Base Hill Road are entirely undeveloped forest.

Another significant cluster of poorly drained soils is located between Forest Avenue and West Street which affects a number of parcels fronting NH 10 on both sides of the road. Most affected parcels are zoned Commercial/Industrial. Many of these parcels are already developed with existing commercial land uses. There are several smaller scattered areas of poorly drained soil south of West Street to the Winchester town line, including at the intersection of South Winchester Street and NH 10 and Westport Village Road and NH 10. A table of parcels affected by poorly drained soils can be found below.

Additional details on poorly drained soils can be found in Map 4 below.

Shallow Water Tables

Shallow water tables often coincide with poorly drained soils and pose similar development challenges. For the purpose of this analysis, shallow water tables were defined as water tables being 50 centimeters or closer to the surface. Within the Study Area, shallow water tables are present in all areas with poorly

[9] It should be noted that the highest resolution data available for bedrock depth, sourced from the USDA Soil Survey Geographic Database (SSURGO), may fail to capture localized ledges or outcroppings with exposed or shallow bedrock.

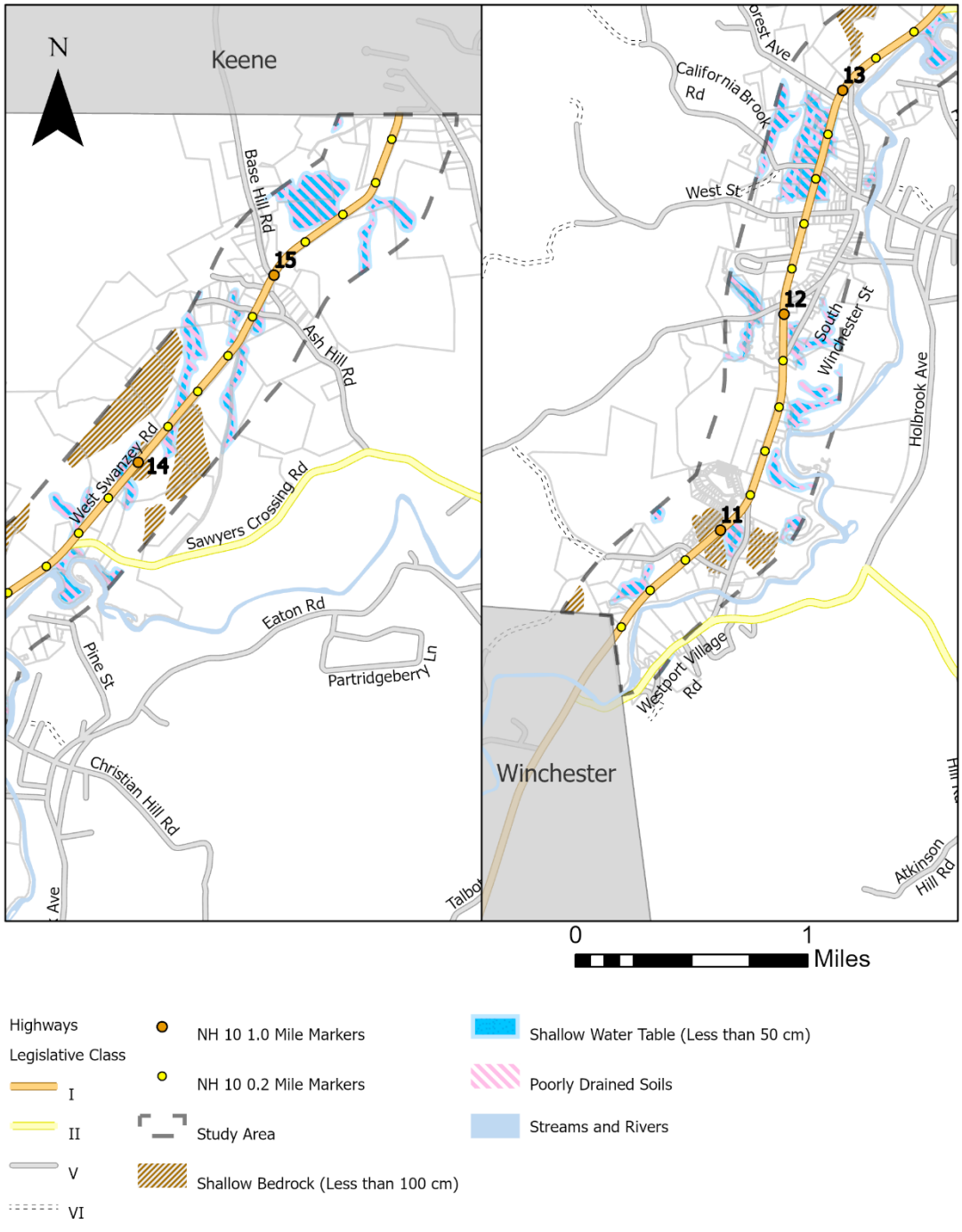
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drained soils, affecting 121 parcels within the Study Area. Additional details on the geographic distribution of shallow water tables can be found in Map 4 included below.

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MAP 4: Problematic Soils

Study Area Problematic Soils



FEMA Designated Flood Zones

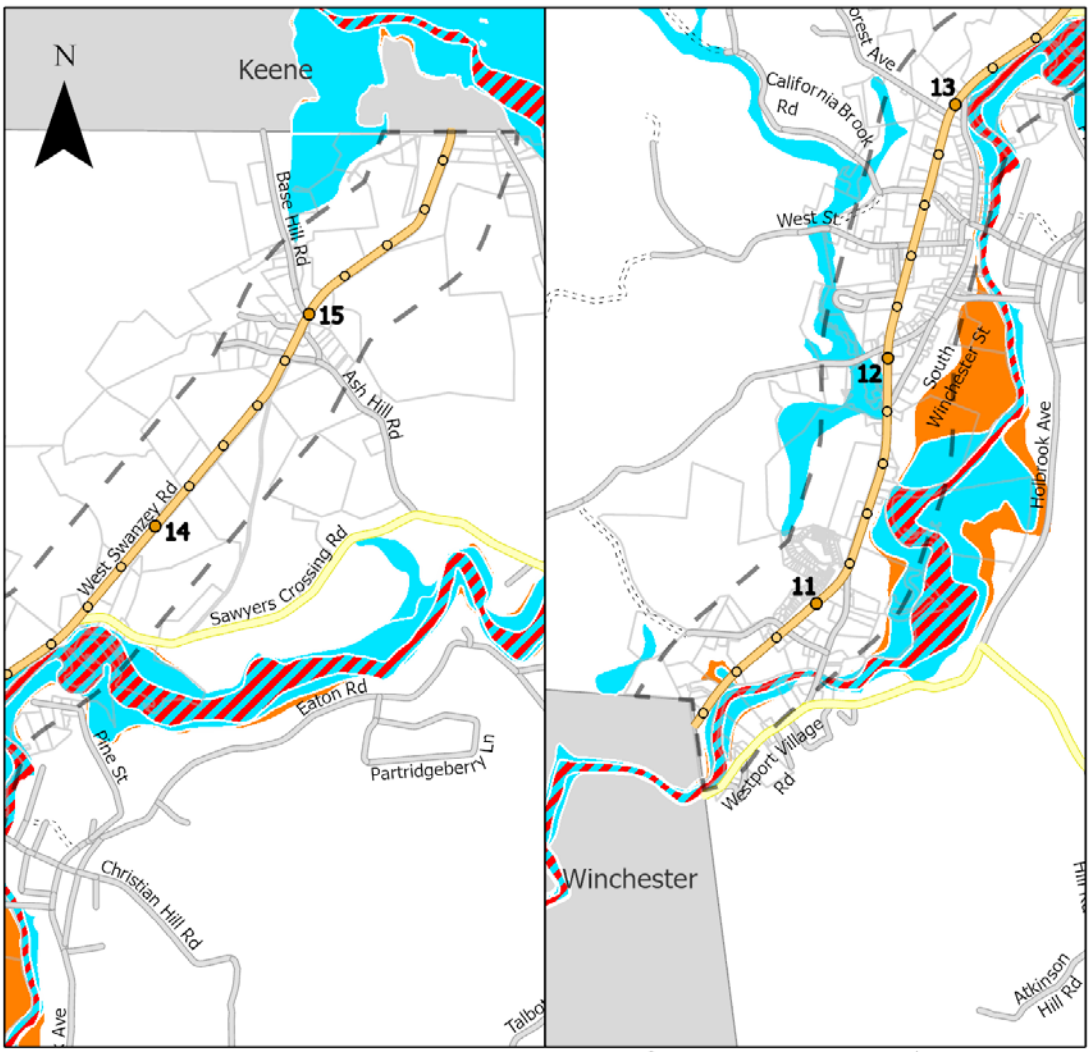
The Federal Emergency Management Agency (FEMA) maps areas susceptible to flooding, including regulatory floodways, 100-year floodplains and 500-year floodplains (Figure 15). Regulatory floodways are streams, channels and adjacent land areas that must be reserved in order to discharge floodwaters without flood water elevations exceeding a certain height. Development in regulatory floodways is subject to a review process meant to determine whether new development would exacerbate floodwater impacts. Regulatory floodways are included in the 100-year floodplain, the area of land where there is a one percent annual chance of a flood event occurring. Property owners in the 100-year floodplain are required to buy flood insurance if they acquired a mortgage through a program that is federally assisted or insured. The 500-year floodplain is the area of land where there is a 0.25 percent annual chance of a flood event occurring. Properties in the 500-year floodplain are not subject to flood insurance requirements, but given the rising probability of intense rainfall events, properties in the 500-year floodplain may be subject to increased risk of experiencing flood events.

Within the study area, flood zones designated by the Federal Emergency Management Agency (FEMA) can be found along the California Brook and the Ashuelot River. Flood zones within the California Brook system represent 100-year floodplains only. Properties on the western edge of Perry Lane and directly south of the Cobble Hill Road and NH 10 intersection are impacted by the California Brook floodplain. The Ashuelot River floodplain includes 100 -year floodplains and regulatory floodways, which typically carry more prohibitive development regulations. The Ashuelot river floodplains primarily impact properties on the east side of NH 10 between Sawyer's Crossing Road and North Winchester Street, and impact some residential properties along North Winchester Street. The area directly south of West Swanzey Village bordered roughly by Holbrook Avenue, NH 10 and Westport Village Road contains both 500-year and 100-year floodplains as well as regulatory floodways. A more detailed overview of the location and distribution of FEMA designated flood zones within the study area can be found in the map below.

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MAP 5: FEMA Flood Zones

Study Area Flood Zones



Highways
Legislative Classification
0
I
II
V
VI

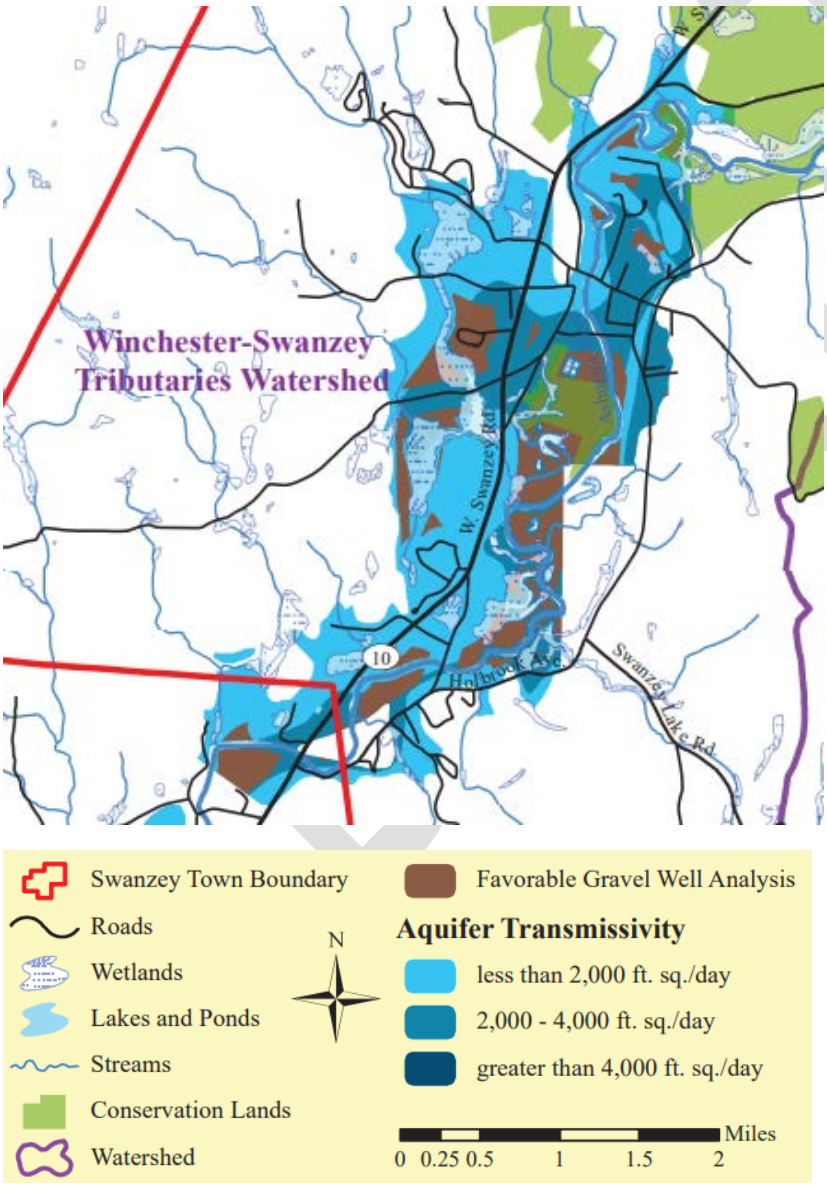
NH 10 1.0 Mile Markers
NH 10 0.2 Mile Markers
Study Area (.25 Mile NH 10 Buffer)

FEMA Flood Zones
1% Annual Chance Flood Hazard
Regulatory Floodway
Special Floodway
Area of Undetermined Flood Hazard
0.2% Annual Chance Flood Hazard
Future Conditions 1% Annual Chance Flood Hazard
Area with Reduced Risk Due to Levee

Stratified Drift Aquifers

According to the United State Geological Survey (USGS), a stratified drift aquifer is "a coarse-grained sand or sand and gravel deposit that contains a usable supply of water." Stratified drift aquifers are an important source of drinking water for public wells in the Town of Swanzey. Stratified drift aquifers are an important natural resource and development constraint to consider because certain types of development might jeopardize water purity. According to the *Town of Swanzey's Phase I Natural Resources Inventory Report* prepared in December of 2018, West Swanzey Village lies on a productive Stratified Drift Aquifer, as does much of the southern half of the NH 10 corridor south of North Sawyers Crossing Road.

FIGURE 1: Productive Aquifers within the NH 10 Study Area



Source: Town of Swanzey Phase I Natural Resources Inventory Report, page 21.

Key Future Land Use Findings

- Some of the types of allowed land uses that tend to include drive-through provisions are not included in the definitions section of the Swanzey Zoning Ordinance including Coffee Shops, Restaurants and Banks. The lack of definition may result in a situation in which a court interprets drive-throughs as an allowed land use if there is a conflict in interpretation between the Town of Swanzey and a land owner or developer.
- While much of the northern half of the Study Area is currently protected as conservation land, very few parcels are protected through easements or other legal restrictions on the use of the property. Yale-Toumey forest is the preeminent source of conservation land in the Study Area and is managed as conservation land entirely through fee ownership by Yale University.
- The Ashuelot River floodplain represents a significant natural and regulatory barrier to development within the Land Use Study area. However, there are relatively few parcels that fall within the floodplain, and mostly are concentrated along North Winchester Street, NH 10 between North Winchester Street and Sawyers Crossing Road, and parcels directly south of West Swanzey Village.
- Water and sewer availability is almost exclusively concentrated within West Swanzey Village, which is a critical piece for potential future residential and commercial development. However, a large portion of the Study Area south of the Forest Avenue intersection falls within some form of aquifer, which presents some opportunity for the development of wells.
- Soils that are poorly drained with shallow water tables represent another significant natural barrier to development and affect multiple parcels north of Base Hill and Sawyers Crossing Road, as well as several parcels between Forest Avenue and West Street.
- The intersection of Westport Village Road and NH 10 lies on top of a number of problematic soils that would pose a barrier to development. In addition, the area bounded between NH 10 and Westport Village Road is crossed by the Ashuelot River and contains considerable floodplain areas that restrict development.
- Many of the Town of Swanzey's community planning efforts support additional commercial and mixed-use development in West Swanzey Village. This includes the Town of Swanzey's most recent Master Plan update (currently underway), planning efforts undertaken by Plan NH to gauge citizen input on West Swanzey Village, as well as the establishment of an Economic Revitalization Zone on the Homestead Woolen Mills property.
- The Town of Swanzey's current Master Plan discourages the development of housing in the Business and Commercial/Industrial Districts, which comprise in total over 80% of the Study Area. While residential development is allowed via zoning on Town-owned roads outside of the Study Area, within the Study Area current planning documents point primarily to West Swanzey Village as the location most suitable for future residential development.
- There is no aquifer protection district in the Study Area.

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Swanzey NH 10 Demographic & Economic Activity Analysis

Demographic factors such as population growth trends, density, age and income can impact transportation patterns and needs within the corridor. This section provides an overview of demographic trends in the Town of Swanzey, with a particular focus on the NH 10 Study Area where demographic data at that geography is available.

Population Change

Predicting population change specifically for the Study Area is difficult to determine, due to shifting Census block geographies and the absence of population projections at that level of resolution. As of 2010—the last veritable population count for the area--the total population of Census blocks that intersect with the Study Area was approximately 2,000 people, which represented about 28% of the total population of the Town of Swanzey at that time.[10] Based on a survey of driveway permitting in the area and town issued housing permits across Swanzey during the last decade, it does not appear that there was a large number of development activity on the Corridor, so the population has probably not changed significantly in the last 10 years.[11]

Swanzey has seen extensive growth in the past, however. Between 1970 and 2010 the Town of Swanzey's population increased 70% from 4,254 to 7,230, which is slightly slower than the State of New Hampshire's population, which grew 78% from 1970 to 2010. During that same period Swanzey grew at a much faster rate than Cheshire County as a whole, which only grew 47% between 1970 and 2010.

According to the most recent population projections from the NH Office of Strategic Initiatives (NH OSI) (2016), population growth trends for the Town of Swanzey are predicted to follow historical patterns in which Swanzey grows faster than Cheshire County, but slower than the State as a whole. The NH OSI estimates that the Town of Swanzey's population, which was 7,230 in 2010 is predicted to increase to 7,662 by 2040. This represents a total growth from 2010 to 2040 of 5%, as opposed to a predicted growth of 2% for Cheshire County and 9% for the State. During that same time period, Swanzey is projected to grow at a much slower rate than the United States as a whole, which has a growth of 16.5% projected by 2040. In the following chart, the projections for Swanzey's population growth is compared to the other geographies mentioned above, as well as neighboring communities. Only the Town of Marlborough is expected to grow as fast as Swanzey among this group of municipalities.

[10] The official 2010 Census Block count for the study area was 2,038 people. Please note that Census Blocks differ greatly in size and shape, and some larger rural blocks included in this Study Area population calculation include people living outside of the quarter mile radius from NH 10.

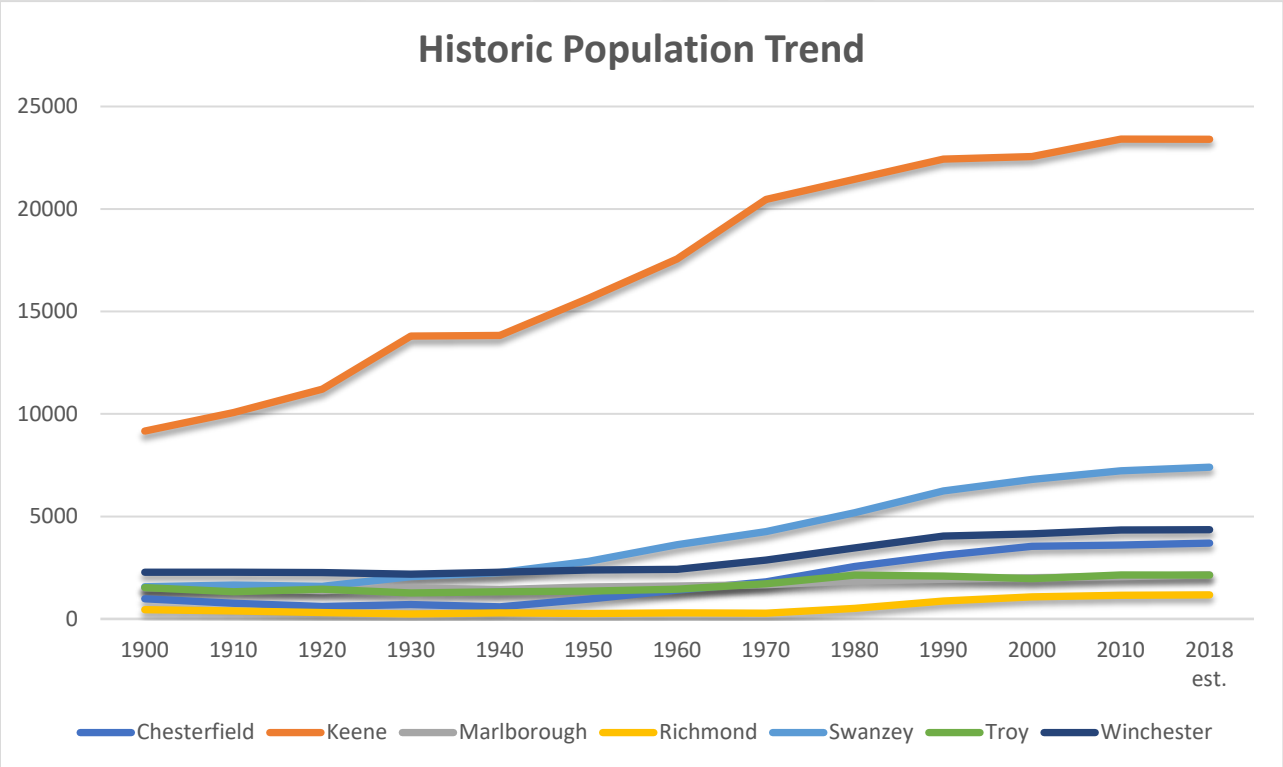
[11] There were 136 housing units permitted between 2010 and 2019 in Swanzey and only 4 new driveway permits issued for housing by NHDOT on NH 10 during the same period.

TABLE 7: Population Change over Time for Swanzey and Surrounding Towns

	Census	NH Office of Strategic Initiatives September 2016 Projections						Change
	2010	2015	2020	2025	2030	2035	2040	2010-2040
New Hampshire	1,316,470	1,330,501	1,349,908	1,374,702	1,402,878	1,422,503	1,432,730	9%
Cheshire County	77,117	77,342	77,653	78,002	78,315	78,543	78,695	2%
Chesterfield	3,604	3,610	3,598	3,588	3,602	3,613	3,620	0%
Keene	23,409	23,550	23,641	23,743	23,839	23,908	23,954	2%
Marlborough	2,063	2,110	2,130	2,151	2,160	2,166	2,170	5%
Richmond	1,155	1,159	1,172	1,185	1,189	1,193	1,195	3%
Swanzey	7,230	7,339	7,445	7,554	7,585	7,607	7,622	5%
Troy	2,145	2,135	2,159	2,185	2,194	2,200	2,205	3%
Winchester	4,341	4,334	4,345	4,357	4,375	4,388	4,396	1%

Source: NH Office of Strategic Initiatives

FIGURE 2: Historical Population for Swanzey and Surrounding Towns

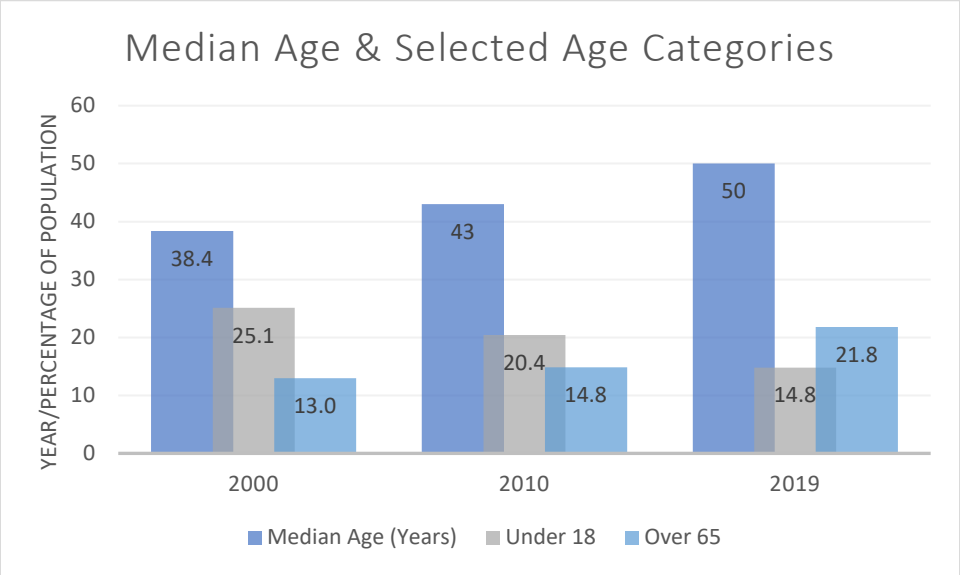


Source: U.S. Census

Age Distribution

Different age groups tend to have different transportation needs. Both young and older persons may have a need for transportation alternatives to single-occupancy vehicles, and a higher overall portion of working-age adults may signal the presence of more single-occupancy vehicles and subsequently potential commuting traffic. The mix of different age groups and the propensity of certain age groups over others also may have an impact on future land use, which in turn shapes transportation needs and patterns. In Swanzey, the median age increased from 38.4 years in the 2000 Census to 43 years in 2010, with an estimated median age of 50.0 years as of 2019.[12] At the same time, the proportion of the population under 18 has decreased over time from 25.1% in 2000 to 20.4% in 2010, with an estimated decrease of 14.8% in 2019.[6] At the same time as the population under 18 is decreasing, Swanzey experienced a significant increase in the portion of the population that is over 65, increasing from just 13% of the population in 2000 to 21.8% of the population in 2019. While it is difficult to estimate the age distribution within the Study Area due to changing census geography, the Town of Swanzey demonstrates a clear trend of an increase in median age and those over 65 coupled with a decrease in those under 18. This trend of an aging population could have a substantial impact on the transportation needs for the Demographic Study Area in the future.

FIGURE 3: Median Age and Selected Age Categories



Source: U.S. Census and American Community Survey 5-year estimates, Table S0101

Population Density

Population density can have a major effect on the forms of transportation options that are viable, as well as the overall patterns of transportation within the larger corridor. Population density within the Study Area was determined at the Census block level, which is the smallest geography available for the Study

[12] US Census, Table S0101, 2019: ACS 5-Year Estimate Tables.

Area. Population counts used to determine density were derived from the 2010 U.S. Census, and density was calculated as the number of people per square mile.[13]

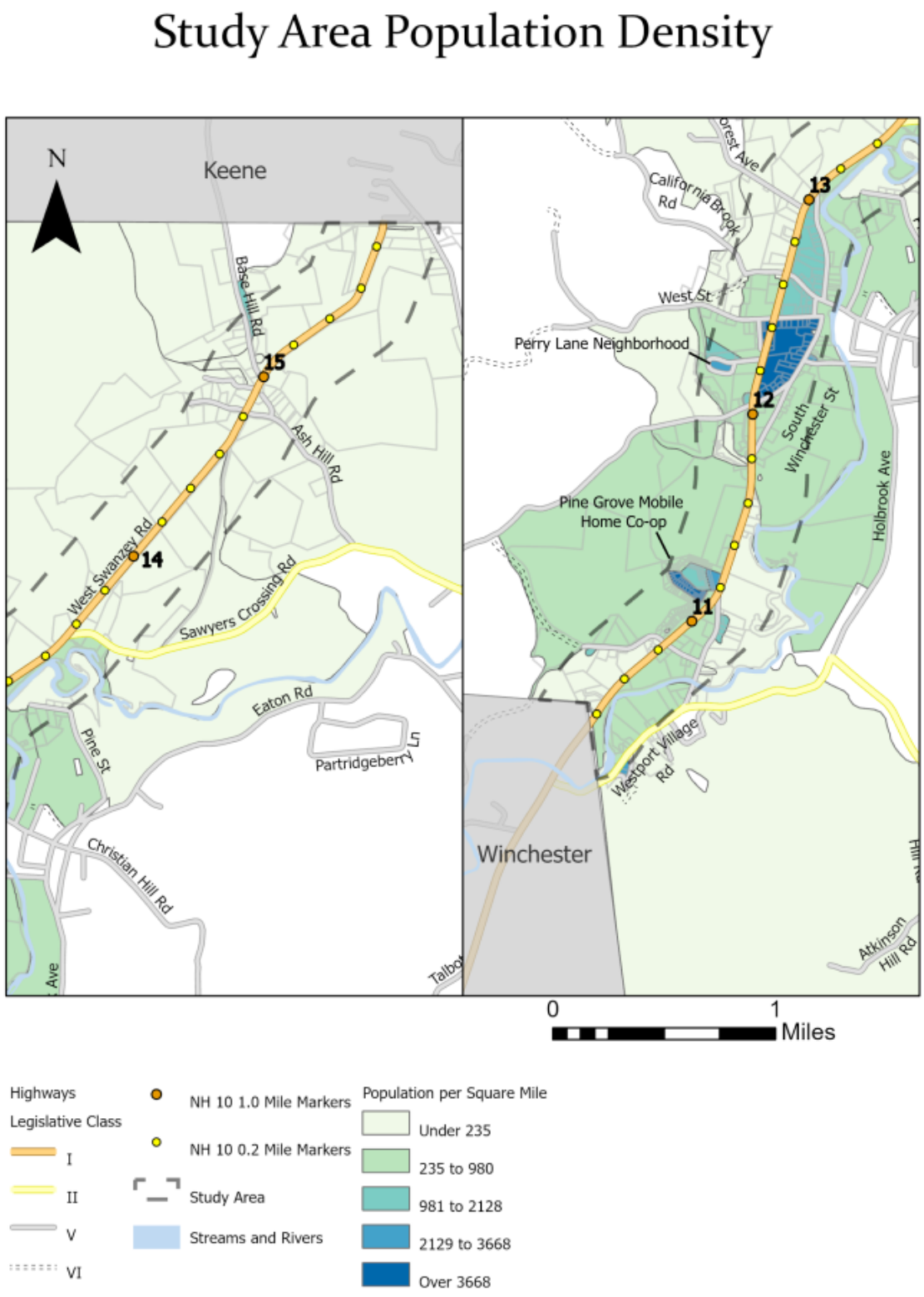
By far the blocks with the highest density were in West Swanzey Village in an area roughly bounded by North Winchester Street, South Winchester Street, Cobble Hill Road and NH 10 at over 3,668 people per square mile. Both the Perry Lane neighborhood and the Pine Grove Mobile Home Park Cooperative also demonstrate higher densities (see Map 6). Apart from these pockets of density, many of the blocks south of Forest Avenue and Sawyers Crossing Road have moderate population density which aligns with the residential zoning along major streets extending from the Study Area. The Census blocks north of Sawyers Crossing Road or Forest Avenue are lower in density than Census blocks in the southern half of the Study Area.

Calculation of population density via U.S. Census data can be combined with parcel-level housing and land-use data to gain a more complete understanding of population distribution within the Study Area. Higher densities along the corridor generally coincide with specific housing developments, such as the Perry Lane neighborhood or the Pine Grove Mobile Home Park Co-operative with the exception of West Swanzey Village.

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[13] Due to the irregular sizes of Census blocks some blocks may have artificially high density per square mile while other blocks may encompass a wider area of both residential and non-residential or rural areas. With these limitations taken into account, the population density of the Study Area can provide some insight to the distribution of population within the Study Area.

MAP 6: Population Density in the study area by block group



Median Household Income and Poverty

Socio-economic factors can influence transportation needs and trends. Income can determine the transportation modes households utilize and may also indicate the relative burden of transportation costs on households. The table below provides the median household income for the Town of Swanzey as well as the West Swanzey Census Designated Place, or the Census geography for West Swanzey Village. While median household incomes for both geographies increased from 2010 to 2019, West Swanzey Village is shown to have consistently lower median incomes than the Town of Swanzey as a whole. Keene Housing, Southwestern Community Services and others own some income restricted housing in that area. Outside of West Swanzey Village, the Study Area has a number of clusters of low- and moderate-income populations because of the presence of a housing development owned by Keene Housing (Evergreen Knoll) which is subject to income restrictions, as well as the Pine Grove Mobile Home Park.

TABLE 8: Median Income Over Time

	2010	2019
Swanzey town, Cheshire County, NH	$52,053	$65,019
West Swanzey CDP, NH	$40,259	$58,494

Source: American Community Survey 2018 5-year estimates, Table S1901

TABLE 9: Population Under Poverty

Poverty Status, 2019			
Geography	**Total Population**	**Population 150% or more under the Federal Poverty Level**	**Percent of total population 150% or more under the Federal Poverty Level**
New Hampshire	1,305,013	169,285	13%
Cheshire County	71,402	11,438	16%
Swanzey	7,185	862	12%
West Swanzey CDP	896	76	8%

Source: American Community Survey 2019 5-year estimates, Table S1701

Key Demographic Findings

- West Swanzey Village, and likely the Study Area as a whole, has lower incomes and than the Town of Swanzey as a whole
- The Town of Swanzey is anticipated to have a very slow population growth rate in the future, slower than the State of New Hampshire as a whole and much slower than the national average.
- The Study Area is home to approximately 28% of the Town of Swanzey's population as of the 2010 Census, although this is likely an inflated statistic due to the irregularities of the Census block geography.
- The Town of Swanzey is aging, with the median age and share of the population over 65 increasing and the share of the Town's population under 18 decreasing over time.

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- The majority of the population in the Study Area lives in the southern half of the corridor, and the highest population densities outside of specific multifamily or manufactured housing developments can be found in West Swanzey Village.
- Higher densities along the corridor generally coincide with specific housing developments, such as the Perry Lane neighborhood or the Pine Grove Mobile Home Park Co-operative with the exception of West Swanzey Village.

Jobs and Commuting Patterns

Using Census Longitudinal Employer-Household Dynamics, this section will provide an overview of employment and commuting patterns for workers and residents of the Corridor area. Analysis includes an overview of employment within the Study Area itself, a profile of workers within the Study Area, an overview of the inflow and outflow of workers from the Study Area, and finally an overview of the commuting distance and destinations for those who live and work in the Study Area. This section will provide data for 2010 and 2018 to provide insights into the recent economic changes and trends along the corridor. As NH 10 is a major commercial and industrial hub for the Town of Swanzey, understanding commuting patterns and trends can provide significant insights into existing transportation patterns along the corridor, particularly in the peak weekday commuting hours. For this section, the Study Area is defined as the 0.25-mile buffer from the NH 10 centerline within the Town of Swanzey.

Study Area Employment

The Study Area saw a dramatic increase in jobs from 2018 to 2010, increasing by 267 jobs or 114%. The vast majority of these new jobs, 213, were in the retail sector. This likely reflects the development of Market Basket within the northern section of the Study Area and to a lesser degree the Dollar General in the southern section of the Study Area since 2010. Workers within the Study Area also were younger and lower income in 2018 when compared to 2010. Those aged 29 or younger made up the majority of workers within the Study Area in 2018 (40.9%), while in 2010 the majority of workers were 30 to 54. There were also many more low-earning jobs within the Study Area in 2018 compared to 2010, with 48.1% of jobs earning $1,250 or less in 2018 as compared to 32.9% in 2010. These trends are consistent with the growth in retail trade as the dominant industry within the Study Area. The Study Area also saw increases in the industries of Manufacturing, Wholesale Trade, and Other Services.

While employment within the Study Area grew substantially between 2010 and 2018, there were a number of industries that saw losses in employment. The most dramatic decrease was in the Educational Services sector which decreased from 45 positions, about 20% of all jobs in 2010, to no jobs in 2018. The sectors of Accommodation and Food Services and Public Administration also saw a decrease in their total number of jobs in the Study Area.

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TABLE 10: Study Area Labor Market Overview

Total All Jobs				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
Total All Jobs	501	100.0%	234	100.0%
Jobs by Worker Age				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
Age 29 or younger	205	40.9%	56	23.9%
Age 30 to 54	193	38.5%	117	50.0%
Age 55 or older	103	20.6%	61	26.1%
Jobs by Earnings				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
$1,250 per month or less	241	48.1%	77	32.9%
$1,251 to $3,333 per month	156	31.1%	93	39.7%
More than $3,333 per month	104	20.8%	64	27.4%
Jobs by NAICS Industry Sector				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
Agriculture, Forestry, Fishing and Hunting	0	0.0%	0	0.0%
Mining, Quarrying, and Oil and Gas Extraction	0	0.0%	0	0.0%
Utilities	0	0.0%	0	0.0%
Construction	31	6.2%	34	14.5%
Manufacturing	25	5.0%	2	0.9%
Wholesale Trade	43	8.6%	30	12.8%
Retail Trade	264	52.7%	51	21.8%
Transportation and Warehousing	16	3.2%	0	0.0%
Information	2	0.4%	1	0.4%
Finance and Insurance	0	0.0%	0	0.0%
Real Estate and Rental and Leasing	3	0.6%	7	3.0%
Professional, Scientific, and Technical Services	1	0.2%	1	0.4%
Management of Companies and Enterprises	0	0.0%	0	0.0%
Administration & Support, Waste Management and Remediation	13	2.6%	0	0.0%
Educational Services	0	0.0%	45	19.2%
Health Care and Social Assistance	12	2.4%	10	4.3%
Arts, Entertainment, and Recreation	0	0.0%	0	0.0%
Accommodation and Food Services	22	4.4%	33	14.1%
Other Services (excluding Public Administration)	68	13.6%	12	5.1%
Public Administration	1	0.2%	8	3.4%

Source: U.S. Census Longitudinal Employer-Household Dynamics

Worker Inflow-Outflow

While the number of workers both living in the Study Area and working in the Study Area grew from 2010 to 2018, very few workers both lived or worked in the Study Area in either year. In 2018, despite a 114% increase in employment within the Study Area, only 10 people both lived and worked in the Study

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Area, up from 7 in 2010. This may indicate a mismatch between the skill set and education of those who live in the Study Area and the employment opportunities available along the NH 10 corridor.

Both the number of jobs based in the Study Area and workers living in the Study Area increased significantly from 2010 to 2018. However, the number of jobs grew far faster than the number of workers living in the area, with a 114% increase of the former and a 24.6% increase in the latter. In 2018, the number of jobs in the Study Area was more than the number of workers living in the Study Area, which is a reversal from 2010 where the number of workers far outstripped the number of jobs along NH 10 in Swanzey.

TABLE 11: In-Area Labor Force Efficiency (All Jobs)

	2018	2010	Change 2010-2018
Living and Employed in the Selection Area	10	7	42.9%
Living in the Selection Area but Employed Outside	421	338	24.6%
Employed in the Selection Area but Living Outside	491	227	116.3%

Source: U.S. Census Longitudinal Employer-Household Dynamics

Education

Educational attainment plays a significant role in the skillset of the workforce in a community, and the types of positions that are filled by the residents of that community. In 2019, the population of Swanzey that is 25 and over had comparable levels of educational attainment to Cheshire County and the State of New Hampshire. Notable trends in education include a higher percentage (9%) of those that only reached a high school level of education compared with the State, and a 7% lower percentage of those that had obtained a Bachelor's degree. In West Swanzey Village, which represents the major concentration of population in the Study Area, the percentage of those who had only obtained a high school diploma was much higher, 15% above the State and 12% higher than the Cheshire County. The high percentage of population with a high school level of education would lend itself to a greater percentage of residents in Swanzey who work in the retail and service sectors. However, this is not reflected in the efficiency of the workforce, as most of the workforce is commuting outside of the Study Area even as retail jobs make up the majority of positions in the Study Area. This may indicate that educational attainment is not the primary driver of whether residents of the Study Area fill positions created locally as opposed to commuting outside of the Study Area.

TABLE 12: Educational Attainment for Persons 25 and Over

	Less than Highschool	Highschool	Some College	Associates	Bachelors	Masters or Above
New Hampshire	7%	28%	19%	10%	22%	14%
Cheshire County	7%	31%	19%	10%	20%	13%
Swanzey	7%	37%	21%	13%	15%	11%
West Swanzey CDP	9%	43%	15%	2%	21%	16%

Source: American Community Survey 2019 5-Year Estimates, Table B15003

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Distance of Travel

Between 2010 and 2018, the population of individuals who work in the Study Area commuting long distances increased dramatically. The portion of those who work in the Study Area and travel greater than 50 miles to get to work increased 355% over this time period from 20 to 91 workers, while the number of individuals travelling between 25 and 50 miles between work and home increased 263% from 19 to 69 workers. In addition, the share of all workers employed in the Study Area who travelled less than 10 miles to work decreased from 59.8% in 2010 to 48.1% in 2018.

TABLE 13: Distance to Home for Study Area Workers

	2018		2010	
	Count	Share	Count	Share
Total All Jobs	501	100.0%	234	100.0%
Less than 10 miles	241	48.1%	140	59.8%
10 to 24 miles	100	20.0%	55	23.5%
25 to 50 miles	69	13.8%	19	8.1%
Greater than 50 miles	91	18.2%	20	8.5%

Source: U.S. Census Longitudinal Employer-Household Dynamics

Overall, for those who live in the Study Area commute distances increased slightly but remained primarily stable. There was an increase in the number of workers who lived in the Study Area, from 345 in 2010 to 431 in 2018, but a slight decrease in the share of workers travelling less than 10 miles to work. Those who live in the Study Area increasingly were travelling from at least 10 miles to work, although the share of workers travelling greater than 50 miles to work daily decreased slightly from 2010 to 2018.

TABLE 14: Distance to Work for Study Area Residents

	2018		2010	
	Count	Share	Count	Share
Total All Jobs	431	100.0%	345	100.0%
Less than 10 miles	239	55.5%	203	58.8%
10 to 24 miles	55	12.8%	34	9.9%
25 to 50 miles	68	15.8%	45	13.0%
Greater than 50 miles	69	16.0%	63	18.3%

Source: U.S. Census Longitudinal Employer-Household Dynamics

Home/Work Destinations

In both 2010 and 2018, those who live in the Study Area overwhelmingly work in the City of Keene, while those who work in the Study Area live in a diverse range of locations. Despite an increase in the number of workers who live in the Study Area, the portion of all workers who worked in the City of Keene increased from 2010 to 2018. While the number of workers who live in the City of Keene and work in the Study Area also increased, their relative share of the overall population employed in the Study Area decreased.

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There was also an increase in those who worked in larger communities farther away, such as Concord, Nashua, Manchester, and Derry.

TABLE 15: Residence of People Working in Study Area

	2018		2010	
	Count	**Share**	**Count**	**Share**
Keene city, NH	98	19.6%	50	21.4%
West Swanzey CDP, NH	18	3.6%	12	5.1%
Winchester CDP, NH	12	2.4%	7	3.0%
Nashua city, NH	7	1.4%	2	0.9%
Manchester city, NH	6	1.2%	2	0.9%
Troy CDP, NH	6	1.2%	3	1.3%
Derry CDP, NH	5	1.0%	-	-
Hinsdale CDP, NH	5	1.0%	5	2.1%
Concord city, NH	4	0.8%	-	-
Jaffrey CDP, NH	4	0.8%	1	0.4%
All Other Locations	336	67.1%	152	65.0%

Source: U.S. Census Longitudinal Employer-Household Dynamics

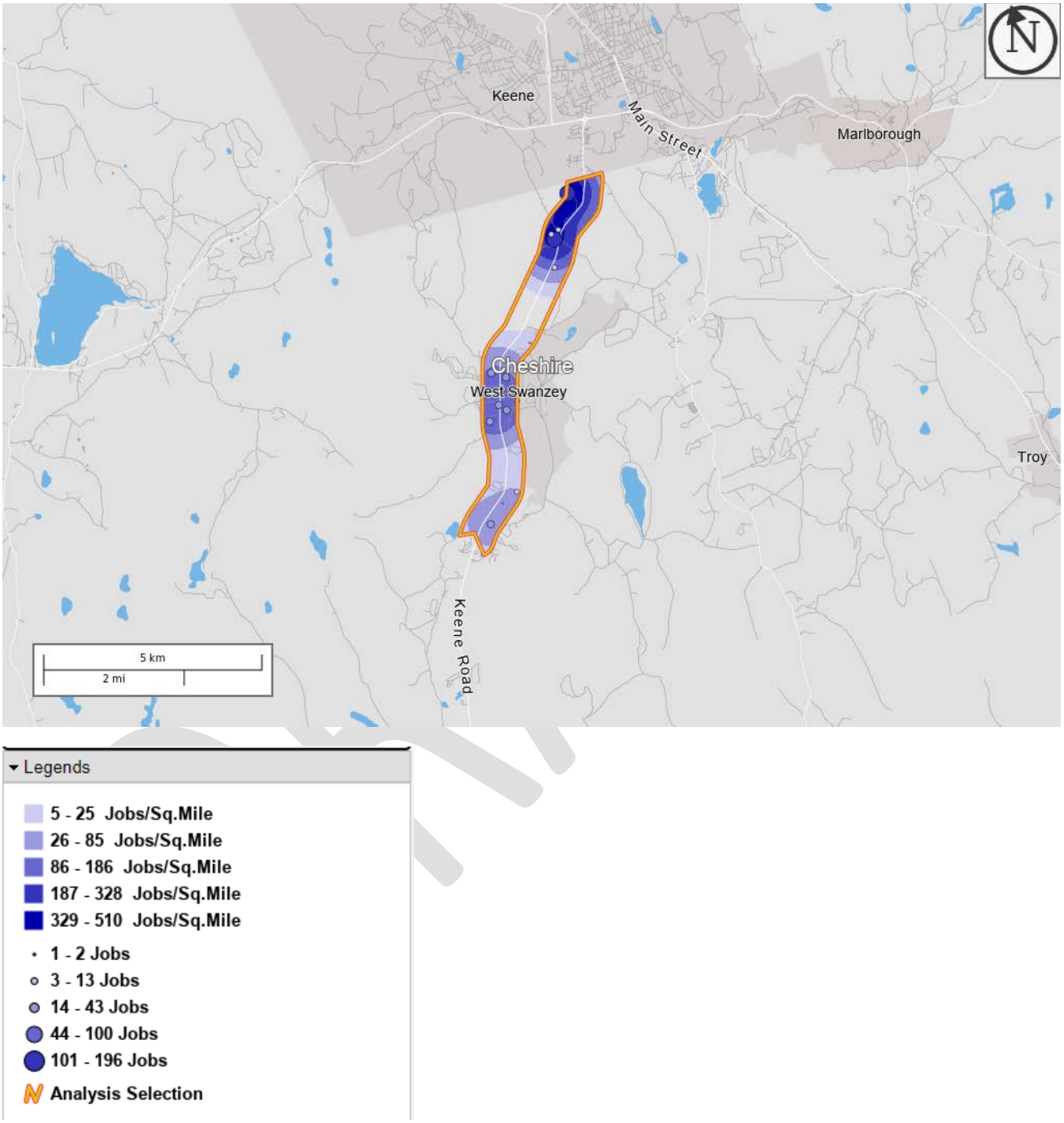
TABLE 16: Work Destinations for Study Area Residents

	2018		2010	
	Count	**Share**	**Count**	**Share**
Keene city, NH	171	39.7%	133	38.6%
Brattleboro CDP, VT	13	3.0%	12	3.5%
Concord city, NH	12	2.8%	9	2.6%
Manchester city, NH	7	1.6%	8	2.3%
Lebanon city, NH	6	1.4%	10	2.9%
Hanover CDP, NH	5	1.2%	7	2.0%
Nashua city, NH	4	0.9%	4	1.2%
Portsmouth city, NH	4	0.9%	3	0.9%
Hinsdale CDP, NH	3	0.7%	1	0.3%
Rochester city, NH	3	0.7%	-	-
All Other Locations	203	47.1%	158	45.8%

Source: *U.S. Census Longitudinal Employer-Household Dynamics*

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FIGURE 4: Job Density within the Study Area, 2018



Source: U.S. Census Longitudinal Employer-Household Dynamics

Key Jobs & Commuting Findings

- The Study Area experienced a significant increase in jobs over the last decade and a shift in dominant industries from Construction, Education, Food and Accommodation, and Retail Trade to an employment base overwhelmingly comprised of jobs in the Retail Trade sector.
- The highest density of employment in the corridor is in the far northern section of the Study Area, adjacent to the border with the City of Keene. This likely represents the Market Basket commercial plaza as well businesses off of Whittemore Farm Road.
- Those who work in the Study Area are younger, have lower incomes, and commute farther on average in 2018 when compared to 2010. This is likely a result of the growth in Retail Trade in the Study Area during this period.
- There is almost no overlap between those who live within the Study Area and those who work in the Study Area. However, the number of jobs in the Study Area and the number of workers in the Study Area are almost equal. This may reflect a mismatch in the industries and opportunities present in the Study Area and the skills and needs of those who live in the Study Area.
- While the majority of those who work in the Study Area in 2018 still commute less than 10 miles between work and home, the number of workers who travelled 25 to 50 or over 50 miles increased substantially between 2010 and 2018. Over the same time period, commute times for those who live in the Study Area remained relatively stable and the majority of Study Area workers travelled less than 10 miles to work daily.
- The majority of those who live in the Study Area work in Keene, and Keene is also the largest source of employees commuting into the Study Area for work.
- The Educational Services sector completely disappeared from the Study Area between 2010 and 2018, and is the loss of a significant industry that provided 19.2% of all jobs in the Study Area in 2010.

Housing

Housing is a critical piece of understanding current and future transportation needs and influences almost all other facets of land use and economic activity that also determine the transportation patterns and needs within the Study Area. This section will provide an overview of the current housing stock along the corridor, including housing types, housing affordability and availability, and how demographic factors can be used to predict future housing need. Data for this section is derived from parcel-level assessing data from the Town of Swanzey, the American Community Survey, the U.S. Census, and the NH Office of Strategic Initiatives.

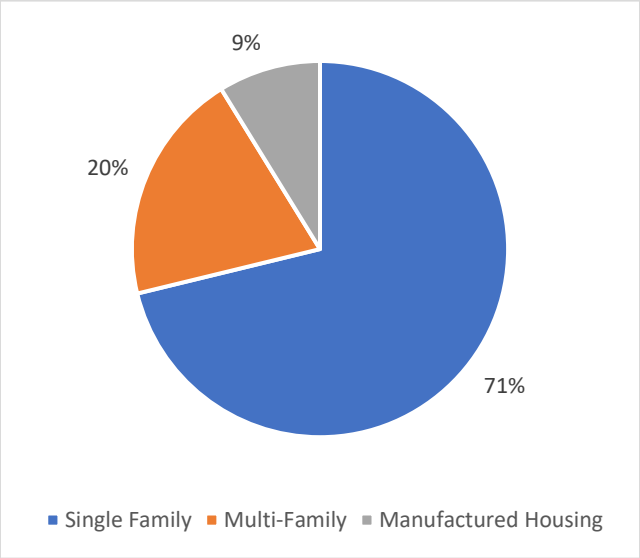
Housing Stock along the Corridor

In 2010, the Census blocks that intersected with a 0.25-mile buffer of NH 10 contained a total of 921 housing units. This is approximately 29% of the 3,205 housing units in the Town of Swanzey as of the 2010 Census. However, as mentioned before, Census blocks have irregular shapes and sizes, and this represents a far larger area of land than the quarter-mile radius around NH 10. While housing type is not

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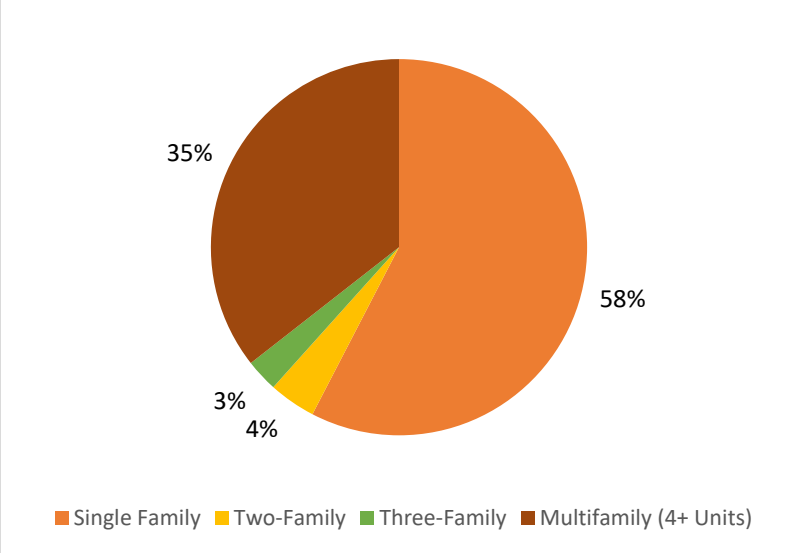
available at the block level, in 2010 the Town of Swanzey had approximately 71% of their housing stock as single-family units, 20% as multi-family units, and 9% as manufactured housing units

FIGURE 5: Swanzey Housing Types in 2010



Source: New Hampshire Office of Strategic Initiatives

FIGURE 6, Parcel-level Study Area Housing Types



Source: Town of Swanzey

Town of Swanzey Assessing Data

To gain a more granular understanding of the housing stock along the Corridor, land use information from parcel-level assessing data can be used. Assessing data in the Town of Swanzey identifies four land use codes for residential uses. The land use code "L-R1" represents a single-family home, "L-R2" represents a duplex, "L-R3" represents a triplex and "L-R4" is used for all parcels with four or more units. According

to assessing data, there are 644 units of housing within the Study Area across 402 total parcels. Of those, the majority (57.6%) of units are single-family homes, followed by multi-family units on parcels with four or more units which make up 42.4% of all units. Duplex and triplex properties comprise 4% and 2.8% of the housing stock in the Study Area, respectively. Of those units in multifamily buildings with 4 or more units, 92 units are subject to some form of income limitation while 137 units are unrestricted units on the private market.

An important detail for parcels identified with the "L-R1" land use code is that manufactured housing units are included and are classified as single-family homes. Within the Study Area, there Pine Grove Mobile Home Cooperative represents the only concentration of manufactured housing. Cross-referencing address and land use data, 116 or 31.2% of "L-R1" properties appear to be in the Pine Grove Cooperative and are manufactured housing. This also represents 18% of all housing units in the Study Area.

According to assessing data for the Town of Swanzey, the median lot size for a parcel with housing indicated as its land use is 0.5 acres. This indicates that at least half of all residential properties are less than an acre, which is the minimum lot size for all zones in the Study Area with the exception of the Village Business District I and II.

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TABLE 17: Parcel-level housing information for the Study Area

Housing Type	Land Use Code	Number of Parcels	Number of Units	Housing Type as Percentage of Stock
Single Family*	L-R1	371	371	57.6%
Duplex	L-R2	13	26	4%
Triplex	L-R3	6	18	2.8%
Four or more units	L-R4	12	229	35.6%
	Total:	402	644	
**Includes 116 units of Manufactured Housing in the Pine Grove Cooperative*				

Source: Town of Swanzey Assessing Data

Housing Affordability & Availability

According to the 2019 American Community Survey 5-year estimates, the Town of Swanzey had an estimated 3089 occupied housing units, 71% of which were owner occupied and 29% renter occupied. Of those owner-occupied units, 63% had a mortgage and 37% had no mortgage. This ratio of owner and renter occupied units is in line with the State and Cheshire County, with a 71% portion of units being owner occupied statewide and 69% of units being owner occupied in Cheshire County. In 2019, Swanzey had an estimated 0% vacancy rate for rental units in Town. While this number is an estimate, it indicates that there is a severely low vacancy rate in the Town for rental housing. The estimated rental vacancy rate in the State of New Hampshire is 3.9%, and 3.4% in Cheshire County. For owner occupied units in Swanzey, there is a 1.8% vacancy rate, which is on par with Cheshire County and the State of New Hampshire. Similar to rental units, a 1.8% vacancy rate is below the level typically considered healthy for a housing market.

An important metric in understanding the housing market for the Town of Swanzey is the level of housing cost burden for households, which is defined as the number of households paying over 30% of their monthly household income on housing. According to the 2019 American Community Survey 5-year estimates, in Swanzey an estimated 28.3% of homeowners with a mortgage and 17.3% of homeowners without a mortgage pay over 30% of their monthly household income on housing costs. The percentage of homeowners both with and without a mortgage that are cost burdened is similar to both the State and Cheshire County. For renters in Swanzey, 48.5% of those who rent their home pay over 30% of their monthly income on housing costs. The percentage of cost burdened renters in Swanzey is on par with the State of New Hampshire (46.2%) and Cheshire County (45.4%). The estimated median monthly housing costs for renters in the Town of Swanzey is $1,028, which is slightly lower than the State of New Hampshire median ($1,111) and slightly higher than the Cheshire County median ($949).

While housing represents a significant cost to households, housing does not exist in a vacuum. The location of housing and its relationship to transportation networks and employment hubs can have a major impact on the transportation costs faced by households. Within the Town of Swanzey, the

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combined costs of housing and transportation, on average, represent 54% of a household's income[14]. On average, transportation costs represent a quarter of a household's income in Swanzey. This may be impacted by both the location of housing, but also the nature of employment in the Study Area. As mentioned previously, almost no workers who live in the Study Area work within the Study area, and almost all of those employees work in a community outside of Swanzey. In the most extreme examples, at least 16% of Study Area workers commute over 50 miles to work daily. When examining housing availability and affordability, it is important to factor in transportation costs as an important factor in the overall affordability of the housing market.

Housing Need

To calculate the need for housing, population projections published by the NH Office of Strategic Initiatives can be paired with household size information from the U.S. Census to estimate the number of units needed to accommodate future population growth while maintaining the same average household sizes. However, this form of analysis leads to an oversimplification and underestimation of housing need and does not incorporate changing demographics and employment trends of both Swanzey and the Region.

The high number of renters burdened by the cost of housing in Swanzey may indicate that the current housing stock does not adequately meet the needs of the current population in Swanzey. In addition, if the average household size decreases, as is common with an aging population, more housing units will be needed to accommodate a greater number of smaller households. The critically low vacancy rates Swanzey experiences, especially for rental housing, also indicate that there is an immediate need for more housing even without factoring in any population growth or changing demographics.

Key Housing Findings

- Availability of both homeowner and rental housing units is scarce within the Town of Swanzey. For renters, this may translate to higher housing prices and more households burdened by the cost of housing.
- One third of all multi-family housing units within the Study Area are subject to some form of income restriction for occupancy. While a valuable resource to low-income families, many income-restricted housing developments have long wait lists for units and may not provide relief to renters searching for housing in housing markets with low vacancy rates such as Swanzey.
- The Study Area has a more diverse housing stock than the Town of Swanzey as a whole, with 116 (18%) units of manufactured housing, 255 (39.6%) units of single-family homes, and 229 (35.6%) units of multi-family units in properties with four or more units. This is likely reflective of the presence of water and municipal sewer infrastructure compared to other areas of Swanzey.
- At least half of all parcels with housing as its land use is less than half an acre, which is less than the required minimum lot size in the Residence District. This indicates that zoning requirements are not in line with the current pattern of housing development in the Study Area.

[14] Center for Neighborhood Technology (2021). New Hampshire H+T Index by Census Tract [Data file]. Retrieved from https://htaindex.cnt.org/download/data.php.

- Renters in Swanzey are disproportionally burdened by the cost of housing, with 48.5% of households who rent their home paying more than 30% of their monthly income on housing, which is the generally accepted definition of affordable.
- While an analysis purely based on projected population growth only calls for the development of 4.6 units of new housing per year to accommodate growth, many factors such as low vacancy rates and high rates of housing cost burden indicate that more housing may be needed to accommodate current and future populations.

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Agenda Item III

Date: March 12, 2021
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Discussion: Survey or Stakeholder Interviews

Background

Surveys or stakeholder interviews can be helpful in gathering information about stakeholders' perceptions of issues or gathering factual data where there are currently data gaps. At the beginning of the study, neither SWRPC nor the Town of Swanzey had a specific survey or stakeholder interview component for the study in mind, but SWRPC reserved a small budget to conduct either survey or stakeholder interviews. As the rest of the study nears completion and staff and the Working Group have a better understanding of data gaps, SWRPC would like to discuss arranging a survey or set of stakeholder interviews.

SWRPC has met initially with Town staff to discuss this and will be prepared to share some potential survey or stakeholder interview efforts. Working Group members are also encouraged to bring their ideas to the meeting as well.

Recommendation

For your information.

Agenda Item IV

Date: March 12, 2021
To: Swanzey NH Route 10 Corridor Study Working Group
From: SWRPC Staff

RE: Discussion: Findings and Recommendations

Background

SWRPC staff have to-date presented findings for the following components of the NH Route 10 Corridor Study:

- A summary of policies, plans and studies;
- An evaluation of crash trends on the corridor;
- A field review and analysis of four intersections;
- An analysis of access management on the corridor;
- An analysis of traffic operations on the corridor; and
- A land use and economic analysis.

This constitutes the majority of the scope of work for the Swanzey NH Route 10 Corridor Study. A next step of the Study is to begin developing recommendations. Recommendations may include action items, policy changes and projects that should be considered or implemented by the Town of Swanzey or other relevant stakeholder groups.

Attached, please find a list of the findings that have been identified to-date through the analyses mentioned above. Some of the findings should be good prompts for the development of recommendations. Staff will come prepared to share some ideas for recommendation with the Working Group and the Working Group is encouraged to bring recommendations of their own for further discussion.

Recommendation

For your information.

Swanzey NH 10 Corridor Summary List of Findings

Summary of Policies, Plans and Studies

1. Both Swanzey and its neighboring communities of Keene and Winchester recognize the importance of NH 10 as a corridor to support current and future development. In particular, all three communities recommend future commercial and industrial development to be promoted along the Corridor.
2. The Ashuelot Rail Trail provides an opportunity to serve as a parallel pedestrian and bicycle facility to NH 10. In particular, the rail trail provides an important connection for bicycles and pedestrians between Keene and West Swanzey Village that runs parallel to NH 10, as well as connections farther south to Winchester and Hinsdale.
3. West Swanzey Village has redevelopment potential that is encouraged both by the Town through an economic revitalization zone, in the Town's master plan, and through the results of the West Swanzey Village charette hosted by Plan NH. West Swanzey also represents a significant node of population density, and a concentration of low-income population along the Corridor.
4. Because of the cost of transportation, the disproportionate number of low-income residents and ongoing predictable trip patterns between Keene, Swanzey and Winchester, NH 10 may be well suited for transportation modes beyond the personal motor vehicle. Such transportation would need to be a result of coordination between Swanzey and its surrounding towns. Residents have also indicated that a lack of transportation options is a significant issue in Swanzey.
5. Swanzey has indicated a strong desire for its transportation system to accommodate all transportation users, including bicyclists and pedestrians. NH 10 currently acts as a crossing barrier and there are safety issues for pedestrians and bicyclists, particularly in the West Swanzey Village area.
6. The Corridor plays an important role in hazard mitigation as a primary evacuation route and a concentration of services and resources which would be needed in the event of a disaster. Populations along NH 10 south of West Swanzey Village are identified as being at risk of isolation in the case of a disaster.
7. While the southern half of the NH 10 corridor within Swanzey overlies an important stratified drift aquifer which provides ample groundwater, the area north of West Swanzey Village possesses limited groundwater resources and water and wastewater infrastructure. This limits the development potential of the northern half of the NH 10 corridor.
8. Collaboration between NHDOT and the Town of Swanzey is key for the NH 10 corridor to reflect the needs and wants of the Town. While NHDOT has established policies for corridor management, the Town of Swanzey through its complete streets policies and other studies has demonstrated that it has a distinct vision for the Corridor that may not be captured in current NHDOT policy.

Evaluation of Traffic Operations on the Corridor

1. Base Hill Road at Keene town line: 94.6% of the traffic is exceeding the 30 mph speed limit in both directions. Truck traffic represents 3% of the traffic. ADT levels ranged from 3,100 and 3,689 between 2010 and 2019 with most recent ADTs at 3,231 in 2019. Average gaps in traffic were 51.2 seconds in the a.m. peak hour and 31.6 seconds in the p.m. peak hour.
2. NH 10 at the Swanzey/Keene town line: 62.4% pf the traffic exceeds the 30 mph posted speed limit in both directions. Truck traffic represents 5.1% of the traffic. ADT levels ranged from 13,000 to

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16,103 between 2010 and 2019 with most recent ADTs at 14,333 in 2019. Average gaps in traffic were 12.9 seconds in the a.m. peak hour and 9.6 seconds in the p.m. peak hour.

3. NH 10 South of Base Hill Road: 56.5% of the traffic is exceeding the 40 mph speed limit in both directions. Truck traffic represents 5.3% of the traffic. ADT levels ranged from 13,000 and 14,000 between 2010 and 2019 with most recent ADTs at 13,476 in 2019. Average gaps in traffic were 8.6 seconds in the a.m. peak hour and 6.0 seconds in the p.m. peak hour.
4. Sawyer's Crossing east of NH 10: 79.6% of the traffic is exceeding the 30 mph speed limit in both directions. Truck traffic represents 3.4% of the traffic. ADT levels was 312 in 2019.
5. NH 10 south of West Street: 86% of the traffic exceeds the 40 mph posted speed limit in both directions. Truck traffic represents 7.2% of the traffic. ADT levels ranged from 9,963 to 10,806 between 2016 and 2020 with most recent ADT at 9,963 in 2020. Average gaps in traffic were 17.9 seconds in the a.m. peak hour and 12.9 seconds in the p.m. peak hour.
6. NH 10 at Winchester town line: 90.5% of the traffic exceeds the 50 mph posted speed limit in both directions. Truck traffic represents 21% of the traffic. ADT levels ranged from 7,000 to 7,981 between 2010 and 2020 with most recent ADT at 7,661 in 2020. Average gaps in traffic were 17.6 seconds in the a.m. peak hour and 12.8 seconds in the p.m. peak hour.
7. Bicycle counts conducted between June and September 2018 found that the daily average number of bicyclists on the Ashuelot Rail Trail was 137 (South of Krif Road), 61 (North of Sawyer's Crossing Road) and 62 (North of Pine Street).
8. SWRPC carpooling data collected by SWRPC in 2019 at NH 10 South of Base Hill Road showed that average vehicle occupancy during the peak hours were about 1.19 people per vehicle which was equivalent to 35% of the people moving through the area sharing a vehicle with at least one other person and approximately 18% of the vehicles sharing a ride with another person.

Evaluation of Crash Data

1. There were two highway segments on NH 10 (West Swanzey Road) in the GIS database that had a statistically higher observed rate of crashes and injuries and therefore have more potential for reducing crashes and injuries. The two segments were part of a list of the top 5% segments provided to SWRPC by NHDOT in 2015:
    a. GIS Segment 59835 recorded 61 crashes during the time period analyzed. This is the section of NH 10 (West Swanzey Road) between Sawyers Crossing Road and North Winchester Street.
    b. GIS Segment 59425 recorded 11 crashes during the time period analyzed. This is the section of NH 10 (West Swanzey Road) between Base Hill Road and Whittemore Farm Road.
2. There was one intersection, NH 10 (West Swanzey Road) at Base Hill Road in the GIS database that had a statistically higher observed rate of crashes and injuries and therefore has more potential for reducing crashes and injuries. The intersection ranked 27th worst of 100 rural intersection around the State as part of a list of the top 100 intersection provided to SWRPC by NHDOT (and based on data from 2002 to 2011).
3. Regardless of whether crashes were "locatable" or "not locatable," the total number of crashes in the entire Town is on a downward trend over the period analyzed (when considering a 5-year rolling average).
4. Within the ¼ mile study area of NH 10 (West Swanzey Road), the "locatable" crash record showed a significant decrease in crashes starting in 2011.

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5. An evaluation of the crashes based on the severity of injuries for "locatable" crashes in the study area showed a lower proportion of "no injury" crashes starting in 2012, however the proportion of "unknown" crashes increased in 2014.
6. A review of crashes by day of week showed that crashes were more likely to occur on Fridays and Saturdays.
7. A review of crashes by type of crash determined that the majority of crashes within the study area were with other motor vehicles or a fixed object. Other crash types included animal, other object, other, unknown, overturn, parked motor vehicle, bicyclist and pedestrian. Most fixed object crashes involved a tree.
8. The location of the first harmful event of each crash was most commonly "along the road" followed by "at intersection" and "along road at driveway access".
9. Crashes on NH 10 occur for the most part in dry conditions. However, wet or slippery road surface conditions played a factor in a significant number of crashes (as many as 54 of 192, or about 28% in the period analyzed).
10. The majority, over two-thirds of crashes occurred during daylight hours (about 68%).
11. Over 80% of crashes occurred when there were no adverse weather conditions (either "clear" or "cloudy").
12. For the 192 crashes in the record, there were a total of 499 individuals involved in the crashes.
13. Information about the use of safety restraints was also analyzed. Approximately 1 in 4 occupants were not using a safety restraint or helmet during a crash (24.6%). For fatality and injury crashes (KAB), the proportion of occupants not using a safety restraint was 43.4%.
14. An analysis of contributing factors related to each vehicle was conducted. Driver inattention/ distraction was the most commonly cited contributing factor in the crash record.
15. Vehicle actions prior to the crash were analyzed. Most vehicles were driving along the road prior to the crash. The other most common situations prior to the crash involved a stopped or turning vehicle.
16. On NH 10 between 2007 and 2017 serious injuries and fatalities occurred at the following locations:
    a. Fatalities:
        i. One at NH 10 at Base Hill Road and
        ii. Two on NH 10 between Sawyer's Crossing Road and North Winchester Street
    b. Serious Injuries:
        i. One on NH 10 in front of Market Basket,
        ii. One on NH 10 between Whittemore Farm Road and Sawyer's Crossing Road,
        iii. One at the intersection of NH 10 and Sawyer's Crossing Road, and
        iv. One at the intersection of NH 10 and North Winchester Road.
17. Based on NHDOT crash data and crash reports shared by the Town of Swanzey Police Department from 2010 to 2019, there were four intersections in the Study Area that showed at least a pattern of specific types of crashes. Findings from the crash reports and other contextual data are presented below:
    a. Base Hill Road/Citgo Station and NH 10
        i. 8 injuries reported and 11 crashes
        ii. Two rear-end crashes in NH 10 northbound left turn lane at Base Hill (3 injuries)
        iii. Six crashes in NH 10 southbound lane in front of the Citgo (3 injuries)
        iv. Two rear-end crashes in Base Hill Road eastbound right turn lane (0 injuries)
        v. There was also one broadside crash between an eastbound Base Hill Road vehicle and a southbound NH 10 vehicle (2 injuries)
        vi. Field review noted high traffic speeds in the area and flush median may be enabling crashes in the area

b. Sawyer's Crossing Road and NH 10
    i. One injury reported and 11 crashes
    ii. Six rear-end crashes in NH 10 southbound lane (0 injuries)
    iii. Four broad side crashes between NH 10 northbound vehicle and Sawyer's Crossing Road westbound vehicle (1 injury)
    iv. There was also one overtaking sideswipe crash between 2 NH 10 southbound vehicles
    v. Field review noted high traffic speeds, lack of southbound left turn lane or right hand shoulder for southbound traffic and intersection geometry may be enabling crashes in the area
c. California Street and NH 10
    i. Six injuries and 7 crashes
    ii. Three broadside crashes between northbound NH 10 vehicle and westbound California Street vehicle (1 injury)
    iii. Two rear end crashes between vehicles in northbound NH 10 lane (1 injury)
    iv. There was one broadside crash between a NH 10 southbound vehicle and a westbound vehicle attempting to cross NH 10 via California Street (3 injuries)
    v. There was one rear end crash between vehicles in southbound NH 10 lane (1 injury)
    vi. Field review suggested that high traffic speeds (traffic speeds were not recorded in this area) and poor sight distance to the south for the California Street eastbound approach may be enabling crashes in the area
d. West Street and NH 10
    i. Five injuries and 3 crashes
    ii. Two broadside crashes between a NH 10 southbound vehicle and a westbound vehicle attempting to cross NH 10 via West Street (5 injuries)
    iii. There was one overtaking sideswipe vehicle crash between two southbound vehicles (0 injuries)
    iv. Field review noted high traffic speeds may be enabling crashes in the area

Evaluation of Access Management Conditions

1. SWRPC staff utilized data from the NH Department of Transportation (NHDOT), the Town of Swanzey, and NH GRANIT to conduct an analysis of access management features and potential nonconformities along the NH 10 corridor in Swanzey based on the NHDOT driveway permitting rules and the Town of Swanzey's driveway permitting ordinance:
    a. Lots with frontage less than 500 feet, but with 3 or more access points included 2 commercial/industrial parcels on NH 10
    b. Lots with suspected corner clearance nonconformities included 12 parcels on NH 10 and 7 parcels on the side roads of Sawyer's Crossing Road, Forest Avenue, North Winchester Street, Cobble Hill Road, South Winchester Street, and Kempton Road
    c. Lots with driveway widths wider than 50 foot included 7 commercial/industrial properties and 2 single family/duplex properties on NH 10
    d. Lots with suspected nonpermitted access include 1 commercial/industrial parcel and 6 single family/duplex parcels on NH 10
    e. Lots with suspected miscellaneous objects in the highway right-of-way included 6 commercial/industrial parcels, 1 single family/duplex parcel and 1 multifamily parcel on NH 10

f. Lots with suspected vehicles parking, loading, vending or servicing in the NH 10 right-of-way included 3 single family/duplex parcels on NH 10

2. Two-way left turn lanes comprise the predominate form of on-road access management in the Corridor. There is approximately one half-mile of two-way left turn lanes on NH 10 in the study area. This represents approximately 9% of the total length of NH 10 through Swanzey.

Analysis of Land Uses and Zoning

1. Every property along NH 10 north of Forest Avenue on the west side of the corridor and north of Sawyers Crossing Road on the east side of the corridor is zoned Commercial/Industrial. Commercial/Industrial is also exclusive to the NH 10 corridor within Swanzey and does not cover any parcels outside of the ¼ mile Zoning Study Area. No form of housing is allowed in this zone.
2. The intent of the Commercial/Industrial district is to "minimize strip development and encourage off road development on portions of Route 10". The district promotes this goal by requiring a 3-acre minimum lot size for properties utilizing access to NH 10 while only requiring a 1-acre minimum lot size for parcels using access to "feeder roads". Reduced lot size and frontage requirements within the Commercial/Industrial district were used in the development of businesses along Whittemore Farm Road in the 1980's, which currently is home to several commercial uses. The Town of Swanzey Planning and Economic Development Department is not aware of any other development proposals taking advantage of this zoning flexibility.
3. With the exception of Village Business Districts I and II, minimum lot sizes in all other zones are at least 1 or 3 acres. Both the Village Business District I & II have a minimum lot size of one-half acre, with the exception of a 1-acre requirement for multifamily properties within Village Business District I.
4. West Swanzey Village includes a mix of Residence, Village Business I & II, and Commercial/Industrial zoning.
5. For sections of the Land Use Study Area, particularly West Swanzey Village, current zoning dimensional requirements do not align with existing land use patterns. For example, in West Swanzey Village the majority of parcels are zoned either Residential or Commercial/Industrial, both of which have a minimum lot size of 1 acre. An analysis of parcel sizes in West Swanzey village identified at least 73 parcels of just over 100 that are under 1 acre in size. In addition, 31 parcels are under half an acre, which is the minimum lot size requirement for the Village Business District I & II. This indicates that there is an existing pattern of development in West Swanzey Village that is not allowable under current zoning regulations.
6. Village Business II is a zone almost exclusively applying to the Homestead Woolen Mills properties, while the Village Business I district applies to the properties directly north and south of the Mills.
7. Multifamily housing is allowed only by special exception in the Business, Village Business I and Residence districts but is allowed by-right within the Village Business II district.
8. A minimum setback of 75 feet from the NH 10 right-of-way is required for parcels within the Business district.
9. There are a number of land uses within the corridor that are nonconforming with existing zoning regulations. For example, the vast majority of the northern half of the Study Area is zoned Commercial/Industrial which does not include any residential uses as a permitted use. However, there are several single-family and a few multi-family properties within the northern half of the Study Area. One-family dwellings are also not permitted in the Business District, but several single-family properties are intermixed with commercial or industrial uses in that District.

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10. While 80% of the Study Area is comprised of just two zoning districts that focus mostly on business related uses, the Business and Commercial/Industrial zones, existing land uses within the Study Area are diverse.
11. There is no aquifer protection district in the Study area.
12. Existing land uses in the Study area generate different types of traffic during peak hours and over the course of the day. Existing housing in the study area is expected to generate up to 5,350 trips per day on NH 10. The land use with the greatest single contribution of trips in the Study Area is the likely to be the Market Basket store.
13. The capacity for the road to accommodate more traffic is far from congested. The standard reference for maximum saturation flow per lane is 1,900 vehicles per hour and the area with the highest peak hour on the Corridor reaches about 1,470 vehicles for two opposing lanes combined.

Future Land Use and Development Constraints Analysis

1. While much of the northern half of the Study Area is currently protected as conservation land, very few parcels are protected through easements or other legal restrictions on the use of the property. Yale-Toumey forest is the preeminent source of conservation land in the Study Area and is managed as conservation land entirely through fee ownership by Yale University.
2. The Ashuelot River floodplain represents a significant natural and regulatory barrier to development within the Land Use Study area. However, there are relatively few parcels that fall within the floodplain, and mostly are concentrated along North Winchester Street, NH 10 between North Winchester Street and Sawyers Crossing Road, and parcels directly south of West Swanzey Village.
3. Water and sewer availability is almost exclusively concentrated within West Swanzey Village, which is a critical piece for potential future residential and commercial development within the Study Area due to the Town of Swanzey's zoning regulations. However, a large portion of the Study Area south of the Forest Avenue intersection falls within some form of aquifer, which presents some opportunity for the development of wells.
4. Soils that are poorly drained with shallow water tables represent another significant natural barrier to development and affect multiple parcels north of Base Hill and Sawyers Crossing Road, as well as several parcels between Forest Avenue and West Street.
5. The intersection of Westport Village Road and NH 10 lies on top of a number of problematic soils that would pose a barrier to development. In addition, the area bounded between NH 10 and Westport Village Road is crossed by the Ashuelot River and contains considerable floodplain areas that restrict development.
6. Many of the Town of Swanzey's community planning efforts support additional commercial and mixed-use development in West Swanzey Village. This includes the Town of Swanzey's most recent Master Plan update (currently underway), planning efforts undertaken by Plan NH to gauge citizen input on West Swanzey Village, as well as the establishment of an Economic Revitalization Zone on the Homestead Woolen Mills property.
7. The Town of Swanzey's current Master Plan discourages the development of housing in the Business and Commercial/Industrial Districts, which comprise in total over 80% of the Study Area. While residential development is allowed via zoning on Town-owned roads outside of the Study Area, within the Study Area current planning documents point primarily to West Swanzey Village as the location most suitable for future residential development.
8. There is no aquifer protection district in the Study Area.

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Key Jobs & Commuting Findings

- The Study Area experienced a significant increase in jobs over the last decade and a shift in dominant industries from Construction, Education, Food and Accommodation, and Retail Trade to an employment base overwhelmingly comprised of jobs in the Retail Trade sector.
- The highest density of employment in the corridor is in the far northern section of the Study Area, adjacent to the border with the City of Keene. This likely represents the Market Basket commercial plaza as well businesses off of Whittemore Farm Road.
- Those who work in the Study Area are younger, have lower incomes, and commute farther on average in 2018 when compared to 2010. This is likely a result of the growth in Retail Trade in the Study Area during this period.
- There is almost no overlap between those who live within the Study Area and those who work in the Study Area. However, the number of jobs in the Study Area and the number of workers in the Study Area are almost equal. This may reflect a mismatch in the industries and opportunities present in the Study Area and the skills and needs of those who live in the Study Area.
- While the majority of those who work in the Study Area in 2018 still commute less than 10 miles between work and home, the number of workers who travelled 25 to 50 or over 50 miles increased substantially between 2010 and 2018. Over the same time period, commute times for those who live in the Study Area remained relatively stable and the majority of Study Area workers travelled less than 10 miles to work daily.
- The majority of those who live in the Study Area work in Keene, and Keene is also the largest source of employees commuting into the Study Area for work.
- The Educational Services sector completely disappeared from the Study Area between 2010 and 2018, and is the loss of a significant industry that provided 19.2% of all jobs in the Study Area in 2010.

Key Housing Findings

- Availability of both homeowner and rental housing units is scarce within the Town of Swanzey. For renters, this may translate to higher housing prices and more households burdened by the cost of housing.
- One third of all multi-family housing units within the Study Area are subject to some form of income restriction for occupancy. While a valuable resource to low-income families, many income-restricted housing developments have long wait lists for units and may not provide relief to renters searching for housing in housing markets with low vacancy rates such as Swanzey.
- The Study Area has a more diverse housing stock than the Town of Swanzey as a whole, with 116 (18%) units of manufactured housing, 255 (39.6%) units of single-family homes, and 229 (35.6%) units of multi-family units in properties with four or more units. This is likely reflective of the presence of water and municipal sewer infrastructure compared to other areas of Swanzey.
- At least half of all parcels with housing as its land use is less than half an acre, which is less than the required minimum lot size in the Residence District. This indicates that zoning requirements are not in line with the current pattern of housing development in the Study Area.

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- Renters in Swanzey are disproportionally burdened by the cost of housing, with 48.5% of households who rent their home paying more than 30% of their monthly income on housing, which is the generally accepted definition of affordable.
- While an analysis purely based on projected population growth only calls for the development of 4.6 units of new housing per year to accommodate growth, many factors such as low vacancy rates and high rates of housing cost burden indicate that more housing may be needed to accommodate current and future populations.

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Land Use & Economic Activity Analysis

3.12.2021

NH 10 Corridor Study

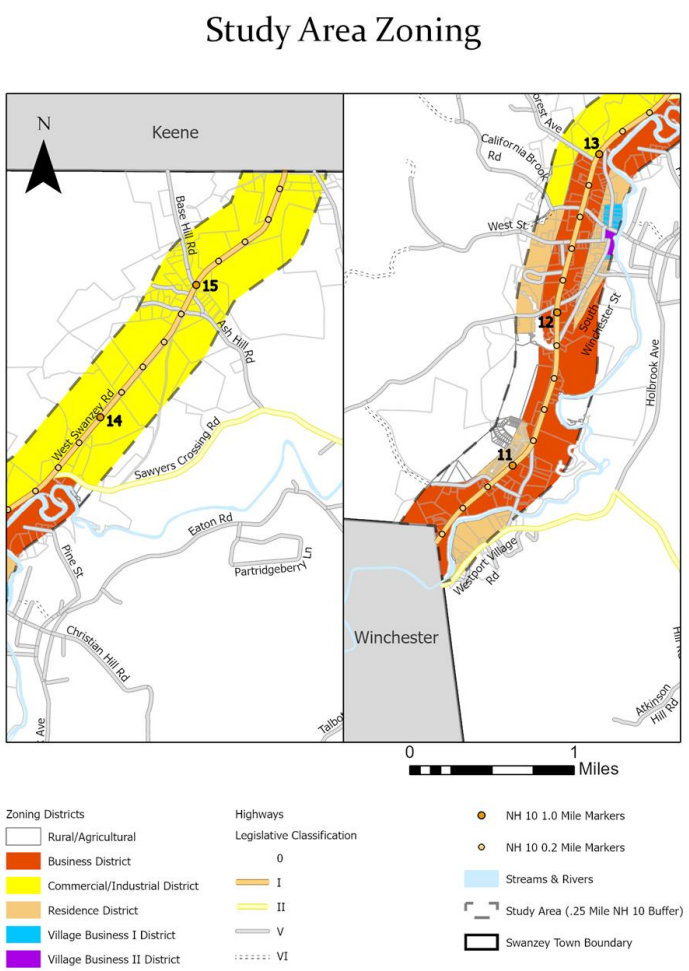
Working Group Meeting

Purpose:

To provide an overview of existing conditions and potential future conditions of land use, zoning, housing, and economic activity along the corridor

Land Use & Zoning Analysis

Existing Zoning

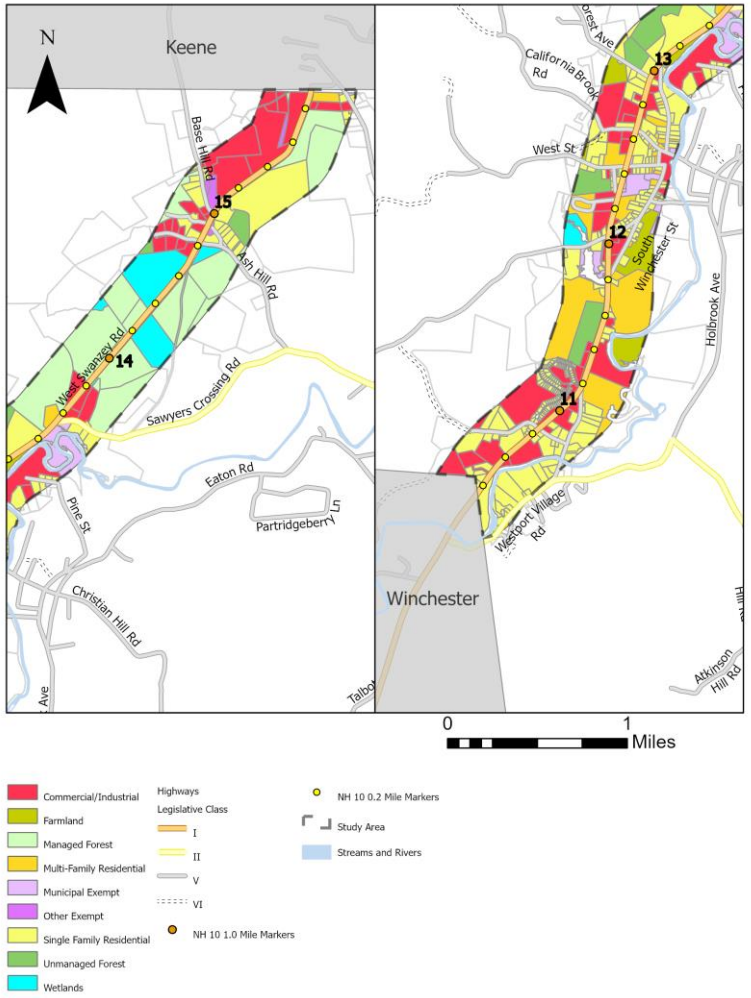


Zoning District Name	Total Area (Acres)	Acres as Percent of Total Study Area
Rural/Agricultural	133.7	8.2%
Business	475.7	29.2%
Commercial/Industrial	834	51.1%
Residence	173.3	10.6%
Village Business I	10.2	0.6%
Village Business II	5.2	0.3%
Total	1632	100%

Land Use & Zoning Analysis

Existing Land Use

Study Area Land Use



Land Use Type	Parcels	Acres	Acreage as Percent of Total Study Area
Single Family Residential	355	451	27%
Multi-Family Residential	30	167	10%
Commercial/Industrial	77	386	23%
Municipal Exempt	19	42	1%
Other Exempt	4	11	4%
Farmland	5	58	4%
Managed Forest	19	341	21%
Unmanaged Forest	8	86	5%
Wetlands	10	90	5%
Total	527	1632	100%

Land Use & Zoning Analysis

Existing Zoning

Key Zoning Findings

- Except for the Village Business Districts, minimum lot sizes are either 1 or 3 acres.
- Village Business District II is the only district that allows two-family and multi-family units by right.
- 80% of the area within a .25-mile radius of NH 10 is zoned either Business or Commercial/Industrial.

Key Land Use Findings

- Land uses within the .25-mile radius of NH 10 are highly diverse.
- Residential uses are scattered throughout the Study Area, including in areas zoned Business and Commercial/Industrial.
- Many parcels in West Swanzey Village are under 1 acre, including at least 31 parcels that are under half an acre

Land Use & Zoning Analysis

Traffic Generation

Key Traffic Findings

- Existing housing along the corridor is estimated to generate 5,350 trips per day
- Different land uses have varied peak hours over the course of the day
- Market Basket is likely to be the largest contribution of trips in the Study Area.
- The NH 10 corridor in Swanzey has significant additional capacity for traffic. The standard reference for maximum saturation flow per lane is 1,900 vehicles per hour, while the highest peak hour on the corridor reaches about 1,470 vehicles combined between both lanes.

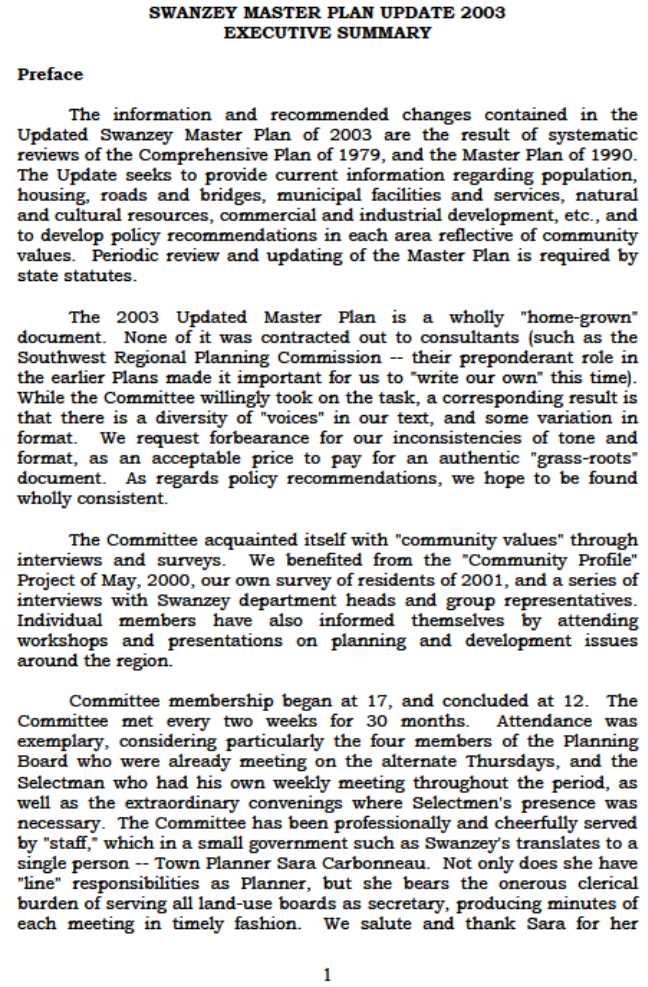
Land Use	Unit of Measure	ADT Weekday
Single Family	Per Dwelling Unit	9.57
Multi-Family	Per Occupied Dwelling Unit	6.59
Grocery Store	1,000 sq. ft. gross floor area	102.24
Free-standing Discount Store	1,000 sq. ft. gross floor area	57.24
Restaurant: Sit-Down	1,000 sq. ft. gross floor area	127.15
Restaurant: Fast Food without Drive-Through	1,000 sq. ft. gross floor area	716.00
Business and Professional Office	1,000 sq. ft. gross floor area	11.01
Convenience Store with Gasoline Pumps	1,000 sq. ft. gross floor area	845.60
Gasoline, Car Wash, with Convenience Store	1,000 sq. ft. gross floor area	152.84
Coffee Shop with Drive-Through, no Seating	1,000 sq. ft. gross floor area	1,800.00
Auto Sales and Service	1,000 sq. ft. gross floor area	33.34
Manufacturing	1,000 sq. ft. gross floor area	3.82
Wholesale, Warehouse, Storage Facility	1,000 sq. ft. gross floor area	3.65
Recreational Facility	1,000 sq. ft. gross floor area	22.88

Land Use & Zoning Analysis

Community Planning

2003 Master Plan Goals:

- Encourage commercial and retail growth along NH 10.
- Discouraging new residential development in the Commercial/Industrial and Business Zoning Districts.
- Promote higher density development in West Swanzey Village and North Swanzey



SWANZEY MASTER PLAN UPDATE 2003
EXECUTIVE SUMMARY

Preface

The information and recommended changes contained in the Updated Swanzey Master Plan of 2003 are the result of systematic reviews of the Comprehensive Plan of 1979, and the Master Plan of 1990. The Update seeks to provide current information regarding population, housing, roads and bridges, municipal facilities and services, natural and cultural resources, commercial and industrial development, etc., and to develop policy recommendations in each area reflective of community values. Periodic review and updating of the Master Plan is required by state statutes.

The 2003 Updated Master Plan is a wholly "home-grown" document. None of it was contracted out to consultants (such as the Southwest Regional Planning Commission -- their preponderant role in the earlier Plans made it important for us to "write our own" this time). While the Committee willingly took on the task, a corresponding result is that there is a diversity of "voices" in our text, and some variation in format. We request forbearance for our inconsistencies of tone and format, as an acceptable price to pay for an authentic "grass-roots" document. As regards policy recommendations, we hope to be found wholly consistent.

The Committee acquainted itself with "community values" through interviews and surveys. We benefited from the "Community Profile" Project of May, 2000, our own survey of residents of 2001, and a series of interviews with Swanzey department heads and group representatives. Individual members have also informed themselves by attending workshops and presentations on planning and development issues around the region.

Committee membership began at 17, and concluded at 12. The Committee met every two weeks for 30 months. Attendance was exemplary, considering particularly the four members of the Planning Board who were already meeting on the alternate Thursdays, and the Selectman who had his own weekly meeting throughout the period, as well as the extraordinary convenings where Selectmen's presence was necessary. The Committee has been professionally and cheerfully served by "staff," which in a small government such as Swanzey's translates to a single person -- Town Planner Sara Carbonneau. Not only does she have "line" responsibilities as Planner, but she bears the onerous clerical burden of serving all land-use boards as secretary, producing minutes of each meeting in timely fashion. We salute and thank Sara for her

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Land Use & Zoning Analysis

Community Planning

West Swanzey Charette:

- Redevelopment of Homestead Woolen Mills.
- Establishment of a vibrant, walkable village and growth of commercial uses in West Swanzey Village.
- Expansion of the Village Business Districts I and II.
- Establishment of "gateways" along NH 10 to West Swanzey Village and additional wayfinding.



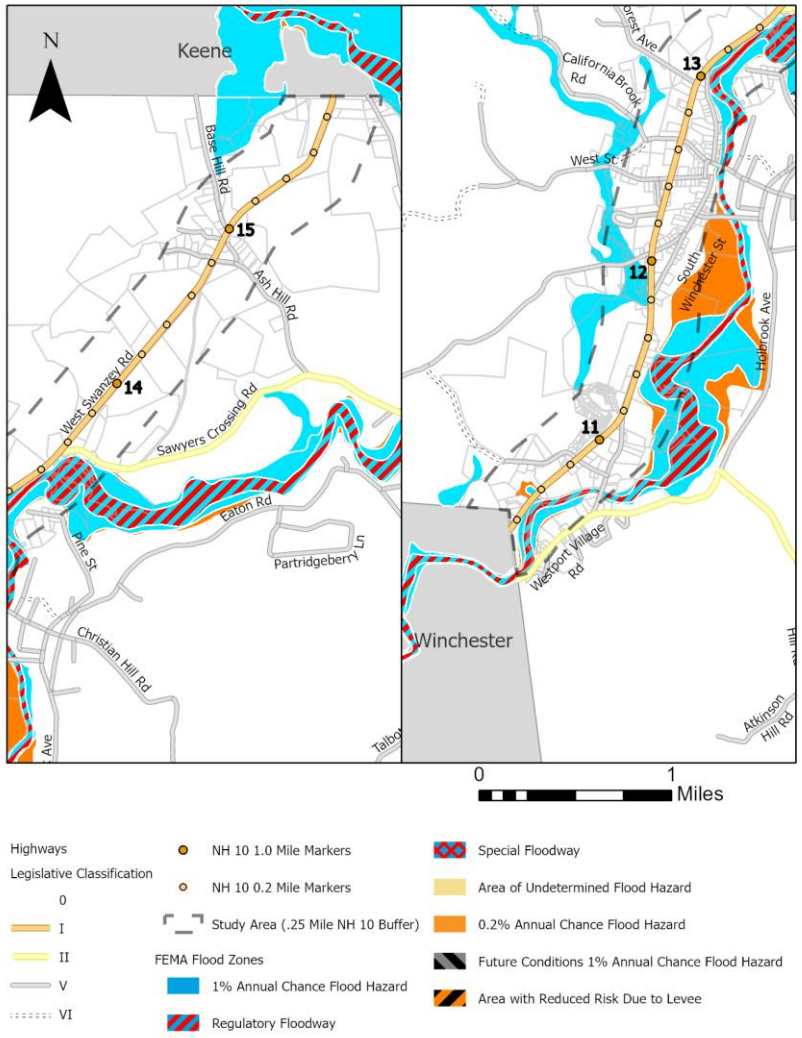
Land Use & Zoning Analysis

Development Barriers

Barriers Studied:

- Water and Sewer Availability
- Natural Resource Constraints
  - Conservation & Protected Lands
  - Problematic Soils
  - FEMA Designated Flood Zones
  - Stratified Drift Aquifers

Study Area Flood Zones



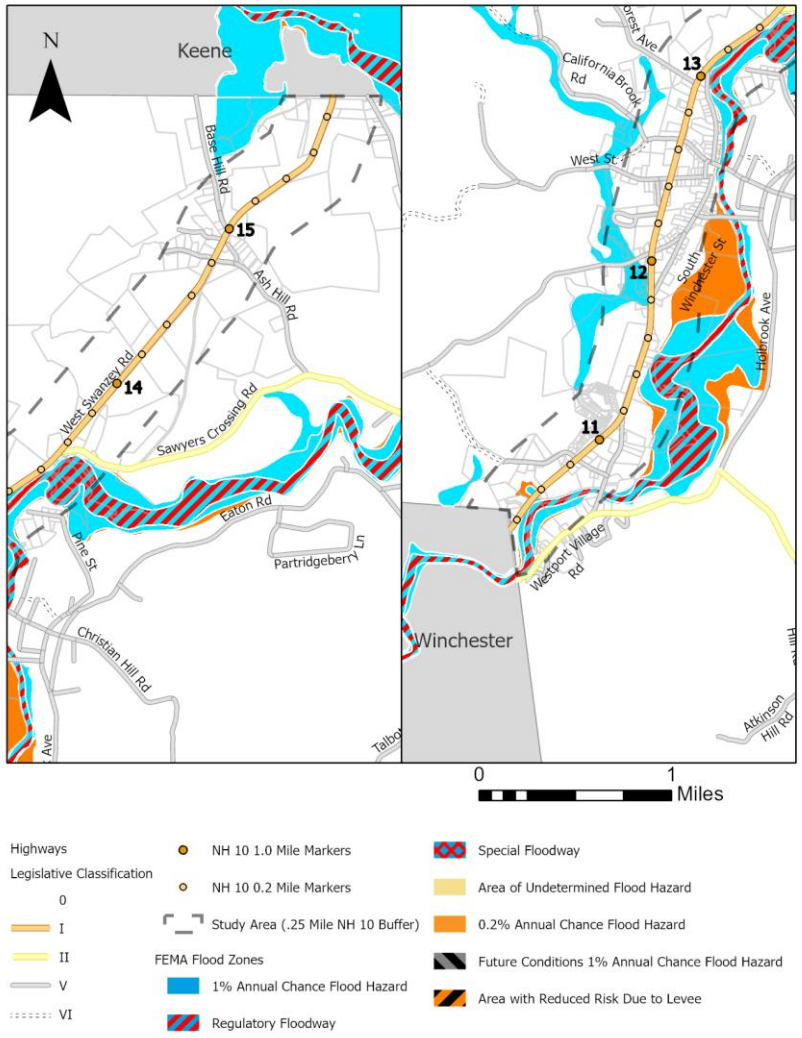
Land Use & Zoning Analysis

Development Barriers

Barriers Identified:

- Limited sewer infrastructure outside of West Swanzey Village
- Problematic soils throughout the Study Area, particularly in the northern half of the Study Area
- Flood zones south of West Swanzey Village and near the Sawyers Crossing intersection
- Significant portions of the northern half of the Study Area preserved as conservation land through the mission of Yale University

Study Area Flood Zones

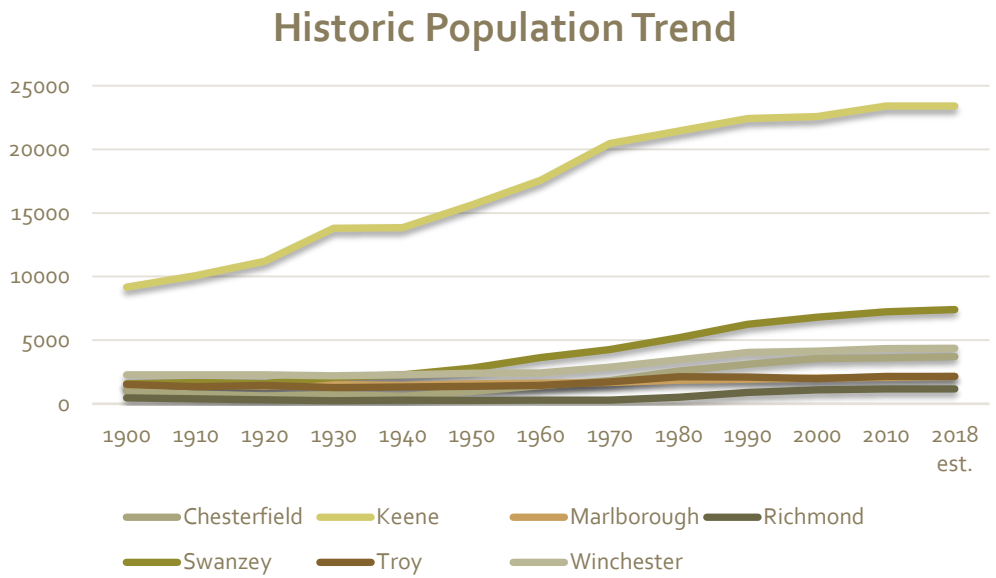


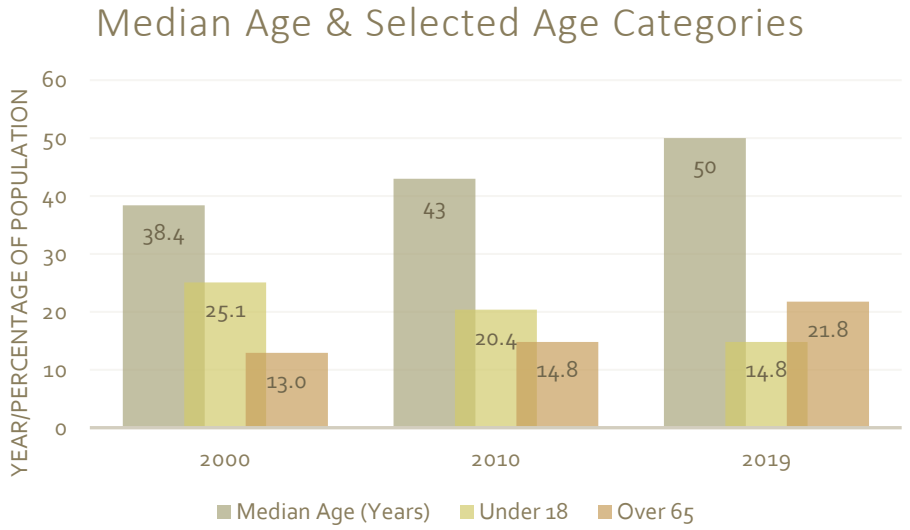
Housing & Economic Activity Analysis

Demographics

Key Demographic Trends:

- Slow growth between 2010-2040, estimated at 5% or 392 people
- Higher growth rate than Cheshire County and surrounding towns; lower than the State of NH
- Increasing median age from 38.4 in 2000 to an 50 in 2019 (estimated)
- Increase in share of population over 65 from 13% in 2000 to an estimated 21.8% in 2019
- Decrease in share of population under 18 from 25.1% in 2000 to an estimated 14.8% in 2019



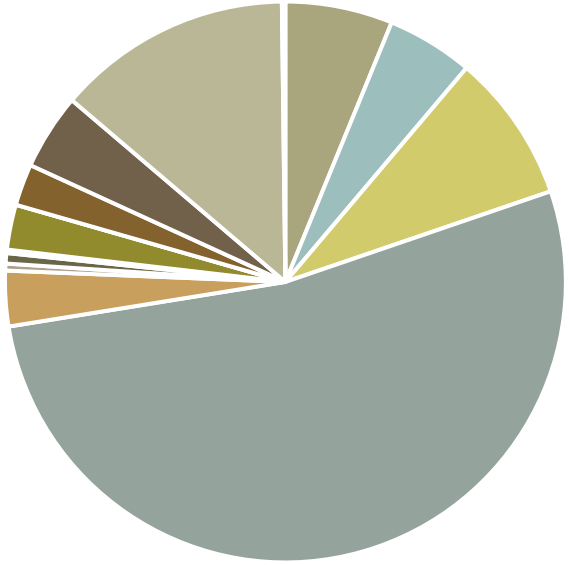


Housing & Economic Activity Analysis

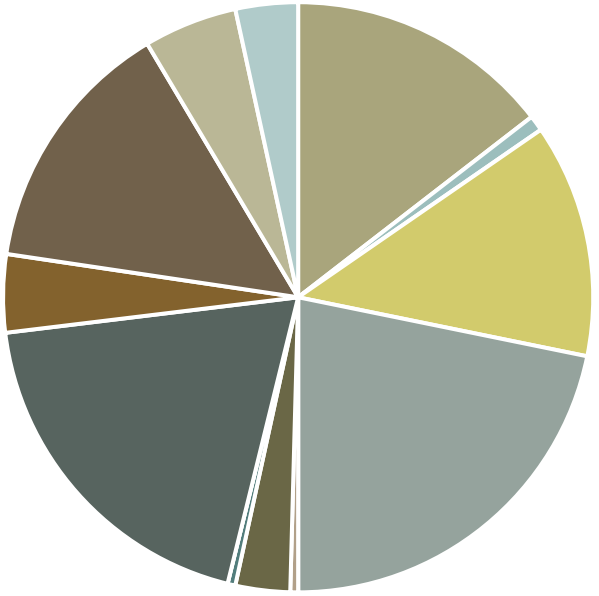
Employment Overview

- Construction
- Manufacturing
- Wholesale Trade
- Retail Trade
- Transportation and Warehousing
- Information
- Real Estate and Rental and Leasing
- Professional, Scientific, and Technical Services
- Administration & Support, Waste Management and Remediation
- Educational Services
- Health Care and Social Assistance
- Accommodation and Food Services
- Other Services (excluding Public Administration)
- Public Administration

2018 Employment



2010 Employment



Housing & Economic Activity Analysis

Commuting Patterns

Key Demographic Trends:

Study Area Employment Efficiency

	2018	2010	Change 2010-2018
Living and Employed in the Selection Area	10	7	42.9%
Living in the Selection Area but Employed Outside	421	338	24.6%
Employed in the Selection Area but Living Outside	491	227	116.3%

Distance to Home for Study Area Workers

	2018		2010	
	Count	Share	Count	Share
Total All Jobs	501	100.0%	234	100.0%
Less than 10 miles	241	48.1%	140	59.8%
10 to 24 miles	100	20.0%	55	23.5%
25 to 50 miles	69	13.8%	19	8.1%
Greater than 50 miles	91	18.2%	20	8.5%

Distance to Work for Study Area Residents

	2018		2010	
	Count	Share	Count	Share
Total All Jobs	431	100.0%	345	100.0%
Less than 10 miles	239	55.5%	203	58.8%
10 to 24 miles	55	12.8%	34	9.9%
25 to 50 miles	68	15.8%	45	13.0%
Greater than 50 miles	69	16.0%	63	18.3%

Discussion: Survey or Stakeholder Interviews

3.12.2021

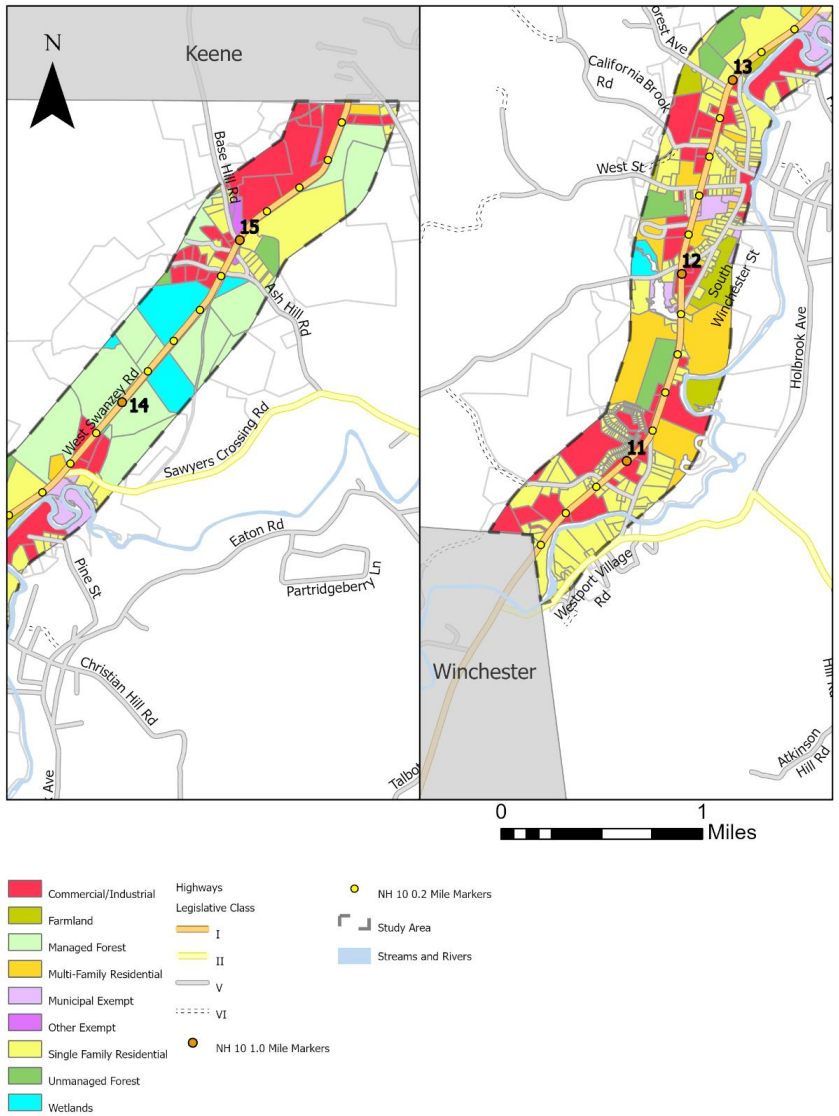
NH 10 Corridor Study

Working Group Meeting

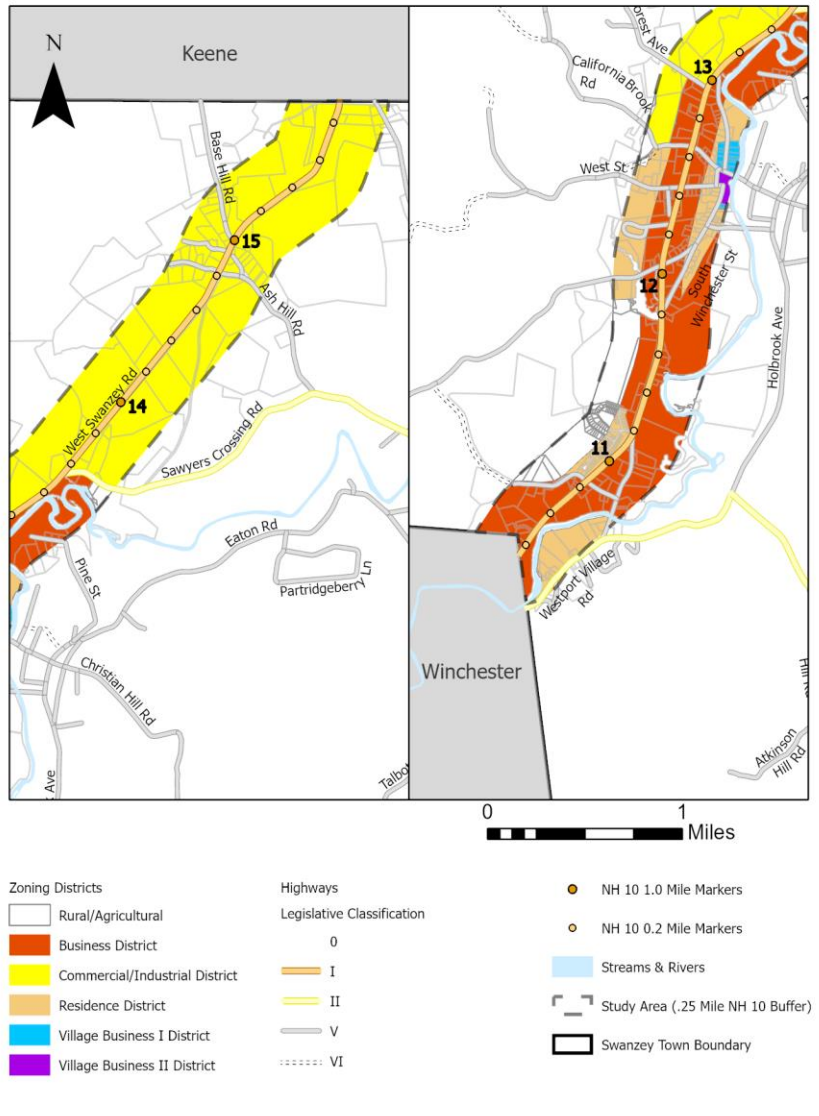
Stakeholder Interviews: Theme One

Northern Part of Corridor: Commercial/ Industrial or Conservation Land?

Study Area Land Use



Study Area Zoning



Stakeholder Interviews: Theme One

Northern Part of Corridor: Commercial/ Industrial or Conservation Land?

Need for more permanent conservation controls in northern part of corridor? Preserve mobility, habitat? More precision to commercial/industrial zoning?

- Interviews with Conservation Commission
- Interviews with Planning Board
- Interviews with Monadnock Conservancy
- Interviews with Yale Toumey Forest

Yale-Toumey Forest



The Yale Toumey Forest is 1930 acres in area (764 hectares) and is located in the towns of Keene and Swanzey, in Cheshire County, New Hampshire. The original tract of this forest was also a gift by George Hewitt Myers.

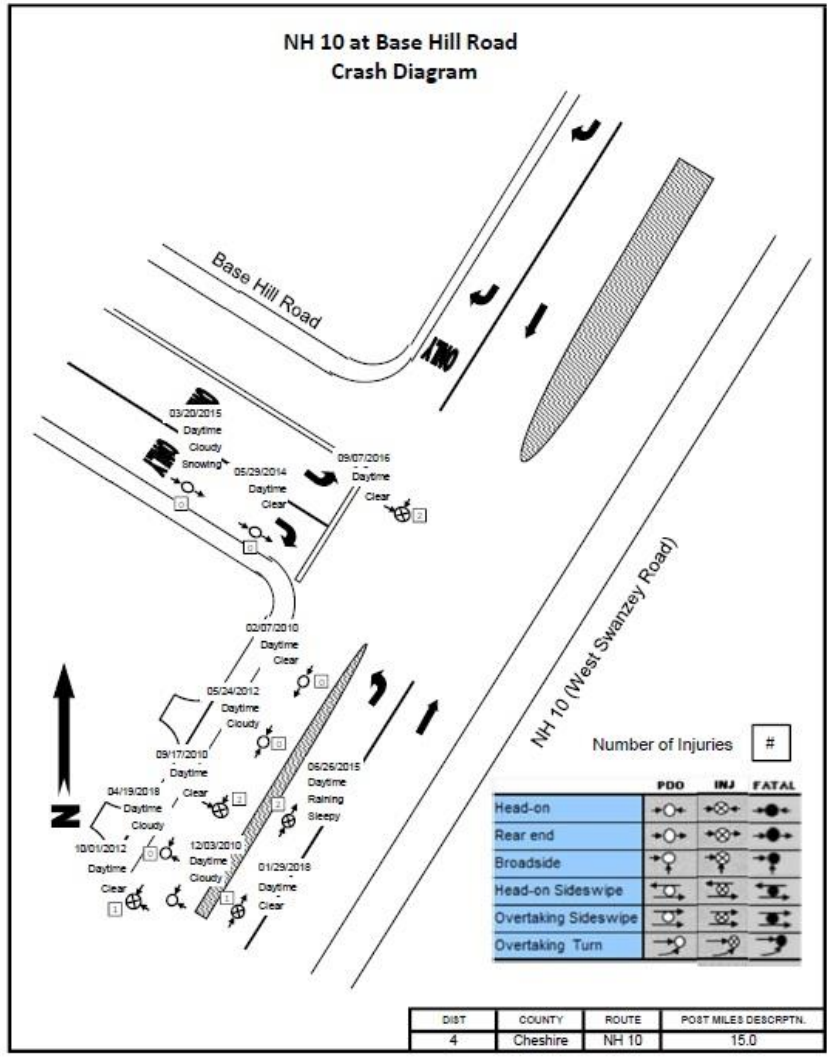
The forest is mostly comprised of white and red pine, all of plantation or old-field origin and as a result of hurricane blowdowns. The soils of the Assabet river valley are of glacial sandy outwash origin and promote a coniferous ecosystem typical of the region. This forest is utilized as pallet for young foresters at Yale to hone their skills in the management of conifer and mixwood ecosystems. The area is also serves as a home for collaborative research within Yale and neighboring academic institutions.

Stakeholder Interviews: Theme Two

Access Management Issues Follow-up

Need to follow up on access management related issues discovered? To help catch these issues during change of use? To enforce existing driveway permit infractions? To get temperature of land owners in willingness to voluntarily make changes?

- Interviews with NHDOT District IV
- Interviews with Planning Board
- Interviews with Land Owners



Survey: Theme Three

Southern Part of Corridor: Visual Preference Survey

Visual Preference Survey

Streets & Streetscapes

Please rate each image according to their appropriateness to your downtown. Rate the overall image and ignore minor details.

Things to Consider

- Street Widths
- On-Street Parking
- Type of Bike Lanes



24. On-street Bike Lane, Semi-Protected

I Hate it	Not appropriate	Not Best fit	Neutral	OK	Nice	I Love it
○	○	○	○	○	○	○

Survey: Theme Three

Southern Part of Corridor: Visual Preference Survey

Visual Preference Survey

Site Layout

Please rate each image according to their appropriateness to your downtown. Rate the overall image and ignore minor details.

Things to Consider

- How Building Meets the Sidewalk
- Building Setbacks
- How Parking is Integrated



14. Staggered Setback

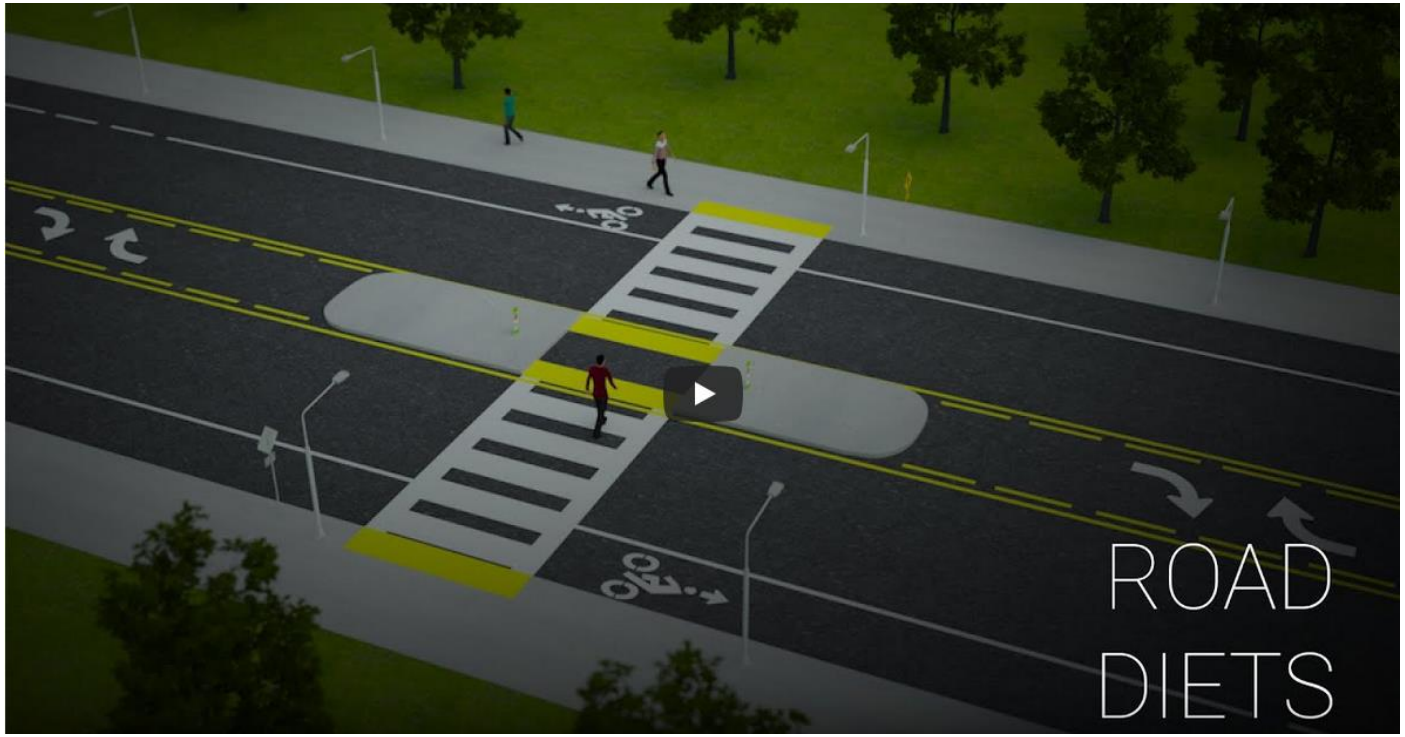
I Hate it	Not appropriate	Not Best Fit	Neutral	OK	Nice	I Love it
○	○	○	○	○	○	○



Survey: Theme Three

Southern Part of Corridor: Visual Preference Survey

Is there reason to explore changes to land development form and/or transportation environment in West Swanzey part of NH 10 ? To get the temperature of residents in their attitudes towards changes to zoning, sewer and water expansion, different layout and feel? Improved sense of place?



Discussion: Findings and Recommendations

3.12.2021

NH 10 Corridor Study

Working Group Meeting

Opportunity to Recommend Next Steps

- Road Safety Improvements/Projects
- Changes to Zoning
- Land Conservation
- Access Management Controls
- Improvements to Alternative Forms of Transportation
- Policies or Plans Relating to Water Expansion/Protection and Sewer Expansion

Southwest Region Planning Commission
37 Ashuelot Street Keene, NH 03431 603-357-0557 Fax 357-7440

Swanzey NH Route 10 Corridor Study Working Group

June 3, 2021
9:00 a.m.

Zoom Meeting Link:
http://bit.ly/Jun3SwRt10WG21

Call-in Number: (929) 205-6099

Meeting ID: 835 9773 5211

Agenda

I. Welcome and Introductions

II. Project Updates

III. Discussion: Findings and Recommendations

IV. Scheduling Public Presentation(s)

V. Other Matters

VI. Adjourn

Southwest Region Planning Commission

Swanzey NH Route 10 Corridor Study Working Group

Meeting Summary

March 12, 2021

Members Present: Matthew Bachler, *Planning and Economic Development Director*; Michael Branley, *Town Administrator;* Mike Gomarlo, *Economic Development Advisory Committee;* John Kallfelz, *NHDOT District* 4; Gus Lerandeau, *SWRPC Transportation Advisory Committee.*

Staff members present: J. B. Mack, *Principal Planner;* James Weatherly, *Planning Technician.*

I. Welcome and Introductions

J. B. Mack called the meeting to order at approximately 10:00 a.m. and welcomed those in attendance. He said that the meeting would first focus on research that had been done relative to land use and economic activity. Later in the meeting staff is hoping to gain feedback on potential survey efforts as well as begin discussing study recommendations based on research done thus far.

II. Overview and Findings from Land Use and Economic Analysis

James Weatherly provided an overview of SWRPC's research and data collection efforts for land use, demographic and economic activity that had occurred over the last several months. He noted that there is a lot of information included in the analysis, and encouraged Working Group members to review the full report. The purpose of the Study includes providing an overview of existing housing, zoning, economic activity, and land-use along the NH 10 corridor and that the Study is separated into two parts. The first part of the report is focused primarily on existing and future potential conditions of land use and zoning, while the second part focuses on housing, demographics and economic activity along the Corridor.

With respect to current land uses and zoning, James Weatherly noted that within a quarter-mile radius of NH 10 over 80% of the land area is zoned either Business or Commercial/Industrial. While there are other zoning districts just beyond the quarter-mile buffer, parcels with immediate frontage on NH 10 overwhelmingly fall into these two districts. In contrast, existing land uses along the Corridor are highly diverse. He explained that despite only 10% of the Study Area being zoned for residential uses, single-family and multi-family residential uses accounted for 37% of the Study Area. He also noted that the southern half of the Corridor has a higher diversity of land uses.

James Weatherly then described the relationship between existing land uses and traffic generation. Generally, there exists significant capacity on NH 10 for additional vehicle travel. J. B. Mack added that the analysis examined existing land uses as well as what is currently allowed under zoning. While SWRPC has not identified any land uses along NH 10 that would cause regional traffic issues on their own, there is the potential for some newer introduced uses currently allowed by Swanzey's existing zoning that could cause local traffic issues, such as commercial drive-through uses. Depending on the intensity of development in specific areas, there could be regional traffic issues in the future. J. B. Mack mentioned that he is interested in how the Town currently addresses proposals for drive-throughs, as they are not directly addressed in the Town's zoning ordinance. Michael Branley responded that as of this week, the Zoning Ordinance had been updated to address drive-throughs. Matthew Bachler

added that drive-throughs are allowed as a special exception as an accessory to an existing use in the Commercial/Industrial and Business districts. The Town also created specific design standards for drive-throughs in the update to the Zoning Ordinance.

James Weatherly gave a brief overview of community planning in relation to Land Use & Zoning Analysis including information about the 2003 Master Plan and West Swanzey Charette in 2012. He noted that an update to the Master Plan is underway which may have substantial impacts on the relation of community planning efforts to NH 10 as a transportation facility.

Matthew Bachler made a minor correction that North Swanzey, which is referred to a number of times in the report, refers primarily to the village of North Swanzey which is centered around NH Route 12, as opposed to the northern end of the NH 10 corridor. He requested that the report be updated accordingly.

Potential barriers to development were also discussed by James Weatherly. Barriers to development identified in the Study include infrastructure limitations, problematic soils, FEMA flood zones, stratified drift acquirers, and conservation lands. Noteworthy is that the majority of the northern half of the Study Area is owned by Yale University as conservation land held in fee, meaning that there is not a deed restriction on the property.

Matthew Bachler inquired on outreach efforts to the West Swanzey Water Company as part of the Study, and whether SWRPC staff was able to make contact with a representative of the Company. J. B. Mack confirmed that staff was successful in contacting West Swanzey Water Company, and was able to obtain a number of maps and data that could be shared with the Town. James Weatherly added that key information in regards to the Water Company is included in the report, including the fact that there is a third unused well that is owned by the Company and could be used to expand water infrastructure.

James Weatherly discussed the second half of the analysis which focuses on economic activity, demographics and housing. He noted that the major demographic trends for the Town identified in the Study include an increase in median age and the portion of the population over 65 as well as slow growth rates predicted from 2010 to 2040.

As part of the economic activity analysis of the Study, James Weatherly stated that U.S. Census Longitudinal Employer-Household Dynamics data was utilized to gain an understanding of employment trends in the NH 10 corridor. From 2010 to 2018, there was a significant increase in the number of jobs in the Study Area, however, almost all of these jobs were in the retail sector leading to a less diverse employment base overall. Michael Branley inquired whether the data was accounting for those who live in the Study Area or the jobs located within the Study Area. James Weatherly responded that the data represents the jobs located within the Study Area.

James Weatherly stated that a striking data point in the economic activity analysis is that only a handful of people who live in the Study Area also work within the Study Area. In addition, the largest source and destination for workers is the City of Keene. Average commuting distances for those who work in the Study Area also increased from 2010 to 2018. J. B. Mack added that one additional economic development trend that was not reflected in the presentation is that with the increase in retail jobs from 2010 to 2018, there was an increase in younger, lower paid workers who live farther outside the community who work in the Study Area. While the Study Area is seeing job growth, it's primarily in the retail sector and does not necessarily benefit those that live in Swanzey.

James Weatherly noted that the housing analysis was done at the parcel-level using assessing data from the Town of Swanzey. He reported that there are 644 units in the Study Area, the majority of which are single-family homes. However, the Study Area has a much more diverse housing stock than the Town of Swanzey as a whole. In addition, Swanzey has a very low rental vacancy rate (around 0%) and just under half of renters in the Town of Swanzey are burdened by the cost of housing according to U.S. Census Bureau data.

J. B. Mack noted that Working Group members may wonder why SWRPC looked at housing, jobs, land use, zoning and development barriers as part of the Study. He explained that it is difficult to look at transportation in a vacuum, and the analysis provides context to look at potential transportation trends and how they will affect the Corridor.

Michael Branley noted that he appreciates the Study and information presented.

Mike Gomarlo inquired as to whether the California Brook Estates was included in the traffic calculations mentioned previously in the presentation. James Weatherly responded that the California Brook Estates neighborhood is outside of the quarter-mile buffer and therefore not included in the analysis. Mike Gomarlo encouraged the inclusion of California Brook Estates neighborhood in future versions of the Study as there are over 200 families living in the neighborhood which accounts for significant traffic going on the route every day.

III. Discussion: Survey or Stakeholder Interviews

J. B. Mack explained that at the beginning of the project, part of the scope of work anticipated survey or interview efforts to reinforce or further explore findings uncovered during the course of the Study. The purpose for bringing this up is to gauge the reaction of the Working Group members to different survey concepts and identify other ideas for a potential survey or stakeholder effort. He noted that he met with Matthew Bachler and established three potential survey or stakeholder interview ideas to review with the Working Group, but is also open to additional ideas.

The first stakeholder interview concept is relative to conservation land in the northern part of the Corridor. Currently, large tracts of land are held in fee by Yale University. While it is unlikely to be developed in the near future, there is the possibility that the land could be sold and developed suddenly as there are no conservation easements on the Yale Toumey Forest. Conservation land can provide a number of benefits to the Corridor, including mobility preservation, wildlife habitat and open space. The concept is to have stakeholder interviews with the Conservation Commission, Planning Board, regional conservation nonprofits, and Yale to understand if there is any value in strengthening conservation or planning for conservation for Yale-owned property in the Study Area. Alternatively, an angle of the stakeholder interviews could be to establish whether there is a need for additional precision to the Commercial/Industrial district zoning to separate commercial from conservation land since much of the Yale Toumey forest is zoned as Commercial/Industrial.

Michael Branley responded to the idea, stating that his reaction is actually to pursue stakeholder interviews in the opposite direction. He stated that the Yale Toumey land serves as a major impediment to development south of Market Basket, and that the Select Board would likely not be in favor of additional conservation measures or planning. J. B. Mack stated that it would also be possible to identify lands farther away from NH 10 for conservation. Michael Branley agreed and stated that another perspective to the stakeholder effort is to explore the opening-up of land with direct road frontage for development while preserving land farther away from NH 10. J. B. Mack also noted that the stakeholder interviews could be an opportunity to start conversations with various stakeholders around the idea of introducing more development. Michael Branley added that the concept of adding additional precision to the Commercial/Industrial zoning makes sense, and that more precise neighborhood-focused zoning and a more focused Commercial/Industrial district would be positive. Matthew Bachler noted that while development in the northern end of the Corridor is a possibility, the majority of infrastructure is in West Swanzey Village, and while he could see that land in the northern end of the Study Area developed in 50 years it would be unlikely to develop in the next decade and would prefer to see development in West Swanzey Village.

J. B. Mack introduced the next potential stakeholder interview concept relative to access management issues. For this concept, SWRPC staff could potentially conduct interviews with the Planning Board and local landowners about parcels along NH 10 that are identified to have potential access management concerns. The purpose of these interviews would be to take the temperature of local landowners along the Corridor relative to improving access management and to help prepare Town staff to advocate for improved access management when parcels with issues

undergo changes in use or other circumstances that presents opportunity for re-permitting. Michael Branley noted that he liked this approach.

A third idea focuses more heavily on the creation of a survey instead of stakeholder interviews. The idea for the survey is to gauge the preference for land use, zoning and traffic changes based on important trends identified over the course of the Study such as speeding traffic, development pressure, opportunities for infrastructure expansion, and proposed development along the Corridor in West Swanzey. J. B. Mack presented an example of a visual preference survey for reference, and that such a survey can allow people without a technical background to provide input on complicated topics. Some topics that could be presented include higher density building, pedestrian and bicycle improvements and traffic calming measures. This option is recommended only if the Town is legitimately interested in considering changes to the West Swanzey Village area of the corridor in the future.

Michael Branley noted that he liked the approach, and that many of the potential ideas presented such as traffic calming, crosswalks and bike lanes are items that he would like to see along the Corridor if possible. He added that a number of local neighborhoods could benefit from pedestrian infrastructure. J. B. Mack added that the survey could provide some useful information to the Planning Board to explore zoning changes in the future based on the public opinion collected as well as support for transportation corridor improvements.

Michael Branley asked what the limitations of the Town would be to alter a state highway, and what items would be under the purview of NHDOT District 4. J. B. Mack noted that many of the items mentioned as possible survey topics would be in control of the Town, such as sidewalks and zoning. He also mentioned that NHDOT has embraced the idea of context sensitivity, which provides some room for State-Town coordination if there is a local desire for certain roadway improvements. For example, the City of Keene has requested some pedestrian and bicycle friendly amenities along a section of NH 10 from NHDOT and the Town of Swanzey could request similar treatments.

Mike Gomarlo inquired whether the State would provide land for a potential sidewalk, and if the Town installed a sidewalk along the Corridor that would mean the maintenance would be the responsibility of the Town. John Kallfelz responded that if a sidewalk were to be installed, the State would not be purchasing additional land solely for the sidewalk as the current right-of-way has ample width. A sidewalk along NH 10 would be the responsibility of the Town and would need to address issues such as drainage and plowing. He referenced NH 101 in Bedford as an example of context sensitive design, but noted that NH 10 is not at that point now but may be in the future depending on traffic volume and development. J. B. Mack responded that the survey would be proactive in this case and would be encouraging changes that would set up constraints and flexibilities for future development. John Kallfelz added that other design elements could be considered such as a median, plantings on the outside of the road and narrower lanes. He noted that it would be difficult to see bike lanes along NH 10 as they would not be well connected to other bicycle routes.

Matthew Bachler said that he agrees with others sentiments and prefers the visual preference survey option. He noted that the survey would help set a vision for the Corridor to work towards which is a positive way to approach the issue. He also noted that the Ashuelot Rail Trail runs parallel to NH 10 and the Town would likely direct bicycle traffic towards that trail. He stated that in terms of the options presented, the visual preference survey fills a gap in knowledge as opposed to addressing known conditions which is important for the limited resources of the Study.

J. B. Mack noted that he is hoping to pull away from the meeting with concrete guidance on what to focus on for a survey or interview effort, and that work would need to start relatively soon. Based on the discussion in the meeting, J. B. Mack reiterated that the visual preference survey appears to be the preferred option.

IV. Discussion: Findings and Recommendations

J.B. Mack introduced the next agenda item on findings and recommendations for the Study and referred to a handout showing the findings thus far. He stated that the Study has the opportunity to include recommendations, with some possibilities being road safety improvement projects, traffic calming design elements, recommendations for zoning changes, access management concerns, and promoting walking and bicycling along the Corridor. He also noted a possible recommendation would be to identify ways to create more certainty on water and sewer infrastructure for developers interested in building in West Swanzey Village. J. B. Mack invited members of the Working Group to provide input on what recommendations they would like to see in the final version of the Study.

Matthew Bachler noted that water protection is identified as a potential finding topic in the meeting materials and confirmed with J. B. Mack that it is meant to promote aquifer and groundwater protection in the West Swanzey area. He noted that while a lot of the umbrella categories presented in the handout touch on his recommendations, he thinks it is important that economic development recommendations be included. He noted some examples could be opportunities for sewer expansion or the limited use of tax increment finance districts in West Swanzey.

J. B. Mack noted that the plan for next steps would be to present the Study to the Swanzey Board of Selectmen with specific recommendations for next steps along the Corridor based on feedback from the Working Group. The purpose of the agenda item for this meeting is to have a brainstorming session for specific recommendations to help SWRPC staff draft the final version of the Study.

Matthew Bachler provided a number of ideas relative to the NH 10 Corridor including:

- Submitting road safety audit applications to NHDOT for intersections such as Base Hill Road;
- Proposing improved landscaping on either side of the right-of-way;
- Proposing a raised median to calm traffic speeds;
- Submission of an application to Plan NH for a Municipal Technical Assistance Grant to investigate the Village Business District I and II;
- Discussing with the Planning Board and Economic Development Committee the Business and Commercial/Industrial Districts to promote development;
- Changing zoning to match potential traffic calming measures such as reducing setback requirements, requiring rear parking, creating architectural design standards, or other measures that encourage forms of development outside of strip development; and
- Exploring ways to extend transit into West Swanzey Village to serve residents who need access to Keene.

Matthew Bachler also noted that the Town will be making improvements to the Ashuelot Rail Trail to the Winchester Town Line over the next several years, and a recommendation could be to investigate ways to better connect trail users with NH 10. The Town of Winchester and the region in general is also providing additional attention to the Ashuleot Rail Trail corridor. The Town of Swanzey also just received approval from voters for funding to do a wastewater asset management program with NHDES to be completed in spring of 2022, which may lead to future wastewater expansion opportunities. He also noted that for source water protection that the Planning Board is hesitant to institute a full water protection ordinance but that smaller steps, such as limiting impervious surface cover, could be a way to protect groundwater resources.

V. Other Matters

No other matters were brought before the Working Group. J.B. Mack thanked attendees for their time and participation.

VI. Next Meeting

J.B Mack stated that the next meeting would occur sometime after the conclusion of the survey effort, possibly in May.

VII. Adjourn

The meeting adjourned at 11:30 a.m.

Respectfully submitted,

James Weatherly
Planning Technician

Swanzey NH 10 Corridor Study Working Group

June 3, 2021

9:00 a.m.

Project Updates

Estimating Demand for Transit Services on Swanzey NH 10 Corridor

Community Transportation Association of America

- Model Assumptions:
  - 15% of population 65+ and population living in poverty age 64 and under
  - One-way trip needed every 9 days per person (41 trips per year)
- ACS 5-Year Estimates data available for:
  - Population 65+ = 695 people (Tract 9709, Blocks 1 & 4)
  - Head of Household living in poverty under 65 = 28 (Tract 9709, Blocks 1 & 4)
  - Average Household Size = 2.33 (Tract 9709) Multiply 28 x 2.33 = ~65
- Transit Demand for Tract 9709, Blocks 1 & 4 = 760 (total population) x 15% (proportion of population needing rides) x 41 (average number of trips per year) = **4,674 estimated trips needed in 2021.**

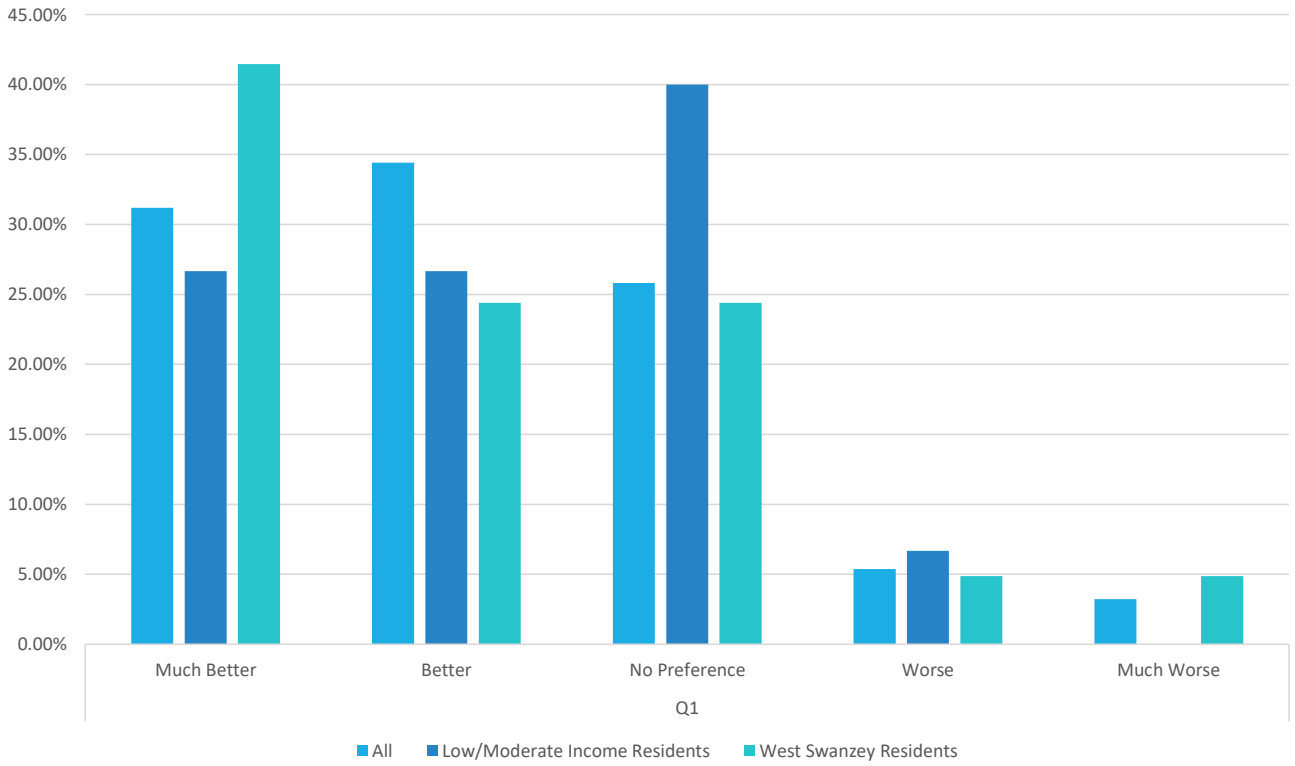
Survey Results

NH 10 WORKING GROUP JUNE 3, 2021

Survey Response Overview

Total Responses = 93			
Topic	% Favorable	% Neutral	% Opposed
Crosswalk	71%	10%	19%
Sidewalk	66%	26%	9%
Pedestrian Refuge	59%	14%	26%
Bike Lane	49%	15%	36%
Commercial Density	48%	18%	34%
Signage	47%	34%	19%
Setback	31%	15%	53%
Parking (Rear/Side)	29%	28%	42%

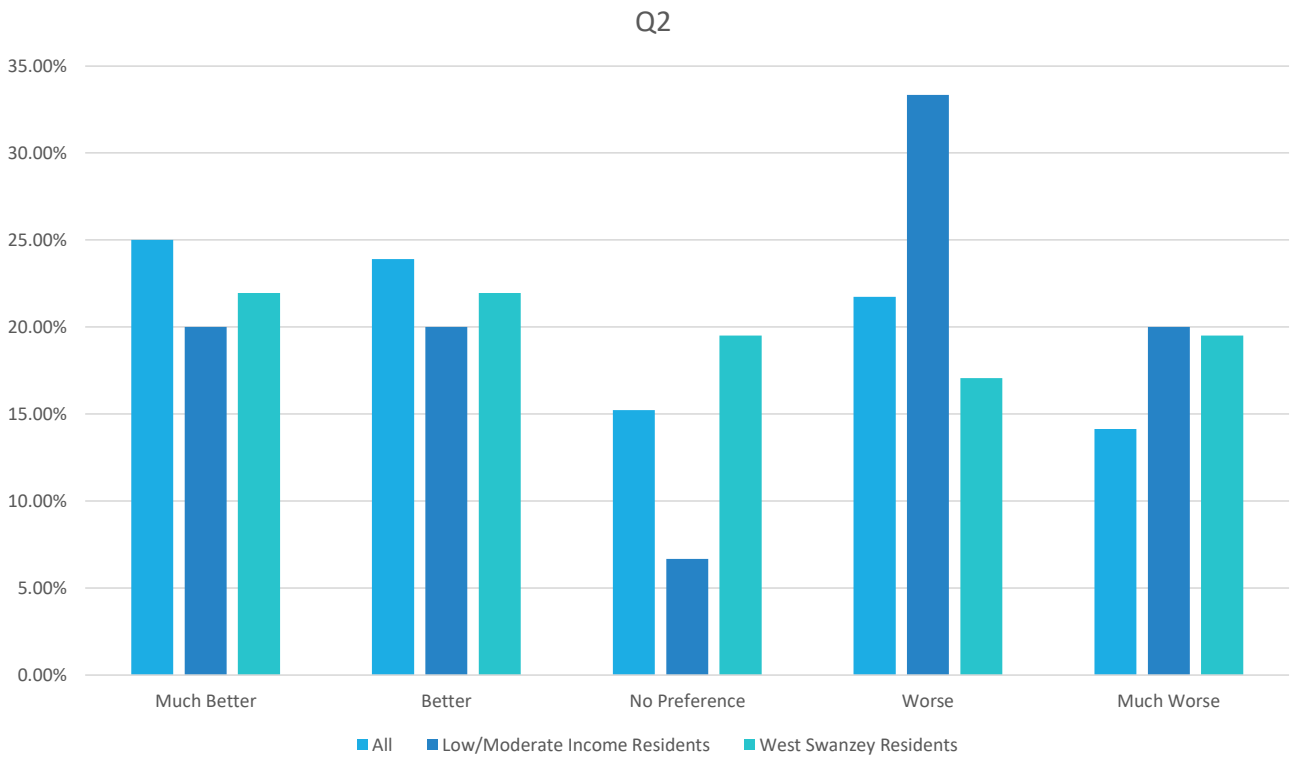
Sidewalk Alternative







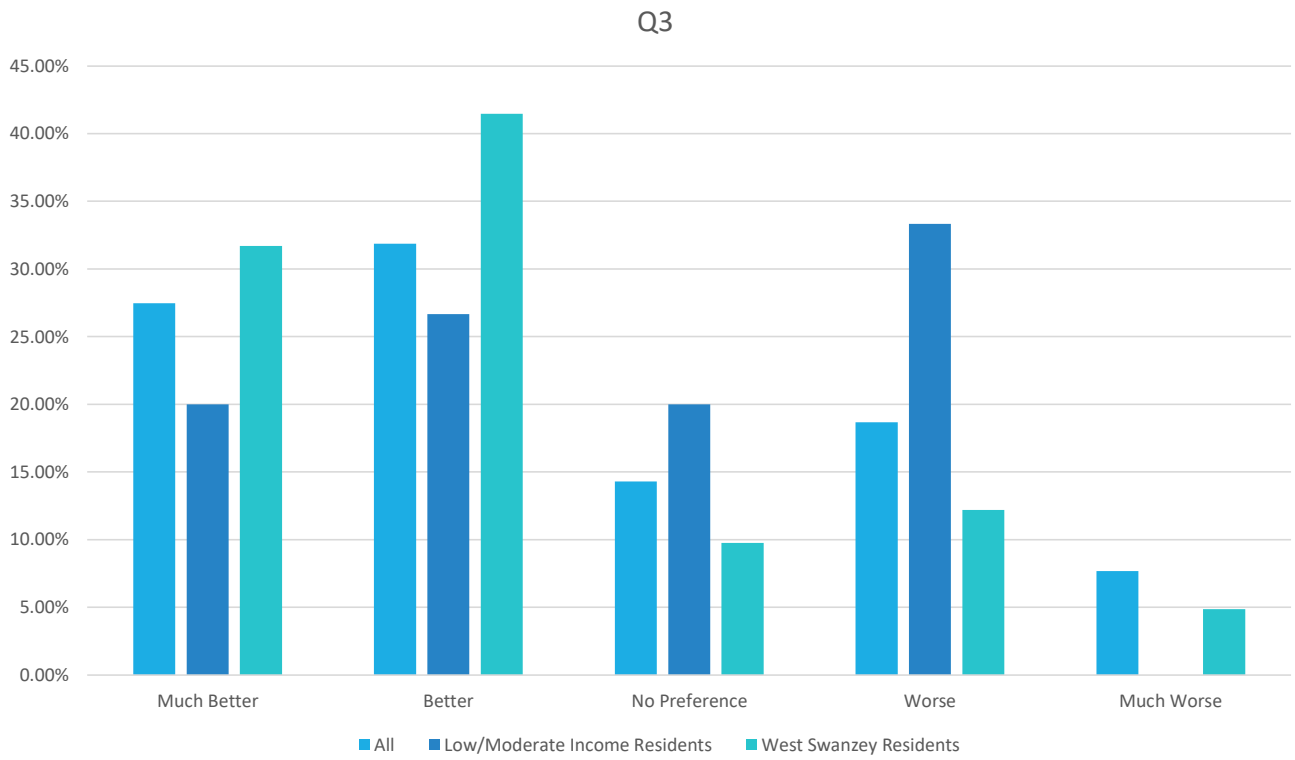
Bike Lane Alternative







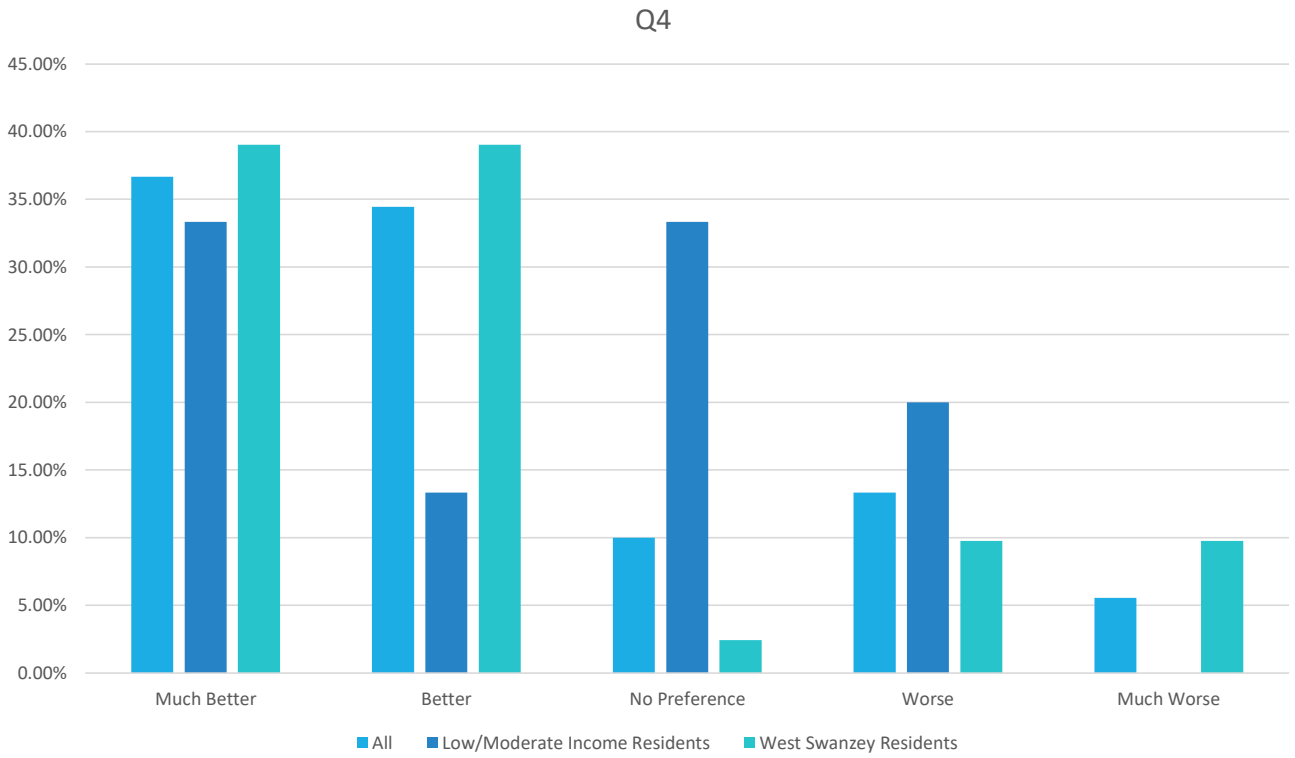
Pedestrian Refuge Alternative







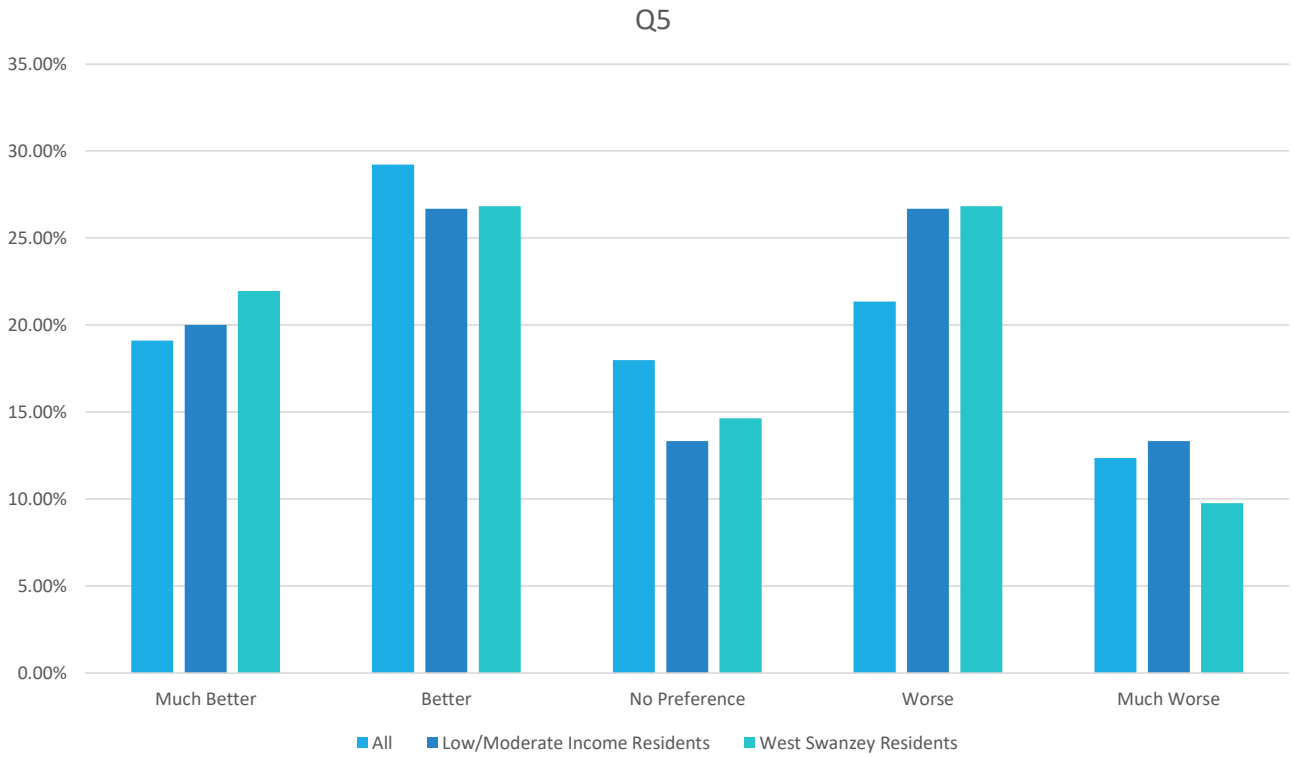
Crosswalk Alternative







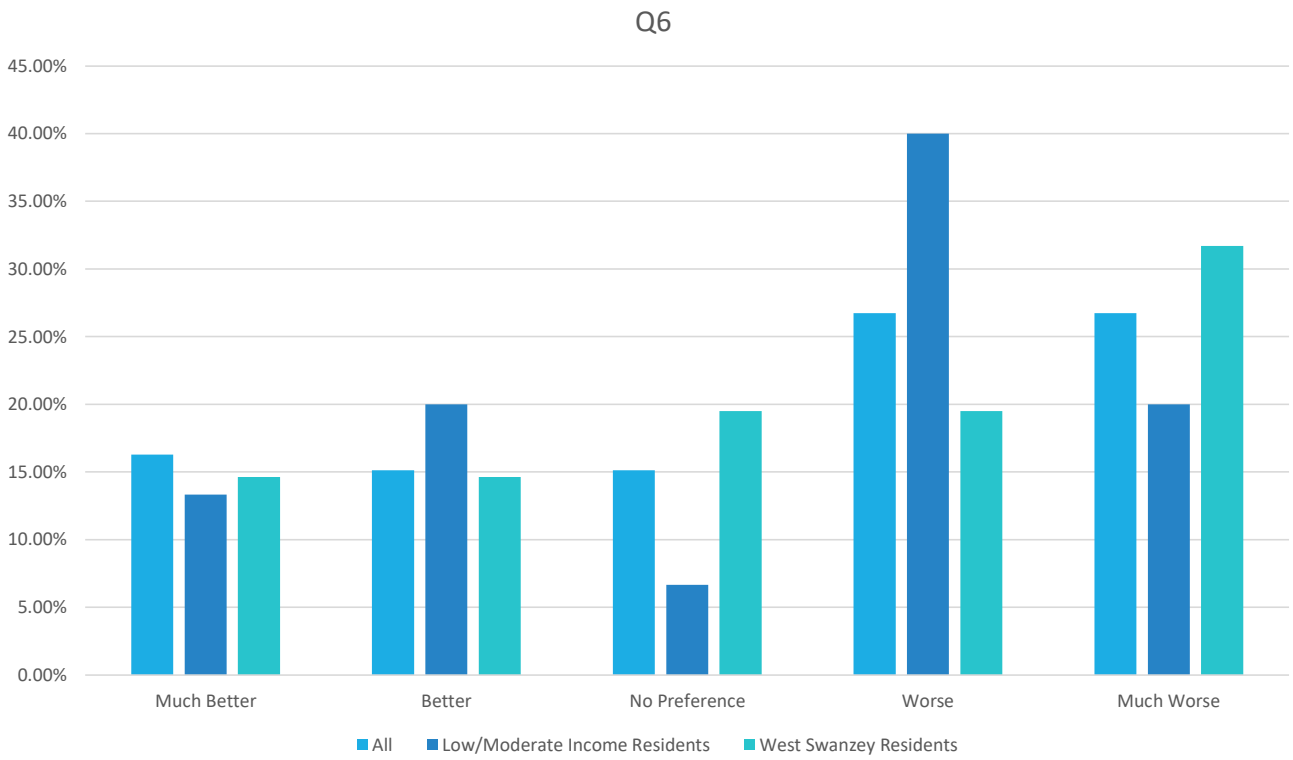
Commercial Density Alternative







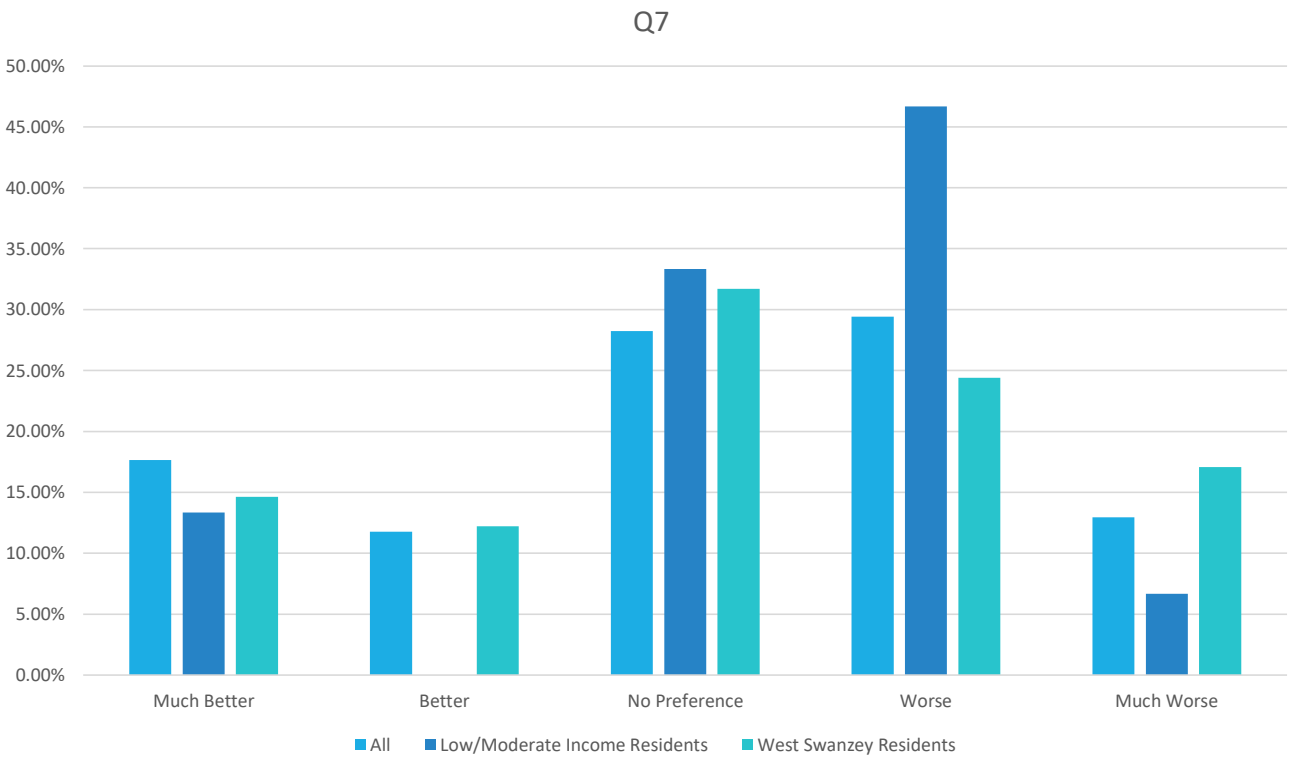
Setback Alternative







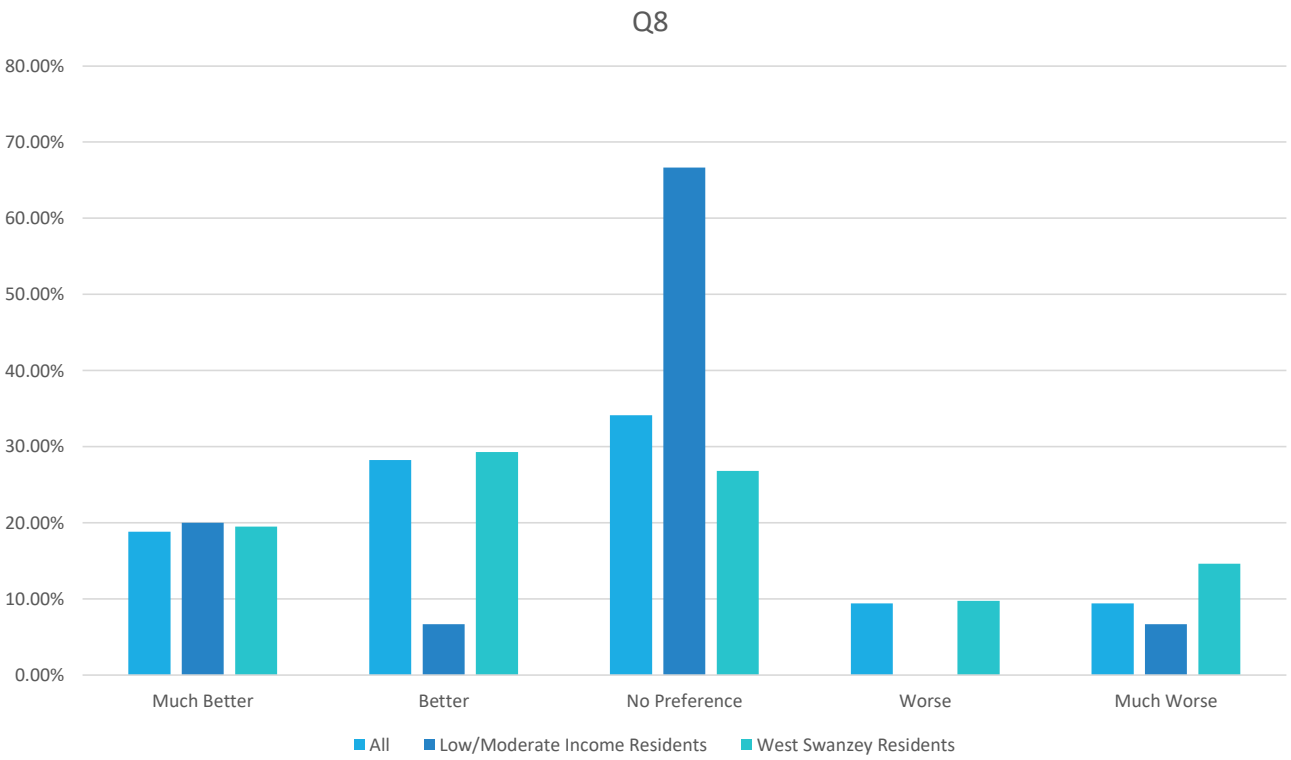
Parking Alternative







Signage Alternative







Discussion: Findings and Recommendations

NH 10 Corridor Study Components

- Summary of Policies, Plans and Studies
- Evaluation of Traffic Operations on the Corridor
- Evaluation of Crash Data
- Field Review of 4 Intersections
- Evaluation of Access Management Conditions
- Analysis of Land Uses and Zoning
- Future Land Use and Development Constraints Analysis
- Jobs and Commuting Analysis
- Housing Analysis
- Visual Preference Survey for NH 10-West Swanzey

Objectives Guiding SWRPC Recommendations

A. Improve highway **safety** based on crash data, speeding data and observations relating to other safety issues

B. Improve highway and land use **coordination**

C. Make improvements that foster **economic vitality and sustainability**

D. Improve **pedestrian and bicycle access** particularly in higher density areas of the corridor

A. Improve Highway Safety

- Consider 11 foot lanes throughout corridor to decrease corridor wide speeding (addresses speeding by intersections Base Hill Rd, Whittemore Farm Rd, Sawyer's Crossing Rd, N and S. Winchester St, California St, West St and Cobble Hill Rd.
- Develop plan for consistent speed enforcement including consideration of speed feedback signs
- Build raised median at Citgo Station near Base Hill Rd
- Adjust skewed angle for WB Sawyer's Crossing vehicles turning left (SB) on NH 10
- Address brush clearing-sight distance issue at SE quadrant of California Street and NH 10
- Consider crosswalks at California St, West St and Cobble Hill Rd
- Consider vegetated median and left turn pockets in place of TWLTL
- Consider changes to built environment regulations to change driving environment where traffic should slow down

B. Improve Highway and Land Use Coordination

- Review coordination practices between NHDOT driveway permitting and Planning Board site plan and subdivision review
- Develop process for correcting access management deficiencies through site plan and subdivision review process when there is a change of use
- Consider nodal development (place creation) strategy along corridor-- Places where higher speeds and better mobility ok, reduce access points and reduce land use density, Places where reduced speeding and less mobility ok, allow for more access and higher land use density
- Reassess incentives/disincentives for Commercial/Industrial district feeder roads
- Develop gateway signage for West Swanzey area or any other identified “nodes”
- Schedule any sewer or water upgrades with planned highway improvements

C. Foster Economic Vitality & Sustainability

- Reassess diversity of land uses along Business and Commercial/Industrial Zones including allowances for housing
- Consider improved landscaping
- Consider measures to protect aquifer in West Swanzey such as restrictions on impermeable surfaces
- Consider opportunities to create connectivity and synergies between neighboring land uses such as the creation of shared driveways, sidewalk connectivity in site plans and subdivisions, and promotion of diversified mix of land uses
- Consider development of gateway signage that provides driver with information about shopping/business opportunities
- Consider wayfinding signage for corridor area attractions including Ashuelot Rail Trail, Yale-Toumey Forest and Slate Covered Bridge on Westport Village Road
- Explore transit feasibility with Keene and Winchester on NH 10

D. Improve Pedestrian and Bicycle Access

- Sidewalk along NH 10 from Keene to Market Basket Entrance
- Crosswalk near Winchester Wood Housing
- Crosswalk at Market Basket light if sidewalk extends that far
- California Street crosswalk (would require sidewalks on California St)
- West St crosswalk
- Cobble Hill Rd crosswalk (no sidewalk on west side of highway)
- S. Winchester St crosswalk
- Sidewalks from S. Winchester Road to California Street
- Bicycle lanes from S. Winchester road to California Street?
- Connectivity and wayfinding improvements between NH 10 and Ashuelot Rail Trail
  - California St/Main St/Railroad St/Pine St
  - Cobble Hill Rd/S. Winchester St/Denman Thompson Hwy/Holbrook Ave
  - West St/Swanzey St/Main St/Railroad St/Pine St

Appendix 2:
Summary of Policies, Plans and Studies

Summary of Policies, Plans and Studies

SWRPC Staff, with input from the Swanzey NH 10 Advisory Group, compiled and reviewed a wide variety of documents and policies relevant to the NH 10 corridor. Such materials include the Swanzey Master Plan, Southwest Connects: Southwest Region Transportation Plan, Cutler Elementary Safe Rotes to School Action Plan, Route 10 Job Access Reverse Commute Study, NHDOT's Long Range Transportation Plan, and municipal master plans for neighboring communities. The documents are organized in the table below based on their geographic scope; namely whether they are specific to the Town of Swanzey, other communities in the corridor, the Southwest New Hampshire region, or the State of New Hampshire. A brief list of major findings, as well as more comprehensive summary of each document as it relates to NH 10, can be found below.

Findings

- Both Swanzey and its neighboring communities of Keene and Winchester recognize the importance of NH 10 as a corridor to support current and future development. In particular, all three communities recommend future commercial and industrial development to be promoted along the Corridor.
- The Ashuelot Rail Trail provides an opportunity to serve as a parallel pedestrian and bicycle facility to NH 10. In particular, the rail trail provides an important connection for bicycles and pedestrians between Keene and West Swanzey Village that runs parallel to NH 10, as well as connections farther south to Winchester and Hinsdale.
- West Swanzey Village has redevelopment potential that is encouraged both by the Town through an economic revitalization zone, in the Town's master plan, and through the results of the West Swanzey Village charette hosted by Plan NH. West Swanzey also represents a significant node of population density, and a concentration of low-income population along the Corridor.
- Because of the cost of transportation, the disproportionate number of low-income residents and ongoing predictable trip patterns between Keene, Swanzey and Winchester, NH 10 may be well suited for transportation modes beyond the personal motor vehicle. Such transportation would need to be a result of coordination between Swanzey and its surrounding towns. Residents have also indicated that a lack of transportation options is a significant issue in Swanzey.
- Swanzey has indicated a strong desire for its transportation system to accommodate all transportation users, including bicyclists and pedestrians. NH 10 currently acts as a crossing barrier and there are safety issues for pedestrians and bicyclists, particularly in the West Swanzey Village area.
- The Corridor plays an important role in hazard mitigation as a primary evacuation route and a concentration of services and resources which would be needed in the event of a disaster. Populations along NH 10 south of West Swanzey Village are identified as being at risk of isolation in the case of a disaster.
- While the southern half of the NH 10 corridor within Swanzey overlies an important stratified drift aquifer which provides ample groundwater, the area north of West Swanzey Village possesses limited groundwater resources and water and wastewater infrastructure. This limits the development potential of the northern half of the NH 10 corridor.

- Collaboration between NHDOT and the Town of Swanzey is key for the NH 10 corridor to reflect the needs and wants of the Town. While NHDOT has established policies for corridor management, the Town of Swanzey through its complete streets policies and other studies has demonstrated that it has a distinct vision for the Corridor that may not be captured in current NHDOT policy.

Title and Date	Description
Swanzey-Specific Documents	
Swanzey Master Plan, 2003 Update, Transportation, Economic Development & Land Use Chapter. Pgs 71 -84, 24-25	Swanzey's Master Plan, developed and adopted in 2003, is the current guiding document for land use and development along NH 10 until the 2020 update is completed. The plan also contains a transportation chapter, which has an overall goal for the Town's transportation system to "provide for a safe, efficient and diversified transportation system that is sensitive to the Town's rural character". In the plan, NH 10 is classified as an arterial road that is maintained by the State and listed to be in good to fair condition. The primary goal for NH 10 in the plan is to address safety and congestion issues at the NH 10/Base Hill Road intersection, as well as continued conversations with City Express to coordinate transit development. In the land use chapter of the plan, higher density development in West Swanzey Village is recommended along with commercial and retail development along NH 10. The economic development chapter of the plan calls primarily for increasing industrial and commercial development. While the chapter makes no direct mention of NH 10, the corridor represents a major concentration of both industrial and commercial development in Swanzey.
Town of Swanzey Zoning Map, 2018	The majority of NH 10 through Swanzey is zoned "business district" and "commercial/industrial district", with a small path of "residence district" south of West Swanzey Village. This is in line with the current industrial and commercial development in place along NH 10. Residential development is allowed in the "business district", which is primarily south of Forest Ave west of NH 10 and south of Sawyers Crossing Road east of NH 10. The zoning map is most current as of March 13, 2018.
Swanzey Complete Streets Policy, 2015	Adopted in 2015 by the Town of Swanzey, the complete streets policy is an ordinance that calls for the "Town, through this policy, to ensure that the safety of all users – including motorists, pedestrians of all ages and abilities, bicyclists, emergency responders, freight providers, and users of public transit – is considered in all municipally managed transportation projects and project phases". The policy was developed and passed in conjunction with planning and design guidelines for complete streets in the context of Swanzey's street network and serves as a guiding document for the Town in developing their transportation system in future projects. While NH 10 is a state-owned road, the policy states that "the Town… will encourage partners such as the NHDOT to develop and implement complete streets elements… when working on projects or programs in the Town".

Swanzey Complete Streets Planning & Design Guidelines, 2015	A document adopted in conjunction with the complete streets policy passed the same year, the *Swanzey Complete Streets Planning & Design Guidelines* serve to provide guidance for the implementation of the Town's complete streets policy. The guidelines provide example right-of-way configurations for numerous typologies of streets. Street typologies include collector streets, compact neighborhood streets, and residential streets.[1] Collector streets have the highest traffic volume and are recommended to have separate and wide pedestrian and bicycle space, as well as more developed lighting, curbs and other infrastructure. Compact neighborhood streets are recommended to have narrower vehicle lanes, paved shoulders, green buffer, and an unobstructed pedestrian pathway. Residential streets are recommended to have narrow travel lanes, a paved shoulder and sidewalks on at least one side of the street. Rural streets and state routes are also mentioned in the guidelines but are not subject to the complete streets policy. The guidelines also serve to educate municipal officials and the general public on the elements of a complete street. While NH 10 is managed by NHDOT, the guidelines make mention that the Town will encourage NHDOT to incorporate complete streets elements while working on projects within Swanzey.
Swanzey Hazard Mitigation Plan, 2016 Update pgs 25 – 33, 42 – 44.	Developed by SWRPC in conjunction with the Swanzey Hazard Mitigation Committee in 2016, Swanzey's most recent Hazard Mitigation Plan discusses the NH 10 corridor frequently. NH 10 was the site of previous localized flooding events in the 800 block of West Swanzey Road and the NH 10 corridor south of Cobble Hill Road was the site of a small forest fire due to a lightning strike. The NH 10 Corridor in the 800 block of West Swanzey Road is identified as having medium-high risk of future flooding events. Three phase electric utility poles that run parallel to NH 10 were identified as having moderate risk of damage during snow and ice events. A handful of residential properties in West Swanzey in the area described above were identified as being at risk for future flooding events from the California Brook System. NH 10 serves as a primary evacuation route for both Swanzey and the region and is connected to a number of resources that are critical to protect from future events, including large employers and cultural facilities. South of West Swanzey off of NH 10, a manufactured housing park was identified as being both at risk and isolated in the case of a hazardous event. There are also numerous resources that would be necessary in a disaster event along NH 10 such as grocery stores and gas stations. The plan recommends a number of mitigating culvert projects for roads adjacent to NH 10.[2]

[1] Collector Streets within the study area include Westport Village Road, Base Hill Road, and Ash Hill Road. Compact Residential Streets within the study area include California Street, West Street, Cobble Hill Road, and North & South Winchester Street. Residential streets in the study area include Cobble Hill Road west of NH 10, Perry Lane, West Street west of NH 10, Aylward Avenue, and California Street west of NH 10.

[2] Within the .25 mile study area, this includes a culvert on Base Hill Road. Within a half mile radius, culvert replacements at Forest Avenue and California Brook Road are also recommended.

West Swanzey Charette, November 2012 pgs 8-12	This report details a design charette held by Plan NH in West Swanzey over two days in November of 2012. Over the course of two listening sessions, a group of experts in planning and real estate from Plan NH met with Town officials and residents to brainstorm around the revitalization of West Swanzey Village. As a primary corridor to and from West Swanzey Village, NH 10 was central to the conversation. The Charette group conducted a macro-level analysis of NH 10's relationship with the Village and identified the need to identify possible future downtown businesses that would not compete with existing commercial development along the route. The primary recommendation for NH 10 through Swanzey is the creation of four "gateways" for West Swanzey Village along NH 10[3], as well as the creation of a gateway overlay district to improve pedestrian accommodations. The revitalization of Whitcomb Hall and Homestead Woolen Mills, as well as other underutilized buildings was the principal focus of the charette. The implementation of the revitalization strategies outlined in this document would have a significant impact on the transportation needs of West Swanzey Village.
Cutler Elementary Safe Routes to School Action Plan, 2016	This Action plan was created by SWRPC in conjunction with Cutler Elementary School as part of the Safe Routes to School program established by the FHWA in 2005. The plan evaluates the existing conditions for walking and biking to the school, presents survey results from students and parents to understand perceptions of walking or biking to school and presents a number of recommended projects to improve safety for Cutler Elementary School students. The study found that 10.5% of the school's student body lived west of NH 10, which does not have a marked crossing at the West Street intersection students use to get to school. In addition, during traffic reporting for the study it was found that at least 50% of vehicles exceeded the posted speed limit of 40 MPH by at least 5 MPH during school arrival and departure times. Subsequently, a major recommendation of the study was the development of a crossing guard program for NH 10, as well as working with NHDOT to address safety issues and the lack of a marked pedestrian crossing.

[3] The four proposed "gateways" to West Swanzey Village from NH 10 would be at Winchester Street (2), California Street, and West Street. The "gateways" would have simple and attractive signing and landscaping to set it apart from other signage on NH 10.

Capital Improvements Program Committee Recommendations for 2020 Capital Funding Summary and Detail Schedules, December 2019	This document is the most recent round of recommendations by Swanzey's Capital Improvements Committee for the capital improvement plan that spans from 2020 to 2027. The document is structured as a workbook which lists proposed projects by department scheduled from 2020 to 2027. There are a number of recommended projects that affect the NH 10 corridor. Several culvert replacements projects and repaving projects are recommended for roads adjacent to NH 10. Rail trail improvements for the Ashuelot Rail Trail are also recommended to improve bicycle and pedestrian access to West Swanzey Village, which would affect the number of bicyclists and pedestrians along the corridor.[4]
Swanzey Natural Resource Inventory, 2018, pgs 1-12, 21, 26	Swanzey's Natural Resource Inventory notes a number of ecologically significant resources along the NH 10 corridor. The land to the west of the corridor near the Keene town line is a large swath of unfragmented land which contains important wetlands and an important link for habitat connectivity. Across NH 10, much of the land east of the road and north of West Swanzey Village is held in private conservation by Yale University in what is known as the Yale-Toumey Forest. The Yale-Toumey Forest is also home to prime farmland soils. West Swanzey Village and the NH 10 corridor south of the Sawyers Crossing Road intersection also lie on top of important groundwater resources for the Town.
Swanzey Master Plan Community Survey Data, 2020	Conducted as part of the 2020 Master Plan update for the Town of Swanzey, the online survey garnered 416 participants who responded to a variety of questions on land use, transportation, housing, and their experience living in Swanzey. The perceptions captured by the survey have a number of implications on the current and future use of the corridor. Of those who responded, 32% indicated that they worked in Keene, more than double the number of respondents who indicated they both lived and worked in Swanzey. Eighty-six respondents placed a lack of transportation in their top three choices of what they do not like about Swanzey. In terms of land-use, the survey captured a strong desire for additional retail development including small retail stores, restaurants and breweries. Two-thirds of respondents indicated that Swanzey should encourage multi-use developments within existing businesses and commercial zones, of which NH 10 would be considered a commercial zone for much of its length. However, respondents also indicated an aversion to density, with half of respondents indicating that Swanzey should increase building lot requirements, and two-thirds of respondents indicating that Swanzey should not encourage increased density in village centers. It is important to note that there was some demographics that were overrepresented among those who responded to the survey, particularly homeowners over the age of 55 who had lived in Swanzey for 20 or more years.

[4] Proposed projects of note include: the reconstruction of California Street, South & North Winchester Street, the east side of West Street, as well as the repaving of the west side of West Street and Westport Village Road. There are also $50,000 worth of unspecified Cheshire & Ashuelot Trail Improvements proposed for 2024 as a match to cover TAP Grant and fundraising.

Source Water Protection Plan, 2017. Pgs 16, 17, 19 – 21, 33 – 41, 47	Developed for the Town of Swanzey's Drinking Water Committee, the plan addresses the need for protection of Swanzey's crucial groundwater resources as sources for drinking water. Swanzey is identified as being unique among NH communities for not having a central municipal water system or a wellhead protection ordinance but relying on a number of small private systems and public wells drawing from a productive stratified drift aquifer. Also included in this document is a comprehensive overview of Swanzey's water infrastructure. NH 10 is identified in the plan as being served by North Swanzey Water and Fire Precinct to the north, the West Swanzey Water Company in the vicinity of West Swanzey Village, and by several smaller systems for individual communities or neighborhoods in the southern half of the corridor. West Swanzey Village is also home to a number of public wells that provide drinking water, not part of any explicit water system. While the plan makes several recommendations for protecting Swanzey's groundwater resources, the most impactful would be the two proposed Wellhead Protection Areas (WHPAs) for the West Swanzey Water Company and the Pines Grove Co-op system. The West Swanzey Water Company WHPA would cover an over 200-acre area extending from roughly the Swanzey and California Street Intersection to Old Leonard Farm Road/West Street. The Pines Grove Co-op WHPA would cover a 40-acre area directly south of the Co-op. If enacted in ordinance, these WHPAs would have a significant impact on the nature and level of development of those two areas along the NH 10 corridor.
Yale School Forests Brochure, 2004	This brochure was produced by the Yale School of Forestry & Environmental studies to describe the activities and policies surrounding the use of Yale School Forests. This would also apply to the Yale- Toumey Forest, which straddles NH 10 south of the Market Basket Plaza. Yale Forests are used for a variety of research and educational programs for the College of Forestry, and generally are open to the public for non-motorized uses. The Yale-Toumey Forest has been utilized by a masters-level internship program and has been the site of a number of collaborative research projects with Keene State College, Antioch University and Franklin Pierce University. The Forest is managed by students and supervised by staff and faculty.
Town of Swanzey Rural Fire Water Resource Plan, May 2010, pgs 4, 15	Prepared by the NH Rural Fire Protection Initiative for the Town of Swanzey, this document outlines the water resource sites available in Swanzey for firefighting purposes. The plan includes a map of existing water resources for fire-fighting purposes, which demonstrates the majority of water resources along NH 10 are concentrated in West Swanzey Village and at the Sawyer's Crossing Road, Cobble Hill Road and Kempton Road intersections. There are also a number of mitigation recommendations for additional water resources, of which the NH 10 corridor at the Keene Town Line was listed as an "area of concern" for firefighting infrastructure.

Corridor Area Documents	
Route 10 Job Access Reverse Commute Study, 2008	The Route 10 Job Access Reverse Commute (JARC) study was completed by SWRPC in 2008 to evaluate the market and need for alternative transportation options for populations under 150% of the federal poverty level along NH 10. JARC was funded by a specific program from the Federal Transit Administration that focused on funding transportation services to employment related activities for low income people. The study found that there were significant concentrations of low-income populations along the corridor and the corridor served many commuters going to and from Keene for employment-related activities. Transportation costs were found to present a hardship for low income commuters along the corridor. In addition, Swanzey was identified as having significant employers and commuting employees into and from the community, second only to Keene. The ultimate conclusion of the study was that the NH 10 corridor was viable for a wide variety of transportation services ranging from fixed route commuter shuttles, demand response corridor paratransit service, emergency ride home services, to rideshare programs. The transportation options that could be implemented would ultimately be limited by the local funding sources available and the level of coordination reached between corridor stakeholders.
Keene Master Plan, 2010, Transportation Chapter. Pgs 84-86	The relevancy of Keene's 2010 Master Plan to the NH 10 corridor is how the plan addresses Keene's role as the region's transportation hub. Corridors such as NH 10 were identified as key gateways into the City which should be improved and managed to maintain the rural character of the region. The plan also highlights the need to improve and coordinate regional public transportation, including advocating for increased state and federal funding for transit. In terms of land use, the plan calls for high density commercial and industrial development along Winchester Street and south of the NH 101 traffic circle, a greater mix of uses in the Key Road area and the potential for a live/work area along NH 10 in Keene, all of which would likely affect the traffic demands for the NH 10 corridor through Swanzey.

Winchester Master Plan, 2017, V-4 – V-8, V-15, V-16, III-15	Winchester's most recent Master Plan was adopted in 2017 and provides some important information and recommendations for the NH 10 corridor. In Winchester, NH 10 is classified as a Class I Trunk Line Highway under the state classification system, and as a Minor Arterial under the federal classification system. The northern section of NH 10 in Winchester has the highest estimated average annual daily traffic count, particularly NH 10 at the Swanzey town line and NH 10 north of Mechanic Street. In the southern half of Winchester, NH 10 near Manning Hill is identified as a high priority area for investment due to safety concerns regarding the road's steep grades and curvy layout. In the transportation chapter of the plan, a specific recommendation is made to establish a commuter lot along the northern section of NH 10 near the Swanzey town line to encourage increased carpooling. The plan also references SWRPC's job access reverse commute study for the NH 10 corridor as it relates to the corridor's viability for supporting public transit. In the conclusion of the economic development chapter of the plan, NH 10 is identified as a corridor with the potential for future investments due to its high annual daily traffic count. Such investments could take the form of businesses designed to support Winchester's natural resources.
Regional Documents	
Coordinated Community Transportation Plan for the Monadnock Region, pgs 34 – 45	While not a document that recommends corridor-specific projects, the Coordinated Community Transportation Plan provides important details on the Monadnock Region Coordinating Council's role in community transportation. The plan also serves as a detailed breakdown of federal funding sources for community transportation and each funding program's requirements. Overall, nearly all of transit funding available to the region through the Coordinating Council is through some form of Federal Transit Administration (FTA) program. Currently, FTA 5310 is used heavily in the region for purchase of service trips related to medical appointments. Home Healthcare, Hospice & Community Services (HCS) also utilizes a number of FTA programs to operate their fixed route service in Keene. With many other plans referencing the potential for passenger transit along NH 10, the coordination and funding strategies outlined in the Coordinated Community Transportation Plan would be vital for the planning and implementation of expanded transportation options along the corridor.

Southwest Connects, 2015, pgs 69 - 80	*Southwest Connects* is the regional transportation plan developed by SWRPC as part of the Monadnock Region Future planning process. The plan details eight major corridors for the Southwest NH region, including NH 10 South from Keene to Winchester. The overview of NH 10 in *Southwest Connects* is extensive, and the document takes an expanded corridor approach to its analysis of NH 10, analyzing multi-modal transportation options as well as housing, economic development and demographics along the corridor. NH 10 was noted to have the highest proportion (20%) and total number of low-income populations out of the eight regional corridors identified in the plan. In addition, West Swanzey was found to have an above average proportion of single parent households, middle-aged populations, and youth 15 and under. Swanzey also had the highest number of employees commuting to Keene, more than twice the number commuting from Winchester. Because of these factors, NH 10 was identified as one of the most promising corridors in the region for passenger transit service. The route has also seen significant increases in traffic from the 2010 to 2015 period, and access management along NH 10 in West Swanzey was recognized as a challenge for the corridor.
Plan for Ashuelot Rail Trail, 2020 pgs 18-21	Completed by SWRPC in 2020, the plan is a comprehensive planning document for the trail. Similar to NH 10's role in providing vehicular access to West Swanzey Village, the Ashuelot Rail Trail provides an important corridor for pedestrians and bicyclists between West Swanzey Village and Keene and continues on to Hinsdale via Winchester. *The Plan for Ashuelot Rail Trail* also includes trail counts, quality assessment for the entire trail, a comprehensive review of guiding rail trail documents and plans, and project recommendations for the trail. There are 13 projects that are suggested for the trail within Swanzey town limits, including the installation of wayfinding signs, trail improvements, pedestrian accommodations on roadways which connect to the trail, as well as improvements on road crossings.[5] As the trail runs through West Swanzey Village and near NH 10, these improvements would alter the overall transportation network connecting to the NH 10 corridor. In both Winchester and Keene, there are recommended projects that directly affect NH 10 including wayfinding projects and road crossings.

[5] Projects recommended within the .25-mile NH 10 study area include wayfinding signage at Riley Conservation Area and trail surface improvements at the Holbrook Avenue crossing near Woodale Avenue to the Swanzey-Winchester Town Line. Trail improvements suggested for the entire corridor include creating trail mileage markers, restoring railroad mile markers, and restoring original stone box culverts.

Ashuelot Rail-Trail: The ART of Commuting, 2014 pgs. 58 - 66	Created as the result of a senior seminar for students at Keene State College, the study outlines the opportunities and barriers for the Ashuelot Rail Trail to serve as a potential commuter pathway for the region. The paper includes an outline of the communities served by the trail, as well as a literature review of rail trail documents and a quality index of the trail utilizing GPS technology. A bicycle traffic count was conducted for locations in Swanzey, Hinsdale and Winchester. The Swanzey location north of Sawyer's Crossing Road demonstrated the highest per day number cyclists, and highest total bicyclists. While the trail from Keene to Swanzey was cited to be in excellent condition, trail conditions south of West Swanzey Village were highly variable. Overall, a lack of wayfinding and recognition led to extremely limited commuter activity on the trail, compounded for communities south of Swanzey by trail quality issues.
Comprehensive Economic Development Strategy for Southwest New Hampshire, 2015, pgs 101-106	While the *Comprehensive Economic Development Strategy for Southwest New Hampshire* (CEDS) does not directly reference NH 10 or any projects along the corridor in Swanzey, many of the overall goals called for in the plan would impact development along the corridor. The CEDS calls for the establishing and supporting a system of diverse transportation modes by promoting bicycle and pedestrian improvements in roadway design as a medium-term goal. Most notably, the document calls for the development of a regional public transportation system as an economic development strategy. While not addressed in the CEDS, NH 10 would be a likely corridor for service in a regional public transportation system.
Southwest NH Natural Resources Plan, 2015, pgs 31, 39, 40, 41, 43, 48,	Created as a technical component of the 2015 Monadnock Region Future Plan, the *Southwest NH Natural Resources Plan* covers a wide variety of topics from energy to wildlife corridors. The Plan also provides a number of maps of that convey important information on the NH 10 corridor in Swanzey. In terms of ecological resources, the lands west of NH 10 near the Keene town line are designated as one of the "highest ranked habitat in NH". The plan also demonstrates the significance of the NH 10 corridor for water, sewer and aquifer resources in Swanzey. The West Swanzey Village area contains the majority of public wells along the corridor in Swanzey, and some of the only sewer infrastructure in Swanzey stretches from West Swanzey Village across NH 10 west to residential neighborhoods. A stratified drift aquifer, a valuable groundwater resource, runs under NH 10 south of the Sawyers Crossing Road intersection and through West Swanzey Village. However, there are also several points of potential groundwater contamination throughout the stratified drift aquifer. While the lands north of the Sawyers Crossing Road intersection represent some important ecological habitats, there are limited aquifer resources for public wells.

Southwest NH Broadband Plan, 2015, pgs 22, 25, 27	The *Southwest NH Broadband Plan* was created by Southwest Region Planning Commission and adopted in 2015 as part of the Monadnock Region Future planning effort. While the plan covers a wide range of topics on the forms of broadband available, levels of service and impact of broadband, a series of maps provide insight on the level of broadband service available along the NH 10 corridor in Swanzey. For the majority of the corridor, the maximum advertised speed is 50 megabits per second (Mbps), with the exception of the west side of the corridor from approximately the Ash Hill Road intersection to the North Winchester Street intersection. For that section of the corridor, the maximum advertised speed is between 25 Mbps and 50 Mbps. However, there was a broadband speed test survey as part of the planning efforts, which asked participants to test and report the download speed of their internet. On that survey, there were a number of responses in the southern half of the NH 10 corridor. Responses along the corridor ranged from over 6 Mbps to 1-3 Mbps speeds. The most common speeds along the corridor were either speeds in the 3-6 Mbps range or the 1-3 Mbps range. Generally, the plan categorizes households or businesses with download speeds under 6 Mbps to be "Underserved", which translates to the majority of respondents along the NH 10 corridor to be classified as "Underserved".
NHDOT/Statewide Documents	
New Hampshire State Trails Plan, 2005, pgs 33, 63-66	Created by NHDOT in 2005, this plan includes an inventory of state owned, abandoned rights of way in the State, as well as the summary of a public outreach process, design and construction guidelines for rail trails and summaries of rail trail planning from each of the state's nine regional planning commissions. The plan provides an overview of the Ashuelot Rail Trail as part of its inventory. During the public outreach process of the plan, the Southwest NH session in Keene had the highest attendance, and subsequently demonstrated strong support for improving the Ashuelot and Cheshire Rail Trails. Most trail users surveyed demonstrated a preference for using trails only for non-motorized uses.
NH Long Range Transportation Plan, 2010, pgs 3-6,	The *Long-Range Transportation Plan* outlines the goals and objectives for New Hampshire's transportation for a 20-year period from 2010 to 2030. The Plan describes a number of key initiatives for NHDOT's approach to New Hampshire's transportation system, many of which would serve as guiding principles for projects on NH 10. The key initiative of statewide corridor planning, for example, recommends the creation of corridor management plans for roads such as NH 10 that would cover a wide range of topics not explicitly limited to the use of the corridor as a transportation asset. Context Sensitive Solutions is another key initiative which outlines an approach to planning, design and construction that emphasizes transportation solutions that identify, promote and reinforce community values. Finally, this document outlines NHDOT's policy of "Preservation First", otherwise known as "keep good roads good", which prioritizes the maintenance of roads in good to fair quality over the reconstruction of poor-quality roads.

NH Department of Transportation Driveway Policy, 2000, pgs 7, 15-17	Adopted in March of 2000, this policy dictates the driveway application process required by the NHDOT for all driveways along state highways, including NH 10. The policy outlines a general application process where a standard form is submitted to the district engineer to apply for a driveway construction permit. Additional information such as traffic or drainage studies could be required due to the nature of the driveway and is coordinated with the district engineer. The policy states that a driveway construction permit will be issued if the application and supporting information demonstrates the travelling public will be protected after the construction of the driveway. In general, 1 to 3 driveways are permitted per parcel depending on the site lines and frontage the parcel has with the state highway.
NH Division of Forest & Lands GIS Map Viewer https://www.nh.gov/nhdfl/natural-heritage/state-forests-parks-interactive-map.htm	Produced by NH Division of Forest & Lands, the GIS Map Viewer is an online application that lists conservation lands throughout New Hampshire and the ownership and form of protection used to protect conservation lands. The applicability of the mapping application to the corridor is the information it provides on the Yale-Toumey Forest, a conservation area owned by Yale University which is the predominant land use for the corridor north of Sawyers Crossing Road. The map lists the lands as being held in conservation through "Fee Ownership", which means it is held in conservation by direct land ownership instead of through a conservation easement on the deed for the land.

Appendix 3:
Vehicle, Bicycle & Pedestrian Traffic Analysis

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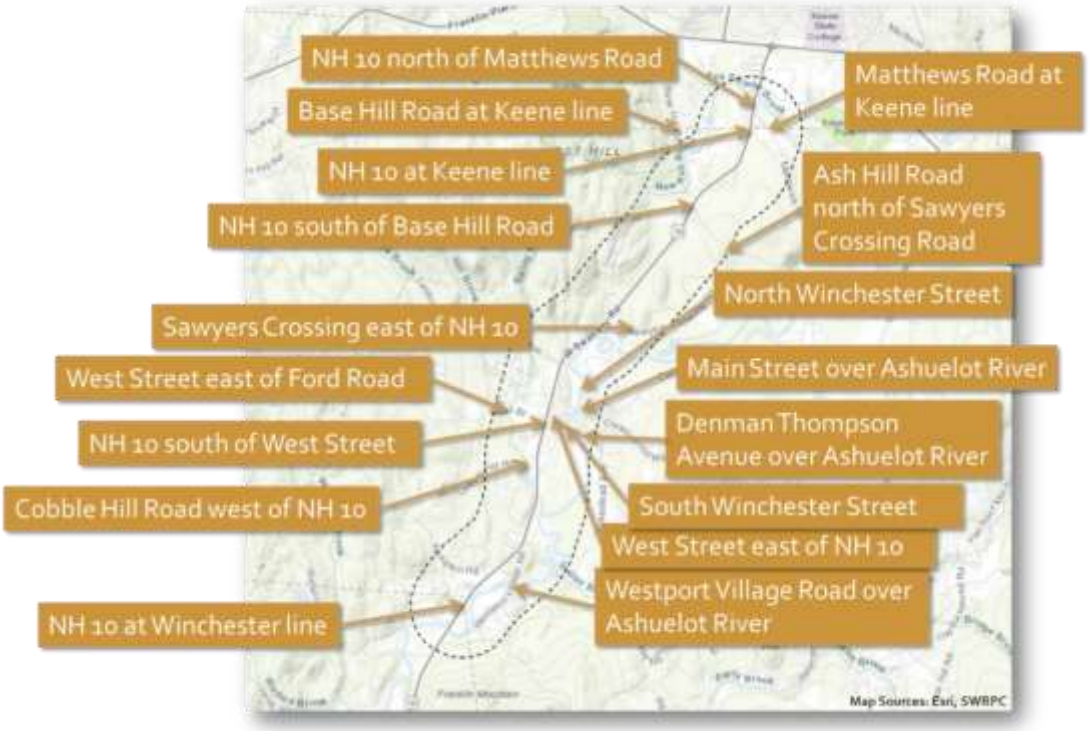
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1 AUTOMATIC TRAFFIC RECORDER STUDIES

The NH 10 South Corridor Study area contains a multitude of historical traffic count locations conducted in the last five years. They include locations where studies are completed on a recurring basis (every three years) for the NH Department of Transportation (NHDOT) and "one-time" requests for other transportation planning-related inquiries that were made by the Town of Swanzey or implemented on behalf of the Cutler School in West Swanzey (Figure 1). Much of the data can be found in the NHDOT Transportation Data Management System, an online database of traffic count data. Data in the following appendix includes information about traffic volumes as well as a subset of studies that include information about the mix of vehicles types (vehicle classification), operating speeds and gaps between vehicles on or near the NH 10 Corridor (Table 1).

Figure 1 – Excerpt of Project Advisory Committee slide depicting an inventory of recent traffic recorder studies within the study area



Source: 12/8/20 NH 10 Corridor Study Working Group Meeting

Table 1 - List of traffic count studies conducted in the last five years within the study area (approximately ¼ mile from the highway centerline)

Location Description	NHDOT Identifier	Most Recent Study	Types of Data Available
Ash Hill Road north of Sawyers Crossing Road	Not applicable	2018	Volume
Base Hill Road at Keene line	Not applicable	2020	Volume, Classification, Speed, Gap
California Street between NH 10 and Covered Bridge	Not applicable	2016	Volume, Classification, Speed, Gap
Cobble Hill Road west of NH 10	82441061	2019	Volume

Location Description	NHDOT Identifier	Most Recent Study	Types of Data Available
Denman Thompson Avenue over Ashuelot River	82441063	2020	Volume
Main Street over Ashuelot River	82441062	2019	Volume
Matthews Road at Keene line	Not applicable	2019	Volume
NH 10 (Keene Road) at Winchester line	62487054	2021	Volume, Classification, Speed, Gap
NH 10 (West Swanzey Road) at Keene line	82441050	2020	Volume, Classification, Speed, Gap
NH 10 (West Swanzey Road) south of Base Hill Road	82441070	2019	Volume, Classification, Speed, Gap
NH 10 (West Swanzey Road) south of West Street	Not applicable	2020	Volume, Classification, Speed, Gap
NH 10 (Winchester Street) north of Matthews Road	82237029	2019	Volume
North Winchester Street	Not applicable	2018	Volume
Sawyers Crossing Road east of NH 10	Not applicable	2020	Volume, Classification, Speed, Gap
South Winchester Street in front of Cutler School	Not applicable	2016	Volume, Classification, Speed, Gap
West Street east of Ford Road	82441060	2019	Volume
West Street east of NH 10	Not applicable	2018	Volume
Westport Village Road over Ashuelot River	82441059	2019	Volume

Source: SWRPC

1.1 Traffic Volume Overview

For the purpose of this appendix, the included reports focus on the following six study locations which were evaluated most recently and in more detail than others. They also focus on the busiest, State-managed roads in the corridor study area:

- Base Hill Road at Keene line
- NH 10 at Keene line
- NH 10 south of Base Hill Road
- Sawyers Crossing east of NH 10
- NH 10 south of West Street
- NH 10 at Winchester line

Reports on the following pages focus on four key themes:

- **Volume Study Results** depict changes in traffic volumes throughout the day and by day of the week and identify peak hours of travel in bold font.
- **Classification Study Results** show traffic volumes based on a 13-member scheme, further aggregated into “light-duty” (classes 1-3), “medium-duty” (classes 4-7), or “heavy-duty” (classes 8-13) vehicle categories for ease of analysis.

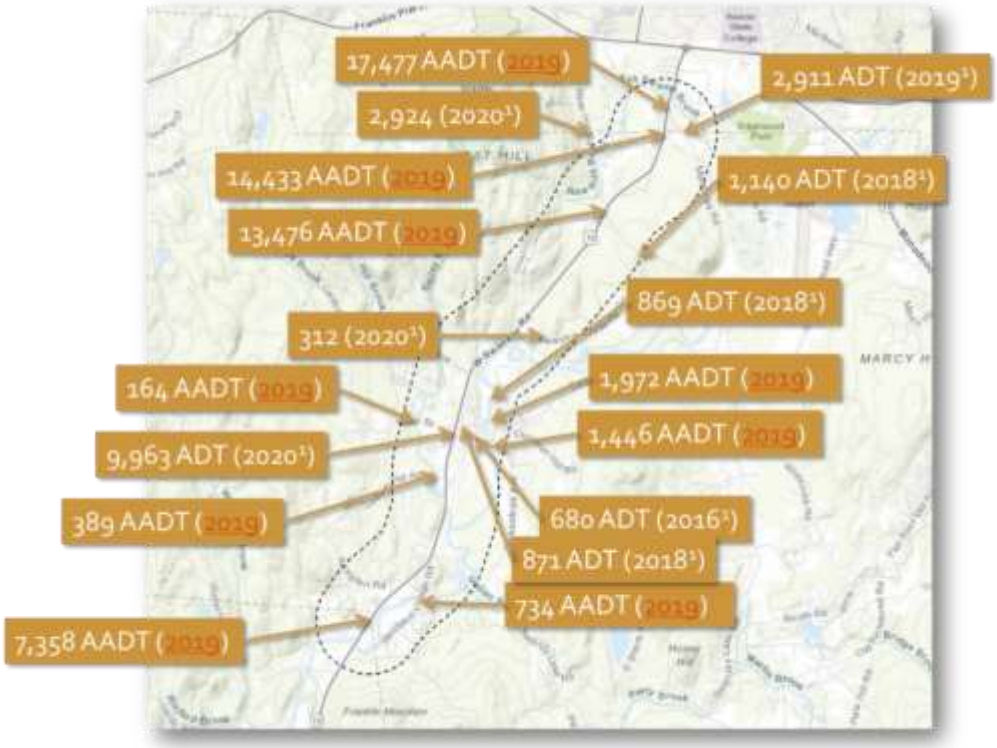
- **Speed Study Results** show how the operating speeds of vehicles vary by direction and throughout the day. SWRPC's analysis of the collected data intentionally excludes vehicles closely following other vehicles to more accurately characterize the operating speed.
- **Gap Study Results** track and quantify gaps of time between vehicles in the flow of traffic throughout the day. The results are summarized based on thresholds identified in transportation research that are likely to be adequate for cars and trucks entering the roadway from a stop-controlled approach[1].

In order to characterize traffic volumes, transportation planners and traffic engineers frequently quantify the daily average of the number of vehicles at a specific location. Depending on the purpose of the study and the amount of data collected, results can even correct for or factor in how traffic volumes change throughout the year. The following two measures are typically used for this purpose:

- **Annual Average Daily Traffic (AADT)** describes the average number of vehicles traveling through a location per day throughout the year. They are derived from short-term weekday studies and are directly comparable with other AADT figures using a factoring system that accounts for seasonal fluctuations in traffic for different classes of roads. The estimates below were calculated by NHDOT and are valid for the 2019 calendar year (Figure 2).
- **Average Daily Traffic (ADT)** also describes the number of vehicles traveling through a location. They are also derived from short-term weekday studies, however, they are not directly comparable due to the natural changes in traffic volumes that occur throughout the year. The estimates in the figure below were calculated by SWRPC based on observed weekday traffic volumes during the study (Figure 2).

[1] Fitzpatrick, K. (1991), "Gaps Accepted at Stop-Controlled Intersections," Transportation Research Record. *http://onlinepubs.trb.org/Onlinepubs/trr/1991/1303/1303-011.pdf*

Figure 2 – Excerpt of Project Advisory Committee slide depicting estimated traffic volumes observed at selected sites



Source: 12/8/20 NH 10 Corridor Study Working Group Meeting

1.2 VOLUME STUDY RESULTS

Weekday average daily traffic volumes vary on NH 10 from a high south of Base Hill Road (14,471 vehicles per day) to roughly half that volume at the Winchester line (7,842).

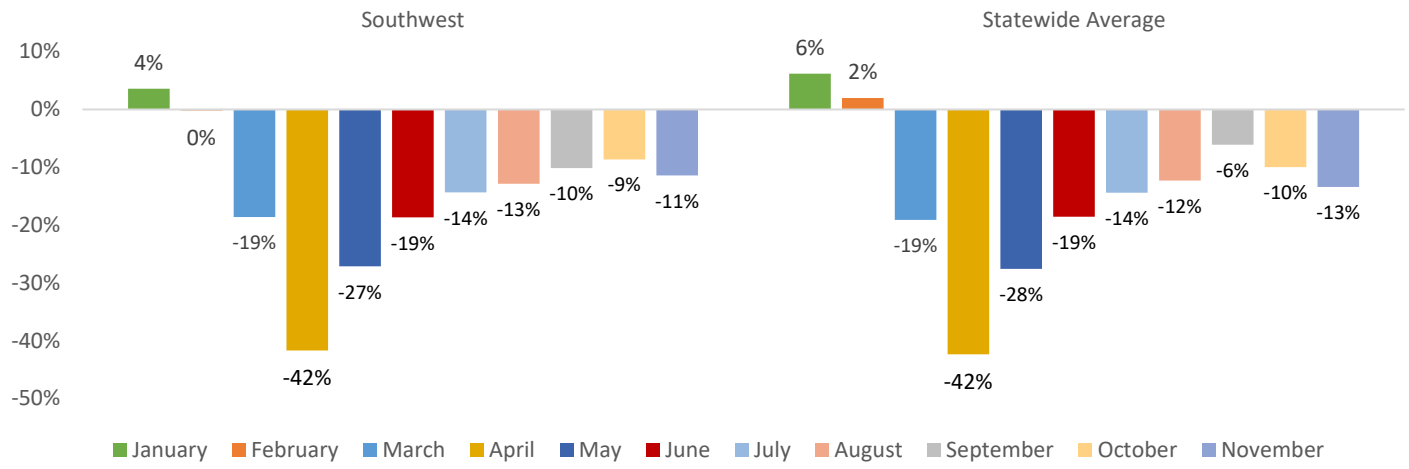
Table 2 - Comparison of Weekday Average Daily Traffic

Location (Study Year)	Average Annual Daily Traffic (vehicles per day)	Weekday Average Daily Traffic (vehicles per day)	Busiest Weekday Hour of Day (a.m.)		Busiest Weekday Hour of Day (p.m.)	
			Duration	Vehicles	Duration	Vehicles
Base Hill Road at Keene line (2020)	Not calculated	2,924	10:00 a.m. to 11:00 a.m.	195	3:00 p.m. to 4:00 p.m.	260
NH 10 at Keene line (2020)	12,528	13,553	11:00 a.m. to 12:00 p.m.	1,004	3:00 p.m. to 4:00 p.m.	1,204
NH 10 south of Base Hill Road (2019)	11,697	14,471	7:00 a.m. to 8:00 a.m.	1,111	4:00 p.m. to 5:00 p.m.	1,273
Sawyers Crossing east of NH 10 (2020)	Not calculated	312	11:00 a.m. to 12:00 p.m.	27	4:00 p.m. to 5:00 p.m.	32
NH 10 south of West Street (2020)	Not calculated	9,971	11:00 a.m. to 12:00 p.m.	674	4:00 p.m. to 5:00 p.m.	884
NH 10 at Winchester line (2020)	6,387	7,842	11:00 a.m. to 12:00 p.m.	506	4:00 p.m. to 5:00 p.m.	690

Source: SWRPC

It is important to note that studies conducted during the coronavirus pandemic are likely to be lower than expected. For example, an analysis of permanent traffic recorder results by the NHDOT Bureau of Traffic indicate August 2020 traffic volumes were 13% lower than August of 2019 (Figure 3).

Figure 3 - Comparison of Average Daily Traffic Volumes by Month (2019 vs. 2020)



Source: NHDOT (Note that NHDOT's analysis did not include the month of December)

The following detailed volume study results show how hourly traffic volumes vary by time of day and how daily traffic volumes vary by day of the week. In the following sections, figures in **bold** indicate the busiest a.m. and p.m. hours of the day.

Each following report lists traffic volumes by hour in a weekly format, with one week per page. Each row represents a single hour time step, and the columns represent days of the week, with the actual dates shown.

Five-day and seven-day averages are provided on the right side of the report. The five-day average is the average vehicle flow for weekdays. The seven-day average is the average vehicle flow across the entire week. Note that weekends are underlined.

12 hour (0700-1900), 16 hour (0600-2200), 18 hour (0600-0000) and 24 hour (0000-0000) totals are included at the bottom of the Weekly Vehicle Counts report. Also included are the a.m. and p.m. peak hours for each day, and their respective hourly totals. Note that the a.m. and p.m. peaks are also indicated in the hourly totals by a bold typeface.

An asterisk * in the report matrix represents an hour where data is not available for the entire hour, or has been excluded in the report Profile. Note that this is different to a zero vehicle count for an hourly period, which will be correctly displayed with a 0.

1.2.1 Base Hill Road at Keene line

1.2.1.1 Wednesday, August 19, 2020 to Sunday, August 23, 2020

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	17 Aug	18 Aug	19 Aug	20 Aug	21 Aug	22 Aug	23 Aug	1 - 5	1 - 7
Hour									
0000-0100	*	*	5	2	5	15	4	4.0	6.2
0100-0200	*	*	4	5	3	8	6	4.0	5.2
0200-0300	*	*	8	8	4	7	4	6.7	6.2
0300-0400	*	*	8	9	9	5	5	8.7	7.2
0400-0500	*	*	15	14	18	8	1	15.7	11.2
0500-0600	*	*	47	46	38	24	12	43.7	33.4
0600-0700	*	*	118	121	119	41	37	119.3	87.2
0700-0800	*	*	180	156	160	76	67	165.3	127.8
0800-0900	*	*	153	141	163	131	111	152.3	139.8
0900-1000	*	*	170	**238**	170	184	167	192.7	185.8
1000-1100	*	*	**191**	207	186	212	202	**194.7**	199.6
1100-1200	*	*	184	197	**200**	**226**	**245**	193.7	**210.4**
1200-1300	*	*	198	199	236	274	**247**	211.0	230.8
1300-1400	*	*	190	222	232	261	245	214.7	230.0
1400-1500	*	*	231	235	257	**276**	220	241.0	**243.8**
1500-1600	*	*	**245**	252	**282**	207	214	**259.7**	240.0
1600-1700	*	*	237	**266**	273	186	180	258.7	228.4
1700-1800	*	*	209	233	250	173	143	230.7	201.6
1800-1900	*	*	141	127	154	131	141	140.7	138.8
1900-2000	*	*	94	96	129	93	105	106.3	103.4
2000-2100	*	*	80	70	79	78	65	76.3	74.4
2100-2200	*	*	38	40	63	54	29	47.0	44.8
2200-2300	*	*	19	28	28	54	15	25.0	28.8
2300-2400	*	*	11	6	21	21	11	12.7	14.0
Totals									
0700-1900	*	*	2329	2473	2563	2337	2182	2455.0	2376.8
0600-2200	*	*	2659	2800	2953	2603	2418	2804.0	2686.6
0600-0000	*	*	2689	2834	3002	2678	2444	2841.7	2729.4
0000-0000	*	*	2776	2918	3079	2745	2476	2924.3	2798.8
AM Peak	*	*	1000	0900	1100	1100	1100		
	*	*	191	238	200	226	245		
PM Peak	*	*	1500	1600	1500	1400	1200		
	*	*	245	266	282	276	247		

*** - No data.**

1.2.2 NH 10 at Keene line

1.2.2.1 Saturday, September 5, 2020 to Sunday, September 10, 2020

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	31 Aug	01 Sep	02 Sep	03 Sep	04 Sep	05 Sep	06 Sep	1 - 5	1 - 7
Hour									
0000-0100	*	*	*	*	*	40	38	*	39.0
0100-0200	*	*	*	*	*	29	35	*	32.0
0200-0300	*	*	*	*	*	31	13	*	22.0
0300-0400	*	*	*	*	*	17	14	*	15.5
0400-0500	*	*	*	*	*	32	26	*	29.0
0500-0600	*	*	*	*	*	113	72	*	92.5
0600-0700	*	*	*	*	*	242	175	*	208.5
0700-0800	*	*	*	*	*	461	338	*	399.5
0800-0900	*	*	*	*	*	675	477	*	576.0
0900-1000	*	*	*	*	*	908	676	*	792.0
1000-1100	*	*	*	*	*	1158	890	*	1024.0
1100-1200	*	*	*	*	*	**1264**	**1025**	*	**1144.5**
1200-1300	*	*	*	*	*	**1250**	1080	*	**1165.0**
1300-1400	*	*	*	*	*	1186	**1082**	*	1134.0
1400-1500	*	*	*	*	*	1157	1013	*	1085.0
1500-1600	*	*	*	*	*	1064	912	*	988.0
1600-1700	*	*	*	*	*	980	860	*	920.0
1700-1800	*	*	*	*	*	946	792	*	869.0
1800-1900	*	*	*	*	*	719	620	*	669.5
1900-2000	*	*	*	*	*	540	450	*	495.0
2000-2100	*	*	*	*	*	369	302	*	335.5
2100-2200	*	*	*	*	*	225	160	*	192.5
2200-2300	*	*	*	*	*	172	113	*	142.5
2300-2400	*	*	*	*	*	164	69	*	116.5
Totals									
0700-1900	*	*	*	*	*	11768	9765	*	10766.5
0600-2200	*	*	*	*	*	13144	10852	*	11998.0
0600-0000	*	*	*	*	*	13480	11034	*	12257.0
0000-0000	*	*	*	*	*	13742	11232	*	12487.0
AM Peak	*	*	*	*	*	1100	1100		
	*	*	*	*	*	1264	1025		
PM Peak	*	*	*	*	*	1200	1300		
	*	*	*	*	*	1250	1082		

*** - No data.**

1.2.2.2 Monday, September 7, 2020 to Thursday, September 10, 2020

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	07 Sep	08 Sep	09 Sep	10 Sep	11 Sep	12 Sep	13 Sep	1 - 5	1 - 7
Hour									
0000-0100	32	26	43	38	*	*	*	34.8	34.8
0100-0200	21	24	26	37	*	*	*	27.0	27.0
0200-0300	20	11	22	23	*	*	*	19.0	19.0
0300-0400	19	22	25	22	*	*	*	22.0	22.0
0400-0500	22	90	80	101	*	*	*	73.3	73.3
0500-0600	91	303	273	275	*	*	*	235.5	235.5
0600-0700	209	611	589	594	*	*	*	500.8	500.8
0700-0800	346	883	855	849	*	*	*	733.3	733.3
0800-0900	467	853	790	849	*	*	*	739.8	739.8
0900-1000	671	832	810	846	*	*	*	789.8	789.8
1000-1100	835	935	875	913	*	*	*	889.5	889.5
1100-1200	**1003**	**1079**	**951**	**981**	*	*	*	**1003.5**	**1003.5**
1200-1300	1040	1068	1059	1065	*	*	*	1058.0	1058.0
1300-1400	992	1089	1072	1072	*	*	*	1056.3	1056.3
1400-1500	**1091**	1051	1081	1190	*	*	*	1103.3	1103.3
1500-1600	975	1200	1287	1352	*	*	*	**1203.5**	**1203.5**
1600-1700	886	**1260**	**1303**	**1352**	*	*	*	1200.3	1200.3
1700-1800	676	1118	1121	1135	*	*	*	1012.5	1012.5
1800-1900	533	762	725	755	*	*	*	693.8	693.8
1900-2000	428	572	567	590	*	*	*	539.3	539.3
2000-2100	284	318	287	300	*	*	*	297.3	297.3
2100-2200	153	143	140	173	*	*	*	152.3	152.3
2200-2300	95	113	89	110	*	*	*	101.8	101.8
2300-2400	50	73	67	77	*	*	*	66.8	66.8
Totals									
0700-1900	9515	12130	11929	12359	*	*	*	11483.3	11483.3
0600-2200	10589	13774	13512	14016	*	*	*	12972.8	12972.8
0600-0000	10734	13960	13668	14203	*	*	*	13141.3	13141.3
0000-0000	10939	14436	14137	14699	*	*	*	13552.8	13552.8
AM Peak	1100	1100	1100	1100	*	*	*		
	1003	1079	951	981	*	*	*		
PM Peak	1400	1600	1600	1600	*	*	*		
	1091	1260	1303	1352	*	*	*		

*** - No data.**

1.2.3 NH 10 south of Base Hill Road

1.2.3.1 Saturday, September 21, 2019 to Sunday, September 22, 2019

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	16 Sep	17 Sep	18 Sep	19 Sep	20 Sep	21 Sep	22 Sep	1 - 5	1 - 7
Hour									
0000-0100	*	*	*	*	*	100	70	*	85.0
0100-0200	*	*	*	*	*	50	40	*	45.0
0200-0300	*	*	*	*	*	29	26	*	27.5
0300-0400	*	*	*	*	*	36	22	*	29.0
0400-0500	*	*	*	*	*	62	35	*	48.5
0500-0600	*	*	*	*	*	127	68	*	97.5
0600-0700	*	*	*	*	*	285	229	*	257.0
0700-0800	*	*	*	*	*	576	364	*	470.0
0800-0900	*	*	*	*	*	729	655	*	692.0
0900-1000	*	*	*	*	*	978	852	*	915.0
1000-1100	*	*	*	*	*	1093	959	*	1026.0
1100-1200	*	*	*	*	*	**1135**	**1056**	*	**1095.5**
1200-1300	*	*	*	*	*	**1114**	**1175**	*	**1144.5**
1300-1400	*	*	*	*	*	1076	1042	*	1059.0
1400-1500	*	*	*	*	*	1072	915	*	993.5
1500-1600	*	*	*	*	*	1030	898	*	964.0
1600-1700	*	*	*	*	*	928	890	*	909.0
1700-1800	*	*	*	*	*	872	775	*	823.5
1800-1900	*	*	*	*	*	729	603	*	666.0
1900-2000	*	*	*	*	*	599	470	*	534.5
2000-2100	*	*	*	*	*	606	269	*	437.5
2100-2200	*	*	*	*	*	334	152	*	243.0
2200-2300	*	*	*	*	*	200	103	*	151.5
2300-2400	*	*	*	*	*	136	60	*	98.0
Totals									
0700-1900	*	*	*	*	*	11332	10184	*	10758.0
0600-2200	*	*	*	*	*	13156	11304	*	12230.0
0600-0000	*	*	*	*	*	13492	11467	*	12479.5
0000-0000	*	*	*	*	*	13896	11728	*	12812.0
AM Peak	*	*	*	*	*	1100	1100		
	*	*	*	*	*	1135	1056		
PM Peak	*	*	*	*	*	1200	1200		
	*	*	*	*	*	1114	1175		

*** - No data.**

1.2.3.2 Monday, September 23, 2019 to Thursday, September 26, 2019

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	23 Sep	24 Sep	25 Sep	26 Sep	27 Sep	28 Sep	29 Sep	1 - 5	1 - 7
Hour									
0000-0100	32	56	59	54	*	*	*	50.3	50.3
0100-0200	19	25	46	31	*	*	*	30.3	30.3
0200-0300	32	28	37	34	*	*	*	32.8	32.8
0300-0400	39	43	37	34	*	*	*	38.3	38.3
0400-0500	112	130	118	118	*	*	*	119.5	119.5
0500-0600	423	367	388	364	*	*	*	385.5	385.5
0600-0700	761	742	774	741	*	*	*	754.5	754.5
0700-0800	1032	**1120**	**1124**	**1167**	*	*	*	**1110.8**	**1110.8**
0800-0900	**1032**	1038	1048	1102	*	*	*	1055.0	1055.0
0900-1000	796	814	812	832	*	*	*	813.5	813.5
1000-1100	810	796	733	865	*	*	*	801.0	801.0
1100-1200	832	779	834	859	*	*	*	826.0	826.0
1200-1300	848	899	837	895	*	*	*	869.8	869.8
1300-1400	900	919	932	970	*	*	*	930.3	930.3
1400-1500	964	974	996	1026	*	*	*	990.0	990.0
1500-1600	1136	1203	1177	1218	*	*	*	1183.5	1183.5
1600-1700	**1207**	**1279**	**1299**	**1308**	*	*	*	**1273.3**	**1273.3**
1700-1800	1167	1253	1139	1232	*	*	*	1197.8	1197.8
1800-1900	711	766	812	736	*	*	*	756.3	756.3
1900-2000	467	526	520	470	*	*	*	495.8	495.8
2000-2100	315	337	347	327	*	*	*	331.5	331.5
2100-2200	200	205	210	265	*	*	*	220.0	220.0
2200-2300	125	138	130	118	*	*	*	127.8	127.8
2300-2400	71	71	81	89	*	*	*	78.0	78.0
Totals									
0700-1900	11435	11840	11743	12210	*	*	*	11807.0	11807.0
0600-2200	13178	13650	13594	14013	*	*	*	13608.8	13608.8
0600-0000	13374	13859	13805	14220	*	*	*	13814.5	13814.5
0000-0000	14031	14508	14490	14855	*	*	*	14471.0	14471.0
AM Peak	0800	0700	0700	0700	*	*	*		
	1032	1120	1124	1167	*	*	*		
PM Peak	1600	1600	1600	1600	*	*	*		
	1207	1279	1299	1308	*	*	*		

*** - No data.**

1.2.4 Sawyers Crossing east of NH 10

1.2.4.1 Wednesday, August 19, 2020 to Sunday, August 23, 2020

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	17 Aug	18 Aug	19 Aug	20 Aug	21 Aug	22 Aug	23 Aug	1 - 5	1 - 7
Hour									
0000-0100	*	*	2	0	0	0	1	0.7	0.6
0100-0200	*	*	0	1	0	0	1	0.3	0.4
0200-0300	*	*	0	0	0	3	1	0.0	0.8
0300-0400	*	*	2	1	0	0	0	1.0	0.6
0400-0500	*	*	3	6	2	1	1	3.7	2.6
0500-0600	*	*	3	0	1	3	1	1.3	1.6
0600-0700	*	*	11	10	7	2	6	9.3	7.2
0700-0800	*	*	18	12	19	10	3	16.3	12.4
0800-0900	*	*	13	11	17	12	17	13.7	14.0
0900-1000	*	*	15	20	9	30	20	14.7	18.8
1000-1100	*	*	20	21	14	28	**29**	18.3	22.4
1100-1200	*	*	**24**	**28**	**28**	**35**	21	**26.7**	**27.2**
1200-1300	*	*	28	24	13	37	8	21.7	22.0
1300-1400	*	*	26	21	**40**	37	**25**	29.0	**29.8**
1400-1500	*	*	**35**	25	23	**48**	16	27.7	29.4
1500-1600	*	*	18	**33**	28	42	15	26.3	27.2
1600-1700	*	*	32	29	34	29	23	**31.7**	29.4
1700-1800	*	*	18	17	26	19	15	20.3	19.0
1800-1900	*	*	17	12	23	22	21	17.3	19.0
1900-2000	*	*	11	17	11	18	16	13.0	14.6
2000-2100	*	*	9	5	13	26	3	9.0	11.2
2100-2200	*	*	5	13	0	11	1	6.0	6.0
2200-2300	*	*	7	0	1	4	4	2.7	3.2
2300-2400	*	*	1	1	2	7	1	1.3	2.4
Totals									
0700-1900	*	*	264	253	274	349	213	263.7	270.6
0600-2200	*	*	300	298	305	406	239	301.0	309.6
0600-0000	*	*	308	299	308	417	244	305.0	315.2
0000-0000	*	*	318	307	311	424	249	312.0	321.8
AM Peak	*	*	1100	1100	1100	1100	1000		
	*	*	24	28	28	35	29		
PM Peak	*	*	1400	1500	1300	1400	1300		
	*	*	35	33	40	48	25		

*** - No data.**

1.2.5 NH 10 south of West Street

1.2.5.1 Tuesday, August 25, 2020 to Sunday, August 30, 2020

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	24 Aug	25 Aug	26 Aug	27 Aug	28 Aug	29 Aug	30 Aug	1 - 5	1 - 7
Hour									
0000-0100	*	40	32	31	30	42	27	33.3	33.7
0100-0200	*	20	23	22	15	41	25	20.0	24.3
0200-0300	*	21	21	22	16	16	13	20.0	18.2
0300-0400	*	26	22	22	22	11	9	23.0	18.7
0400-0500	*	78	85	90	75	29	22	82.0	63.2
0500-0600	*	248	233	221	220	86	63	230.5	178.5
0600-0700	*	411	432	414	409	171	158	416.5	332.5
0700-0800	*	555	587	591	554	254	250	571.8	465.2
0800-0900	*	570	577	500	508	372	356	538.8	480.5
0900-1000	*	580	572	541	588	573	570	570.3	570.7
1000-1100	*	586	594	600	641	709	709	605.3	639.8
1100-1200	*	**651**	**647**	**614**	**784**	**837**	**765**	**674.0**	**716.3**
1200-1300	*	649	725	736	790	**815**	**874**	725.0	764.8
1300-1400	*	671	710	662	779	814	855	705.5	748.5
1400-1500	*	682	684	669	855	749	799	722.5	739.7
1500-1600	*	793	869	768	**891**	644	754	830.3	786.5
1600-1700	*	**886**	**908**	**858**	882	652	665	**883.5**	**808.5**
1700-1800	*	836	780	769	832	581	635	804.3	738.8
1800-1900	*	446	500	534	631	507	623	527.8	540.2
1900-2000	*	392	357	417	480	357	360	411.5	393.8
2000-2100	*	267	254	236	294	236	276	262.8	260.5
2100-2200	*	123	134	132	198	177	133	146.8	149.5
2200-2300	*	93	93	87	144	96	69	104.3	97.0
2300-2400	*	53	52	55	87	58	51	61.8	59.3
Totals									
0700-1900	*	7905	8153	7842	8735	7507	7855	8158.8	7999.5
0600-2200	*	9098	9330	9041	10116	8448	8782	9396.3	9135.8
0600-0000	*	9244	9475	9183	10347	8602	8902	9562.3	9292.2
0000-0000	*	9677	9891	9591	10725	8827	9061	9971.0	9628.7
AM Peak	*	1100	1100	1100	1100	1100	1100		
	*	651	647	614	784	837	765		
PM Peak	*	1600	1600	1600	1500	1200	1200		
	*	886	908	858	891	815	874		

*** - No data.**

1.2.6 NH 10 at Winchester line

1.2.6.1 Wednesday, July 14, 2021 to Sunday, July 18, 2021

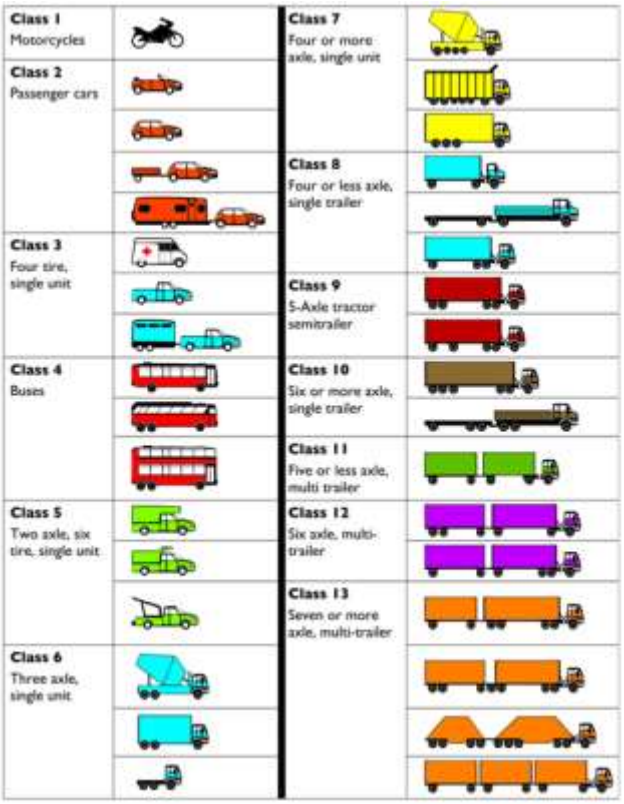
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	12 Jul	13 Jul	14 Jul	15 Jul	16 Jul	17 Jul	18 Jul	1 - 5	1 - 7
Hour									
0000-0100	*	*	33	37	32	51	33	34.0	37.2
0100-0200	*	*	21	16	24	28	25	20.3	22.8
0200-0300	*	*	10	14	18	23	21	14.0	17.2
0300-0400	*	*	26	20	15	15	12	20.3	17.6
0400-0500	*	*	63	65	65	31	16	64.3	48.0
0500-0600	*	*	180	182	171	51	34	177.7	123.6
0600-0700	*	*	322	346	339	130	63	335.7	240.0
0700-0800	*	*	**468**	478	426	262	131	457.3	353.0
0800-0900	*	*	414	417	427	339	265	419.3	372.4
0900-1000	*	*	395	389	457	447	374	413.7	412.4
1000-1100	*	*	408	486	501	573	474	465.0	488.4
1100-1200	*	*	452	**492**	**513**	**635**	**556**	**485.7**	**529.6**
1200-1300	*	*	506	490	551	**663**	**601**	515.7	562.2
1300-1400	*	*	493	518	549	612	593	520.0	553.0
1400-1500	*	*	557	575	621	594	592	584.3	587.8
1500-1600	*	*	632	611	713	564	588	652.0	621.6
1600-1700	*	*	**686**	**689**	**715**	576	501	**696.7**	**633.4**
1700-1800	*	*	606	615	640	497	412	620.3	554.0
1800-1900	*	*	379	407	521	409	291	435.7	401.4
1900-2000	*	*	256	356	392	326	228	334.7	311.6
2000-2100	*	*	202	245	285	224	193	244.0	229.8
2100-2200	*	*	133	171	219	167	122	174.3	162.4
2200-2300	*	*	83	95	122	98	98	100.0	99.2
2300-2400	*	*	40	54	79	65	60	57.7	59.6
Totals									
0700-1900	*	*	5996	6167	6634	6171	5378	6265.7	6069.2
0600-2200	*	*	6909	7285	7869	7018	5984	7354.3	7013.0
0600-0000	*	*	7032	7434	8070	7181	6142	7512.0	7171.8
0000-0000	*	*	7365	7768	8395	7380	6283	7842.7	7438.2
AM Peak	*	*	0700	1100	1100	1100	1100		
	*	*	468	492	513	635	556		
PM Peak	*	*	1600	1600	1600	1200	1200		
	*	*	686	689	715	663	601		

*** - No data.**

1.3 Classification Study Results

Vehicle types or classifications throughout the corridor were identified based on a 13-member scheme, further aggregated into "light-duty" (classes 1-3), "medium-duty" (classes 4-7), or "heavy-duty" (classes 8-13) categories for ease of analysis. For a breakdown of the 13 classes, see Figure 1 below.

Figure 4 - Federal Highway Administration Vehicle Classifications[2]



Source: Federal Highway Administration

Results show that NH 10 medium duty and heavy duty traffic volumes vary from between 622 and 724 trucks a day from the Keene line to the intersection of West Street.

Table 3 - Comparison of Traffic Volume by Classification

	Average Weekday Volume	Light Duty	%	Medium Duty	%	Heavy Duty	%
Base Hill Road at Keene line	2,924	2,836	97.0%	77	2.6%	11	0.4%
NH 10 at Keene line	13,553	12,930	95.4%	414	3.1%	208	1.5%
NH 10 south of Base Hill Road	14,471	13,709	94.7%	622	4.3%	140	1.0%
Sawyers Crossing east of NH 10	312	301	96.5%	10	3.2%	1	0.3%
NH 10 south of West Street	9,971	9,248	92.7%	503	5.0%	221	2.2%

[2] https://www.fhwa.dot.gov/policyinformation/tmguide/tmg_2013/vehicle-types.cfm

NH 10 at Winchester line	7,843	7,221	92.1%	440	5.6%	182	2.3%

Source: SWRPC

1.3.1 Base Hill Road at Keene line

1.3.1.1 Wednesday, August 19, 2020 to Sunday, August 23, 2020

1.3.1.1.1 Light-duty (1), Medium-duty(2), Heavy-duty(3) Statistics

	1	2	3	Total
Wed	2692	69	15	2776
(%)	97.0	2.5	0.5	
Thu	2826	83	9	2918
(%)	96.8	2.8	0.3	
Fri	2991	79	9	3079
(%)	97.1	2.6	0.3	
Sat	2678	58	9	2745
(%)	97.6	2.1	0.3	
Sun	2416	51	9	2476
(%)	97.6	2.1	0.4	

Average daily volume

Weekdays				
	2836	77	11	2924
(%)	97.0	2.6	0.4	
Weekend				
	2547	55	9	2611
(%)	97.6	2.1	0.3	

1.3.1.1.2 Detailed Classification Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Wed	35	1972	685	4	64	1	0	14	0	1	0	0	0	2776
(%)	1.3	71.0	24.7	0.1	2.3	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	
Thu	29	2076	721	2	79	1	1	9	0	0	0	0	0	2918
(%)	1.0	71.1	24.7	0.1	2.7	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Fri	56	2195	740	0	77	2	0	8	1	0	0	0	0	3079
(%)	1.8	71.3	24.0	0.0	2.5	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Sat	38	2015	625	0	58	0	0	9	0	0	0	0	0	2745
(%)	1.4	73.4	22.8	0.0	2.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Sun	46	1824	546	1	50	0	0	8	1	0	0	0	0	2476
(%)	1.9	73.7	22.1	0.0	2.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week														
	41	2016	663	1	66	1	0	10	0	0	0	0	0	2799
(%)	1.5	72.0	23.7	0.1	2.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Weekdays														
	40	2081	715	2	73	1	0	10	0	0	0	0	0	2924
(%)	1.4	71.2	24.5	0.1	2.5	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	
Weekend														
	42	1920	586	1	54	0	0	9	1	0	0	0	0	2611
(%)	1.6	73.5	22.4	0.0	2.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	

1.3.2 NH 10 at Keene line

1.3.2.1 Saturday, September 5, 2020 to Thursday, September 10

1.3.2.1.1 Light-duty (1), Medium-duty(2), Heavy-duty(3) Statistics

	1	2	3	Total
Sat	13453	169	120	13742
(%)	97.9	1.2	0.9	
Sun	11028	109	95	11232
(%)	98.2	1.0	0.8	
Mon	10658	153	128	10939
(%)	97.4	1.4	1.2	
Tue	13648	534	254	14436
(%)	94.5	3.7	1.8	
Wed	13484	455	198	14137
(%)	95.4	3.2	1.4	
Thu	13931	515	253	14699
(%)	94.8	3.5	1.7	

Average daily volume

Weekdays				
	12930	414	208	13553
(%)	95.4	3.1	1.5	
Weekend				
	12241	139	108	12487
(%)	98.0	1.1	0.9	

1.3.2.1.2 Detailed Classification Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Sat	215	10614	2624	20	131	17	1	77	34	7	0	0	2	13742
(%)	1.6	77.2	19.1	0.1	1.0	0.1	0.0	0.6	0.2	0.1	0.0	0.0	0.0	
Sun	233	8724	2071	4	97	8	0	76	13	3	0	0	3	11232
(%)	2.1	77.7	18.4	0.0	0.9	0.1	0.0	0.7	0.1	0.0	0.0	0.0	0.0	
Mon	225	8533	1900	13	126	13	1	88	35	5	0	0	0	10939
(%)	2.1	78.0	17.4	0.1	1.2	0.1	0.0	0.8	0.3	0.0	0.0	0.0	0.0	
Tue	139	10628	2881	52	314	136	32	80	129	41	1	0	3	14436
(%)	1.0	73.6	20.0	0.4	2.2	0.9	0.2	0.6	0.9	0.3	0.0	0.0	0.0	
Wed	135	10416	2933	70	285	90	10	70	95	30	1	0	2	14137
(%)	1.0	73.7	20.7	0.5	2.0	0.6	0.1	0.5	0.7	0.2	0.0	0.0	0.0	
Thu	31	10795	3105	115	305	84	11	117	104	32	0	0	0	14699
(%)	0.2	73.4	21.1	0.8	2.1	0.6	0.1	0.8	0.7	0.2	0.0	0.0	0.0	

Average daily volume

Entire week														
	133	10093	2705	63	258	81	14	89	91	27	1	0	1	13553
(%)	1.0	74.5	20.0	0.5	1.9	0.6	0.1	0.7	0.7	0.2	0.0	0.0	0.0	
Weekdays														
	133	10093	2705	63	258	81	14	89	91	27	1	0	1	13553
(%)	1.0	74.5	20.0	0.5	1.9	0.6	0.1	0.7	0.7	0.2	0.0	0.0	0.0	
Weekend														
	224	9669	2348	12	114	13	1	77	24	5	0	0	3	12487
(%)	1.8	77.4	18.8	0.1	0.9	0.1	0.0	0.6	0.2	0.0	0.0	0.0	0.0	

1.3.3 NH 10 south of Base Hill Road

1.3.3.1 Saturday, September 21, 2019 to Sunday, September 22, 2019

1.3.3.1.1 Light-duty (1), Medium-duty(2), Heavy-duty(3) Statistics

	1	2	3	Total
Sat	13340	414	142	13896
(%)	96.0	3.0	1.0	
Sun	11396	205	127	11728
(%)	97.2	1.7	1.1	
Mon	13375	558	98	14031
(%)	95.3	4.0	0.7	
Tue	13797	554	157	14508
(%)	95.1	3.8	1.1	
Wed	13721	631	138	14490
(%)	94.7	4.4	1.0	
Thu	13943	744	168	14855
(%)	93.9	5.0	1.1	

Average daily volume

Weekdays				
	13709	622	140	14471
(%)	94.7	4.3	1.0	
Weekend				
	12368	310	135	12812
(%)	96.5	2.4	1.0	

1.3.3.1.2 Detailed Classification Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Sat	244	10315	2781	45	338	28	3	113	19	7	0	0	3	13896
(%)	1.8	74.2	20.0	0.3	2.4	0.2	0.0	0.8	0.1	0.1	0.0	0.0	0.0	
Sun	359	9011	2026	7	176	22	0	99	21	2	0	0	5	11728
(%)	3.1	76.8	17.3	0.1	1.5	0.2	0.0	0.8	0.2	0.0	0.0	0.0	0.0	
Mon	113	10834	2428	124	349	80	5	39	47	11	1	0	0	14031
(%)	0.8	77.2	17.3	0.9	2.5	0.6	0.0	0.3	0.3	0.1	0.0	0.0	0.0	
Tue	62	11066	2669	119	303	123	9	52	77	23	3	0	2	14508
(%)	0.4	76.3	18.4	0.8	2.1	0.8	0.1	0.4	0.5	0.2	0.0	0.0	0.0	
Wed	104	11092	2525	137	329	134	31	53	65	16	0	0	4	14490
(%)	0.7	76.5	17.4	0.9	2.3	0.9	0.2	0.4	0.4	0.1	0.0	0.0	0.0	
Thu	24	11239	2680	133	465	129	17	76	72	19	0	0	1	14855
(%)	0.2	75.7	18.0	0.9	3.1	0.9	0.1	0.5	0.5	0.1	0.0	0.0	0.0	

Average daily volume

Weekdays

	76	11058	2576	128	362	117	16	55	65	17	1	0	2	14471
(%)	0.5	76.4	17.8	0.9	2.5	0.8	0.1	0.4	0.5	0.1	0.0	0.0	0.0	

Weekend

	302	9663	2404	26	257	25	2	106	20	5	0	0	4	12812
(%)	2.4	75.4	18.8	0.2	2.0	0.2	0.0	0.8	0.2	0.0	0.0	0.0	0.0	

1.3.4 Sawyers Crossing east of NH 10

1.3.4.1.1 Light-duty (1), Medium-duty(2), Heavy-duty(3) Statistics

Monday, August 17, 2020

	1	2	3	Total
Mon*	0	0	0	0
(%)	0.0	0.0	0.0	
Tue*	0	0	0	0
(%)	0.0	0.0	0.0	
Wed	309	9	0	318
(%)	97.2	2.8	0.0	
Thu	291	15	1	307
(%)	94.8	4.9	0.3	
Fri	304	6	1	311
(%)	97.7	1.9	0.3	
Sat	406	17	1	424
(%)	95.8	4.0	0.2	
Sun	241	7	1	249
(%)	96.8	2.8	0.4	

Average daily volume

Weekdays				
	301	10	1	312
(%)	96.6	3.2	0.2	
Weekend				
	324	12	1	337
(%)	96.1	3.6	0.3	

*** - Incomplete**

1.3.4.1.2 Detailed Classification Statistics

Monday, August 17, 2020

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed	15	211	83	0	9	0	0	0	0	0	0	0	0	318
(%)	4.7	66.4	26.1	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu	9	197	85	1	13	1	0	1	0	0	0	0	0	307
(%)	2.9	64.2	27.7	0.3	4.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Fri	20	201	83	1	5	0	0	1	0	0	0	0	0	311
(%)	6.4	64.6	26.7	0.3	1.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Sat	16	285	105	0	17	0	0	1	0	0	0	0	0	424
(%)	3.8	67.2	24.8	0.0	4.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	
Sun	14	172	55	0	7	0	0	1	0	0	0	0	0	249
(%)	5.6	69.1	22.1	0.0	2.8	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week														
	15	213	82	0	10	0	0	1	0	0	0	0	0	322
(%)	4.6	66.3	25.5	0.1	3.2	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	
Weekdays														
	15	203	84	1	9	0	0	1	0	0	0	0	0	312
(%)	4.7	65.1	26.8	0.2	2.9	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	
Weekend														
	15	229	80	0	12	0	0	1	0	0	0	0	0	337
(%)	4.5	67.9	23.8	0.0	3.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

1.3.5 NH 10 south of West Street

1.3.5.1.1 Light-duty (1), Medium-duty(2), Heavy-duty(3) Statistics

Monday, August 24, 2020

	1	2	3	Total
Mon*	0	0	0	0
(%)	0.0	0.0	0.0	
Tue	8966	486	225	9677
(%)	92.7	5.0	2.3	
Wed	9151	514	226	9891
(%)	92.5	5.2	2.3	
Thu	8864	504	223	9591
(%)	92.4	5.3	2.3	
Fri	10009	507	209	10725
(%)	93.3	4.7	1.9	
Sat	8471	283	73	8827
(%)	96.0	3.2	0.8	
Sun	8680	266	115	9061
(%)	95.8	2.9	1.3	

Average daily volume

Weekdays				
	9248	503	221	9971
(%)	92.7	5.0	2.2	
Weekend				
	8576	275	94	8944
(%)	95.9	3.1	1.1	

*** - Incomplete**

1.3.5.1.2 Detailed Classification Statistics

Monday, August 24, 2020

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue	69	6786	2111	40	285	88	73	68	105	52	0	0	0	9677
(%)	0.7	70.1	21.8	0.4	2.9	0.9	0.8	0.7	1.1	0.5	0.0	0.0	0.0	
Wed	135	6866	2150	40	297	99	78	71	89	66	0	0	0	9891
(%)	1.4	69.4	21.7	0.4	3.0	1.0	0.8	0.7	0.9	0.7	0.0	0.0	0.0	
Thu	26	6608	2230	44	330	72	58	80	99	44	0	0	0	9591
(%)	0.3	68.9	23.3	0.5	3.4	0.8	0.6	0.8	1.0	0.5	0.0	0.0	0.0	
Fri	147	7576	2286	50	338	78	41	87	79	42	1	0	0	10725
(%)	1.4	70.6	21.3	0.5	3.2	0.7	0.4	0.8	0.7	0.4	0.0	0.0	0.0	
Sat	16	6426	2029	15	259	9	0	40	28	5	0	0	0	8827
(%)	0.2	72.8	23.0	0.2	2.9	0.1	0.0	0.5	0.3	0.1	0.0	0.0	0.0	
Sun	263	6496	1921	8	255	3	0	92	16	6	0	0	1	9061
(%)	2.9	71.7	21.2	0.1	2.8	0.0	0.0	1.0	0.2	0.1	0.0	0.0	0.0	

Average daily volume

Entire week														
	109	6793	2121	33	294	58	42	73	69	36	0	0	0	9629
(%)	1.1	70.5	22.0	0.3	3.1	0.6	0.4	0.8	0.7	0.4	0.0	0.0	0.0	
Weekdays														
	94	6959	2194	44	313	84	63	77	93	51	0	0	0	9971
(%)	0.9	69.8	22.0	0.4	3.1	0.8	0.6	0.8	0.9	0.5	0.0	0.0	0.0	
Weekend														
	140	6461	1975	12	257	6	0	66	22	6	0	0	1	8944
(%)	1.6	72.2	22.1	0.1	2.9	0.1	0.0	0.7	0.2	0.1	0.0	0.0	0.0	

*** - Incomplete**

1.3.6 NH 10 at Winchester line

1.3.6.1.1 Light-duty (1), Medium-duty(2), Heavy-duty(3) Statistics

Monday, July 12, 2021

	1	2	3	Total
Mon*	0	0	0	0
(%)	0.0	0.0	0.0	
Tue*	0	0	0	0
(%)	0.0	0.0	0.0	
Wed	6760	442	163	7365
(%)	91.8	6.0	2.2	
Thu	7170	428	170	7768
(%)	92.3	5.5	2.2	
Fri	7733	449	213	8395
(%)	92.1	5.3	2.5	
Sat	7036	250	94	7380
(%)	95.3	3.4	1.3	
Sun	6010	209	64	6283
(%)	95.7	3.3	1.0	

Average daily volume

Entire week				
	6942	356	141	7438
(%)	93.3	4.8	1.9	
Weekdays				
	7221	440	182	7843
(%)	92.1	5.6	2.3	
Weekend				
	6523	230	79	6832
(%)	95.5	3.4	1.2	

*** - Incomplete**

1.3.6.1.2 Detailed Classification Statistics

Monday, July 12, 2021

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed	32	5013	1715	48	305	68	21	78	67	16	0	0	2	7365
(%)	0.4	68.1	23.3	0.7	4.1	0.9	0.3	1.1	0.9	0.2	0.0	0.0	0.0	
Thu	121	5285	1764	51	274	76	27	90	59	14	2	0	5	7768
(%)	1.6	68.0	22.7	0.7	3.5	1.0	0.3	1.2	0.8	0.2	0.0	0.0	0.1	
Fri	123	5643	1967	47	315	70	17	103	75	31	0	0	4	8395
(%)	1.5	67.2	23.4	0.6	3.8	0.8	0.2	1.2	0.9	0.4	0.0	0.0	0.0	
Sat	101	5357	1578	18	218	12	2	69	21	3	0	0	1	7380
(%)	1.4	72.6	21.4	0.2	3.0	0.2	0.0	0.9	0.3	0.0	0.0	0.0	0.0	
Sun	16	4580	1414	2	201	6	0	59	4	1	0	0	0	6283
(%)	0.3	72.9	22.5	0.0	3.2	0.1	0.0	0.9	0.1	0.0	0.0	0.0	0.0	

Average daily volume

Entire week														
	79	5176	1688	33	263	46	13	80	45	13	0	0	2	7438
(%)	1.1	69.6	22.7	0.4	3.5	0.6	0.2	1.1	0.6	0.2	0.0	0.0	0.0	
Weekdays														
	92	5314	1815	49	298	71	22	90	67	20	1	0	4	7843
(%)	1.2	67.8	23.1	0.6	3.8	0.9	0.3	1.2	0.9	0.3	0.0	0.0	0.0	
Weekend														
	59	4969	1496	10	210	9	1	64	13	2	0	0	1	6832
(%)	0.9	72.7	21.9	0.1	3.1	0.1	0.0	0.9	0.2	0.0	0.0	0.0	0.0	

*** - Incomplete**

1.4 Speed Study Results

An analysis of operating speeds along the corridor shows that most drivers exceeded the posted speed limit at all locations in which speed studies were conducted. In the case of Base Hill Road at the Keene line and NH 10 at the Winchester line, over 90% of drivers were found to be exceeding the posted speed limit. Prevailing operating speeds (or the 85th percentile speed of vehicles in the study) were found to exceed the posted speed limits by over 10 mph in those two locations as well.

Table 4 - Comparison of Posted and Operating Speeds by Location and Direction of Travel

	Posted Speed Limit	85th Percentile (mph)	Vehicles Exceeding Posted Speed Limit
Base Hill Road at Keene line	30 mph	41.8	95.0%
Northbound Only		41.4	94.9%
Southbound Only		42.3	95.2%
NH 10 at Keene line	30 mph	36.7	73.4%
Northbound Only		37.5	82.6%
Southbound Only		35.8	64.8%
NH 10 south of Base Hill Road	40 mph	47.9	60.5%
Northbound Only		47.4	55.2%
Southbound Only		48.3	65.4%
Sawyers Crossing east of NH 10	30 mph	39.0	72.1%
Westbound Only		39.0	71.2%
Eastbound Only		39.1	73.4%
NH 10 south of West Street	40 mph	49.5	86.6%
Northbound Only		49.5	86.0%
Southbound Only		49.5	87.3%
NH 10 at Winchester line	50 mph	56.4	66.1%
Northbound Only		56.2	64.8%
Southbound Only		56.6	67.4%

Each following report provides all speed statistics grouped by hour of day.

1.4.1 Base Hill Road at Keene line

1.4.1.1 Speed Statistics by Hour

1.4.1.1.1 Both Directions of Travel

Vehicles = 11161
Posted speed limit = 30 mph, Exceeding = 10605 (95.02%), Mean Exceeding = 37.82 mph
Maximum = 71.1 mph, **Minimum** = 9.2 mph, **Mean** = 37.2 mph
85% Speed = 41.83 mph, **95% Speed** = 45.19 mph, **Median** = 37.13 mph
10 mph Pace = 32 - 42, **Number in Pace** = 8307 (74.43%)
Variance = 24.01, **Standard Deviation** = 4.90 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	30 0.269%	30.9	57.8	39.3	38.9	44.8	52.9	30 100.0%
0100	25 0.224%	22.8	47.3	37.3	36.8	41.8	46.7	24 96.00%
0200	31 0.278%	19.8	43.9	36.2	36.9	41.5	43.4	28 90.32%
0300	36 0.323%	28.8	54.1	37.7	37.7	42.7	49.1	33 91.67%
0400	54 0.484%	29.0	48.3	38.5	38.1	43.8	47.1	53 98.15%
0500	156 1.398%	18.0	61.6	37.4	36.6	43.0	47.1	148 94.87%
0600	385 3.450%	13.0	71.1	38.0	38.3	42.7	46.1	368 95.58%
0700	535 4.793%	9.2	65.0	37.7	37.6	42.1	45.1	520 97.20%
0800	585 5.241%	16.9	65.6	37.7	37.6	42.2	45.1	565 96.58%
0900	704 6.308%	11.0	52.5	36.9	36.7	41.3	44.6	671 95.31%
1000	774 6.935%	13.6	53.6	37.1	37.0	41.6	44.8	741 95.74%
1100	813 7.284%	14.9	57.6	37.0	36.9	41.6	45.4	764 93.97%
1200	888 7.956%	10.0	59.1	37.5	37.4	42.2	46.2	840 94.59%
1300	902 8.082%	11.1	51.2	36.6	36.8	40.9	43.8	843 93.46%
1400	909 8.144%	12.9	51.5	36.6	36.6	41.4	44.4	851 93.62%
1500	921 8.252%	11.3	53.4	37.0	37.1	41.2	44.9	872 94.68%
1600	868 7.777%	12.7	50.9	37.6	37.5	41.9	45.2	841 96.89%
1700	796 7.132%	14.2	61.6	38.0	37.7	42.7	46.2	768 96.48%
1800	560 5.017%	18.2	61.1	37.7	37.5	42.6	46.3	535 95.54%
1900	440 3.942%	12.4	53.8	37.2	36.9	42.3	45.1	416 94.55%
2000	341 3.055%	17.4	67.2	36.2	36.1	40.9	44.7	308 90.32%
2100	207 1.855%	25.7	48.9	36.9	36.8	41.4	45.8	196 94.69%
2200	138 1.236%	26.8	46.7	36.5	36.2	41.1	45.2	129 93.48%
2300	63 0.564%	26.1	63.7	38.4	37.8	43.5	50.1	61 96.83%
----	**11161 100.0%**	**9.2**	**71.1**	**37.2**	**37.1**	**41.8**	**45.2**	**10605 95.02%**

1.4.1.1.2 Northbound Only

Vehicles = 5930
Posted speed limit = 30 mph, Exceeding = 5626 (94.87%), Mean Exceeding = 37.56 mph
Maximum = 71.1 mph, **Minimum** = 11.1 mph, **Mean** = 37.0 mph
85% Speed = 41.38 mph, **95% Speed** = 44.52 mph, **Median** = 36.91 mph
10 mph Pace = 32 - 42, **Number in Pace** = 4530 (76.39%)
Variance = 22.39, **Standard Deviation** = 4.73 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	14 0.236%	31.5	47.2	39.3	38.9	43.8	47.2	14 100.0%
0100	16 0.270%	33.5	47.3	37.8	37.0	41.7	47.3	16 100.0%
0200	21 0.354%	25.1	43.9	37.4	39.0	42.0	43.9	20 95.24%
0300	30 0.506%	28.8	54.1	38.0	38.6	42.7	50.9	27 90.00%
0400	39 0.658%	29.0	47.1	38.1	37.9	42.6	45.6	38 97.44%
0500	106 1.788%	18.0	52.0	37.2	36.8	42.9	45.4	100 94.34%
0600	238 4.013%	24.3	71.1	38.1	37.9	42.5	44.9	231 97.06%
0700	338 5.700%	13.6	65.0	37.7	37.4	41.6	45.1	332 98.22%
0800	337 5.683%	16.9	51.1	37.4	37.6	41.8	44.9	321 95.25%
0900	425 7.167%	15.7	51.8	36.6	36.4	40.8	44.2	401 94.35%
1000	431 7.268%	13.6	53.6	36.6	36.6	40.8	43.4	411 95.36%
1100	448 7.555%	15.6	49.2	36.6	36.5	41.3	44.9	418 93.30%
1200	484 8.162%	17.5	59.1	37.4	37.2	41.6	45.3	461 95.25%
1300	464 7.825%	11.1	50.1	36.2	36.6	40.5	43.3	430 92.67%
1400	460 7.757%	12.9	48.5	36.2	36.4	40.9	43.7	426 92.61%
1500	462 7.791%	18.7	51.4	36.8	36.8	41.2	44.2	437 94.59%
1600	411 6.931%	18.0	50.9	37.0	36.9	41.1	43.6	396 96.35%
1700	390 6.577%	16.9	61.6	37.7	37.6	42.2	45.5	374 95.90%
1800	264 4.452%	18.2	54.7	37.4	37.3	42.1	46.5	253 95.83%
1900	210 3.541%	18.2	53.4	36.9	36.4	41.5	45.7	196 93.33%
2000	158 2.664%	21.0	58.5	36.4	36.2	41.0	44.5	145 91.77%
2100	88 1.484%	29.1	48.9	37.1	37.1	41.6	45.7	86 97.73%
2200	70 1.180%	27.8	46.7	37.0	36.6	42.3	45.4	68 97.14%
2300	26 0.438%	28.8	49.6	37.5	37.2	42.6	48.7	25 96.15%
----	**5930 100.0%**	**11.1**	**71.1**	**37.0**	**36.9**	**41.4**	**44.5**	**5626 94.87%**

1.4.1.1.3 Southbound Only

Vehicles = 5231
Posted speed limit = 30 mph, Exceeding = 4979 (95.18%), Mean Exceeding = 38.11 mph
Maximum = 67.2 mph, **Minimum** = 9.2 mph, **Mean** = 37.5 mph
85% Speed = 42.28 mph, **95% Speed** = 45.86 mph, **Median** = 37.47 mph
10 mph Pace = 32 - 42, **Number in Pace** = 3800 (72.64%)
Variance = 25.67, **Standard Deviation** = 5.07 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	16 0.306%	30.9	57.8	39.4	38.6	46.9	57.8	16 100.0%
0100	9 0.172%	22.8	45.4	36.3	36.8	44.0	45.4	8 88.89%
0200	10 0.191%	19.8	39.9	33.6	36.1	38.4	39.9	8 80.00%
0300	6 0.115%	33.5	39.1	36.5	37.0	39.1	39.1	6 100.0%
0400	15 0.287%	31.3	48.3	39.8	39.8	47.1	48.3	15 100.0%
0500	50 0.956%	23.3	61.6	37.9	35.8	44.1	55.6	48 96.00%
0600	147 2.810%	13.0	54.2	37.8	38.4	43.4	46.7	137 93.20%
0700	197 3.766%	9.2	59.5	37.5	37.8	42.2	45.3	188 95.43%
0800	248 4.741%	22.8	65.6	38.0	37.5	42.6	45.4	244 98.39%
0900	279 5.334%	11.0	52.5	37.4	37.2	41.5	45.4	270 96.77%
1000	343 6.557%	17.0	49.5	37.7	37.7	42.2	46.1	330 96.21%
1100	365 6.978%	14.9	57.6	37.5	37.5	42.2	46.8	346 94.79%
1200	404 7.723%	10.0	55.0	37.7	37.6	43.2	46.8	379 93.81%
1300	438 8.373%	14.4	51.2	36.9	37.1	41.6	44.2	413 94.29%
1400	449 8.583%	23.7	51.5	37.1	37.1	41.6	45.4	425 94.65%
1500	459 8.775%	11.3	53.4	37.3	37.4	41.3	45.6	435 94.77%
1600	457 8.736%	12.7	50.9	38.2	38.3	42.9	45.6	445 97.37%
1700	406 7.761%	14.2	58.8	38.4	37.9	43.4	47.4	394 97.04%
1800	296 5.659%	20.6	61.1	38.0	37.7	42.9	46.3	282 95.27%
1900	230 4.397%	12.4	53.8	37.4	37.4	42.5	44.8	220 95.65%
2000	183 3.498%	17.4	67.2	36.1	36.1	40.9	45.1	163 89.07%
2100	119 2.275%	25.7	46.8	36.7	36.7	41.4	45.9	110 92.44%
2200	68 1.300%	26.8	46.1	36.0	35.9	40.4	45.6	61 89.71%
2300	37 0.707%	26.1	63.7	39.1	38.5	44.5	51.9	36 97.30%
----	**5231 100.0%**	**9.2**	**67.2**	**37.5**	**37.5**	**42.3**	**45.9**	**4979 95.18%**

1.4.2 NH 10 at Keene line

1.4.2.1 Speed Statistics by Hour

1.4.2.1.1 Both Directions of Travel

Vehicles = 32928
Posted speed limit = 30 mph, Exceeding = 24158 (73.37%), Mean Exceeding = 34.38 mph
Maximum = 98.0 mph, **Minimum** = 5.1 mph, **Mean** = 32.5 mph
85% Speed = 36.69 mph, **95% Speed** = 39.37 mph, **Median** = 32.55 mph
10 mph Pace = 28 - 38, **Number in Pace** = 25430 (77.23%)
Variance = 19.35, **Standard Deviation** = 4.40 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	200 0.607%	18.2	65.5	33.6	33.1	37.9	42.3	154 77.00%
0100	164 0.498%	16.7	48.1	33.4	33.3	38.6	42.2	130 79.27%
0200	115 0.349%	18.6	47.6	34.2	34.3	38.7	42.3	92 80.00%
0300	114 0.346%	21.4	48.7	35.4	35.2	40.3	44.8	97 85.09%
0400	305 0.926%	11.9	49.8	35.1	35.2	39.8	42.4	271 88.85%
0500	810 2.460%	15.3	98.0	34.2	34.1	38.3	40.9	692 85.43%
0600	1346 4.088%	18.9	47.6	33.5	33.7	37.7	40.2	1090 80.98%
0700	1777 5.397%	14.3	52.2	33.1	33.0	37.5	40.2	1386 78.00%
0800	1959 5.949%	10.0	47.4	32.5	32.5	36.9	39.4	1439 73.46%
0900	2084 6.329%	10.9	46.0	32.1	32.2	36.4	38.9	1467 70.39%
1000	2164 6.572%	5.1	60.0	31.7	31.8	35.9	38.3	1454 67.19%
1100	2196 6.669%	15.9	49.3	31.7	31.8	35.9	38.5	1483 67.53%
1200	2152 6.535%	8.7	62.8	32.0	32.0	36.0	38.8	1520 70.63%
1300	2203 6.690%	9.9	48.2	31.7	31.8	36.1	38.4	1489 67.59%
1400	2214 6.724%	9.7	53.1	31.8	32.0	36.1	38.9	1511 68.25%
1500	2101 6.381%	7.4	47.9	32.1	32.2	36.4	38.9	1464 69.68%
1600	2059 6.253%	5.4	49.4	32.2	32.4	36.4	38.6	1500 72.85%
1700	2130 6.469%	9.5	50.5	32.7	32.7	36.8	39.6	1625 76.29%
1800	2048 6.220%	15.4	50.1	32.7	32.8	36.8	39.3	1565 76.42%
1900	1735 5.269%	8.9	54.0	32.1	32.2	36.5	38.9	1241 71.53%
2000	1287 3.909%	11.4	49.1	32.9	32.9	36.9	39.4	1005 78.09%
2100	798 2.423%	17.9	57.3	33.8	33.6	38.1	41.2	671 84.09%
2200	573 1.740%	17.5	55.2	34.0	33.8	37.9	40.7	503 87.78%
2300	394 1.197%	16.8	52.9	33.0	33.1	37.2	40.8	309 78.43%
----	**32928 100.0%**	**5.1**	**98.0**	**32.5**	**32.5**	**36.7**	**39.4**	**24158 73.37%**

1.4.2.1.2 Northbound Only

Vehicles = 15810
Posted speed limit = 30 mph, Exceeding = 13066 (82.64%), Mean Exceeding = 34.78 mph
Maximum = 98.0 mph, **Minimum** = 5.1 mph, **Mean** = 33.4 mph
85% Speed = 37.47 mph, **95% Speed** = 40.15 mph, **Median** = 33.55 mph
10 mph Pace = 29 - 39, **Number in Pace** = 12650 (80.01%)
Variance = 18.89, **Standard Deviation** = 4.35 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	65 0.411%	18.2	65.5	35.4	34.8	39.9	47.5	53 81.54%
0100	69 0.436%	17.5	48.1	35.0	34.4	39.8	44.4	59 85.51%
0200	59 0.373%	26.0	46.6	35.1	34.7	40.4	42.4	49 83.05%
0300	60 0.380%	21.4	48.7	35.9	35.6	40.3	46.0	54 90.00%
0400	176 1.113%	11.9	49.8	36.1	36.0	40.2	43.4	166 94.32%
0500	401 2.536%	19.4	98.0	35.1	34.7	38.7	41.5	378 94.26%
0600	668 4.225%	21.1	47.6	34.7	34.8	38.4	41.0	599 89.67%
0700	873 5.522%	18.9	52.2	34.1	34.1	37.9	41.0	758 86.83%
0800	985 6.230%	12.8	47.4	33.5	33.7	37.6	40.1	799 81.12%
0900	1038 6.565%	16.9	46.0	33.1	33.1	37.1	39.7	833 80.25%
1000	1017 6.433%	5.1	60.0	32.7	32.9	36.7	38.9	789 77.58%
1100	1035 6.546%	15.9	46.2	32.7	32.8	36.6	38.9	814 78.65%
1200	1005 6.357%	8.7	62.8	33.1	33.1	36.9	39.5	833 82.89%
1300	1054 6.667%	10.5	48.2	32.8	33.0	36.9	39.3	841 79.79%
1400	1080 6.831%	9.7	53.1	32.9	33.1	37.0	39.7	867 80.28%
1500	1008 6.376%	7.4	47.9	33.1	33.3	37.1	39.9	801 79.46%
1600	986 6.237%	5.4	49.4	33.1	33.4	36.9	39.6	805 81.64%
1700	1042 6.591%	17.5	50.5	33.7	33.7	37.6	40.4	886 85.03%
1800	972 6.148%	15.4	50.1	33.6	33.6	37.5	39.9	825 84.88%
1900	839 5.307%	8.9	45.6	32.9	32.8	37.2	39.6	660 78.67%
2000	593 3.751%	16.6	49.1	33.5	33.7	37.4	40.1	491 82.80%
2100	366 2.315%	17.9	57.3	34.6	34.4	38.7	41.8	327 89.34%
2200	270 1.708%	17.5	55.2	34.9	34.7	39.0	41.7	247 91.48%
2300	149 0.942%	17.6	52.9	34.8	34.6	38.9	43.0	132 88.59%
----	**15810 100.0%**	**5.1**	**98.0**	**33.4**	**33.6**	**37.5**	**40.2**	**13066 82.64%**

1.4.2.1.3 Southbound Only

Vehicles = 17118
Posted speed limit = 30 mph, Exceeding = 11092 (64.80%), Mean Exceeding = 33.91 mph
Maximum = 64.2 mph, **Minimum** = 9.5 mph, **Mean** = 31.5 mph
85% Speed = 35.79 mph, **95% Speed** = 38.59 mph, **Median** = 31.54 mph
10 mph Pace = 27 - 37, **Number in Pace** = 13316 (77.79%)
Variance = 18.06, **Standard Deviation** = 4.25 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	135 0.789%	21.7	64.2	32.7	32.1	36.5	39.8	101 74.81%
0100	95 0.555%	16.7	47.8	32.3	32.7	36.9	39.2	71 74.74%
0200	56 0.327%	18.6	47.6	33.2	32.9	37.6	41.7	43 76.79%
0300	54 0.315%	22.5	45.3	34.8	33.9	40.7	44.2	43 79.63%
0400	129 0.754%	12.6	45.1	33.6	33.4	39.1	41.8	105 81.40%
0500	409 2.389%	15.3	45.6	33.2	33.1	37.7	40.3	314 76.77%
0600	678 3.961%	18.9	46.0	32.4	32.4	36.8	39.6	491 72.42%
0700	904 5.281%	14.3	46.7	32.2	32.1	36.8	39.5	628 69.47%
0800	974 5.690%	10.0	43.9	31.6	31.5	35.9	38.5	640 65.71%
0900	1046 6.111%	10.9	45.2	31.2	31.3	35.2	37.9	634 60.61%
1000	1147 6.701%	10.4	52.2	30.7	30.8	34.8	37.6	665 57.98%
1100	1161 6.782%	17.9	49.3	30.8	30.8	35.0	37.6	669 57.62%
1200	1147 6.701%	14.3	43.0	31.0	30.9	35.2	38.2	687 59.90%
1300	1149 6.712%	9.9	46.6	30.8	30.6	34.9	37.5	648 56.40%
1400	1134 6.625%	13.4	46.2	30.8	30.6	35.1	38.3	644 56.79%
1500	1093 6.385%	13.8	45.4	31.2	31.2	35.2	38.1	663 60.66%
1600	1073 6.268%	10.3	47.5	31.4	31.4	35.6	37.7	695 64.77%
1700	1088 6.356%	9.5	48.5	31.8	31.8	35.8	38.5	739 67.92%
1800	1076 6.286%	15.8	46.3	31.8	31.9	35.8	38.7	740 68.77%
1900	896 5.234%	14.3	54.0	31.5	31.4	35.5	38.1	581 64.84%
2000	694 4.054%	11.4	49.1	32.4	32.2	36.4	39.0	514 74.06%
2100	432 2.524%	19.4	55.4	33.2	32.8	37.4	40.3	344 79.63%
2200	303 1.770%	17.8	53.4	33.3	33.1	36.5	40.0	256 84.49%
2300	245 1.431%	16.8	46.4	31.9	31.8	35.8	38.7	177 72.24%
----	**17118 100.0%**	**9.5**	**64.2**	**31.5**	**31.5**	**35.8**	**38.6**	**11092 64.80%**

1.4.3 NH 10 south of Base Hill Road

1.4.3.1.1 Both Directions of Travel

Vehicles = 33822
Posted speed limit = 40 mph, Exceeding = 20452 (60.47%), Mean Exceeding = 45.60 mph
Maximum = 96.7 mph, **Minimum** = 8.2 mph, **Mean** = 41.5 mph
85% Speed = 47.87 mph, **95% Speed** = 51.56 mph, **Median** = 41.72 mph
10 mph Pace = 37 - 47, **Number in Pace** = 19371 (57.27%)
Variance = 41.61, **Standard Deviation** = 6.45 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 40 mph
0000	319 0.943%	20.4	71.3	42.5	42.2	48.4	52.1	213 66.77%
0100	192 0.568%	25.5	64.6	42.9	42.7	49.0	53.1	135 70.31%
0200	162 0.479%	21.7	58.5	43.6	43.3	49.8	52.7	120 74.07%
0300	193 0.571%	23.5	71.3	43.3	43.4	49.8	56.1	130 67.36%
0400	482 1.425%	24.5	72.2	44.9	44.4	52.0	55.9	370 76.76%
0500	1082 3.199%	17.9	96.7	42.5	41.7	49.9	56.7	645 59.61%
0600	1587 4.692%	21.3	71.4	40.3	39.7	47.6	52.8	774 48.77%
0700	1883 5.567%	16.9	62.1	40.2	40.5	47.1	50.1	982 52.15%
0800	2016 5.961%	21.9	68.9	40.0	39.8	46.8	50.7	986 48.91%
0900	2082 6.156%	18.1	61.7	40.7	40.8	47.8	51.4	1138 54.66%
1000	2122 6.274%	13.0	62.6	41.3	41.4	47.8	51.3	1222 57.59%
1100	2107 6.230%	18.6	61.6	41.0	41.2	47.3	50.7	1229 58.33%
1200	2149 6.354%	9.5	59.6	40.5	40.9	46.5	50.1	1220 56.77%
1300	2161 6.389%	8.2	68.8	40.6	40.8	47.0	50.4	1213 56.13%
1400	2150 6.357%	10.4	64.1	41.3	41.7	47.5	51.2	1292 60.09%
1500	2060 6.091%	12.2	63.1	42.1	42.1	49.1	52.6	1292 62.72%
1600	2108 6.233%	21.2	62.0	42.3	42.4	48.8	52.5	1355 64.28%
1700	2037 6.023%	11.8	65.5	42.8	43.2	49.2	52.7	1391 68.29%
1800	1898 5.612%	12.6	64.0	43.0	43.5	48.9	51.7	1355 71.39%
1900	1672 4.944%	22.0	58.9	41.9	42.4	47.4	50.4	1107 66.21%
2000	1321 3.906%	21.8	65.0	41.6	42.1	47.1	50.0	841 63.66%
2100	961 2.841%	22.3	62.1	42.6	43.1	47.9	51.3	678 70.55%
2200	647 1.913%	17.1	73.2	42.6	42.8	48.1	51.0	454 70.17%
2300	431 1.274%	27.2	85.6	43.1	42.8	47.4	51.8	310 71.93%
----	**33822 100.0%**	**8.2**	**96.7**	**41.5**	**41.7**	**47.9**	**51.6**	**20452 60.47%**

1.4.3.1.2 Northbound Only

Vehicles = 16337
Posted speed limit = 40 mph, Exceeding = 9011 (55.16%), Mean Exceeding = 45.42 mph
Maximum = 85.6 mph, **Minimum** = 10.4 mph, **Mean** = 40.9 mph
85% Speed = 47.42 mph, **95% Speed** = 51.56 mph, **Median** = 40.82 mph
10 mph Pace = 36 - 46, **Number in Pace** = 9431 (57.73%)
Variance = 41.33, **Standard Deviation** = 6.43 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 40 mph
0000	129 0.790%	20.4	71.3	42.3	42.1	47.8	53.9	80 62.02%
0100	70 0.428%	25.5	64.6	42.7	41.9	49.7	54.6	47 67.14%
0200	86 0.526%	21.7	58.3	42.7	42.0	49.6	54.3	58 67.44%
0300	126 0.771%	23.5	71.3	42.7	42.9	49.3	56.6	76 60.32%
0400	319 1.953%	24.5	65.4	43.6	43.2	50.3	54.9	229 71.79%
0500	668 4.089%	17.9	69.7	40.8	40.4	47.9	52.5	352 52.69%
0600	928 5.680%	21.3	70.4	38.5	38.1	44.6	49.7	351 37.82%
0700	935 5.723%	16.9	62.1	38.4	38.1	44.7	49.0	360 38.50%
0800	978 5.986%	23.8	60.6	38.9	38.6	45.0	49.0	399 40.80%
0900	1005 6.152%	18.1	57.1	39.4	39.5	45.6	49.9	464 46.17%
1000	1047 6.409%	17.5	62.6	41.0	40.6	47.5	51.4	562 53.68%
1100	1006 6.158%	21.0	56.7	40.8	40.9	47.3	50.8	572 56.86%
1200	1035 6.335%	21.1	59.3	41.1	41.3	47.2	51.4	618 59.71%
1300	1064 6.513%	19.9	68.8	41.1	41.2	47.6	51.7	617 57.99%
1400	1036 6.341%	10.4	64.1	41.5	41.6	48.3	52.9	614 59.27%
1500	1010 6.182%	20.6	63.1	42.3	41.7	49.8	53.7	620 61.39%
1600	1090 6.672%	21.2	62.0	41.9	41.9	48.5	52.6	673 61.74%
1700	1006 6.158%	16.5	61.9	41.6	41.9	48.1	51.6	615 61.13%
1800	863 5.282%	25.8	64.0	42.1	42.1	47.9	51.3	556 64.43%
1900	702 4.297%	24.5	57.7	41.3	41.3	47.1	50.6	421 59.97%
2000	483 2.956%	25.6	62.4	40.3	40.2	46.1	49.4	250 51.76%
2100	354 2.167%	22.3	62.1	42.0	42.1	47.4	52.0	225 63.56%
2200	248 1.518%	17.1	73.2	42.3	41.7	48.2	53.3	158 63.71%
2300	149 0.912%	29.6	85.6	42.3	41.5	47.1	52.2	94 63.09%
----	**16337 100.0%**	**10.4**	**85.6**	**40.9**	**40.8**	**47.4**	**51.6**	**9011 55.16%**

1.4.3.1.3 Southbound Only

Vehicles = 17485
Posted speed limit = 40 mph, Exceeding = 11441 (65.43%), Mean Exceeding = 45.75 mph
Maximum = 96.7 mph, **Minimum** = 8.2 mph, **Mean** = 42.1 mph
85% Speed = 48.32 mph, **95% Speed** = 51.56 mph, **Median** = 42.50 mph
10 mph Pace = 39 - 49, **Number in Pace** = 10259 (58.67%)
Variance = 41.12, **Standard Deviation** = 6.41 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 40 mph
0000	190 1.087%	26.5	59.4	42.7	42.3	49.0	51.8	133 70.00%
0100	122 0.698%	26.7	61.2	43.0	43.2	48.7	53.0	88 72.13%
0200	76 0.435%	29.8	58.5	44.7	45.1	50.9	52.3	62 81.58%
0300	67 0.383%	30.4	62.9	44.5	44.3	50.1	55.1	54 80.60%
0400	163 0.932%	25.3	72.2	47.5	47.3	54.1	59.4	141 86.50%
0500	414 2.368%	24.7	96.7	45.2	43.5	52.8	71.6	293 70.77%
0600	659 3.769%	22.6	71.4	42.9	43.1	50.0	55.8	423 64.19%
0700	948 5.422%	21.1	60.6	42.0	42.8	48.2	50.9	622 65.61%
0800	1038 5.937%	21.9	68.9	41.0	41.0	47.9	51.7	587 56.55%
0900	1077 6.160%	21.3	61.7	42.0	42.1	49.0	52.9	674 62.58%
1000	1075 6.148%	13.0	61.7	41.5	42.2	47.9	51.1	660 61.40%
1100	1101 6.297%	18.6	61.6	41.1	41.4	47.3	50.7	657 59.67%
1200	1114 6.371%	9.5	59.6	40.1	40.6	46.0	49.3	602 54.04%
1300	1097 6.274%	8.2	57.2	40.1	40.6	46.3	49.4	596 54.33%
1400	1114 6.371%	13.5	56.8	41.0	41.8	47.1	49.7	678 60.86%
1500	1050 6.005%	12.2	61.2	41.9	42.4	48.5	51.4	672 64.00%
1600	1018 5.822%	21.6	60.0	42.8	43.4	49.0	52.3	682 66.99%
1700	1031 5.896%	11.8	65.5	43.9	44.3	49.8	53.1	776 75.27%
1800	1035 5.919%	12.6	60.1	43.8	44.5	49.3	52.0	799 77.20%
1900	970 5.548%	22.0	58.9	42.4	43.1	47.4	50.3	686 70.72%
2000	838 4.793%	21.8	65.0	42.3	42.7	47.4	50.3	591 70.53%
2100	607 3.472%	23.4	56.4	42.9	43.5	47.9	51.0	453 74.63%
2200	399 2.282%	20.0	55.9	42.8	43.4	48.0	50.4	296 74.19%
2300	282 1.613%	27.2	69.5	43.4	43.4	47.8	52.1	216 76.60%
----	**17485 100.0%**	**8.2**	**96.7**	**42.1**	**42.5**	**48.3**	**51.6**	**11441 65.43%**

1.4.4 Sawyers Crossing east of NH 10

1.4.4.1.1 Both Directions of Travel

Vehicles = 1564
Posted speed limit = 30 mph, Exceeding = 1128 (72.12%), Mean Exceeding = 36.19 mph
Maximum = 65.4 mph, **Minimum** = 5.5 mph, **Mean** = 32.7 mph
85% Speed = 39.03 mph, **95% Speed** = 42.17 mph, **Median** = 33.89 mph
10 mph Pace = 30 - 40, **Number in Pace** = 968 (61.89%)
Variance = 50.05, **Standard Deviation** = 7.07 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	3 0.192%	29.2	40.6	34.8	34.7	40.6	40.6	2 66.67%
0100	2 0.128%	59.3	60.0	59.7	59.7	60.0	60.0	2 100.0%
0200	4 0.256%	20.1	37.6	31.3	33.8	37.6	37.6	3 75.00%
0300	3 0.192%	10.9	43.8	28.7	31.3	43.8	43.8	2 66.67%
0400	13 0.831%	29.7	43.1	34.5	33.7	36.8	43.1	12 92.31%
0500	8 0.512%	19.4	38.4	34.0	35.9	38.0	38.4	7 87.50%
0600	36 2.302%	24.1	51.3	36.0	36.1	40.8	46.8	32 88.89%
0700	61 3.900%	16.0	48.5	34.6	36.4	40.9	44.1	51 83.61%
0800	69 4.412%	15.4	42.0	32.3	34.1	39.8	41.3	46 66.67%
0900	91 5.818%	12.9	47.1	32.3	33.2	37.3	40.1	69 75.82%
1000	108 6.905%	8.7	51.8	31.8	32.5	39.3	43.4	75 69.44%
1100	133 8.504%	12.1	47.2	32.7	34.3	39.9	42.3	89 66.92%
1200	105 6.714%	7.1	43.4	32.9	34.7	38.9	40.4	81 77.14%
1300	146 9.335%	11.1	46.7	32.2	33.3	38.6	42.1	108 73.97%
1400	147 9.399%	10.8	65.4	33.4	34.4	39.3	43.0	112 76.19%
1500	132 8.440%	12.4	47.7	32.8	33.8	38.1	41.5	94 71.21%
1600	142 9.079%	15.1	45.7	34.7	35.6	40.1	42.7	116 81.69%
1700	92 5.882%	9.0	43.9	32.0	33.1	37.4	41.2	63 68.48%
1800	88 5.627%	5.5	43.8	32.7	34.4	39.9	42.6	63 71.59%
1900	72 4.604%	14.8	48.3	30.3	31.0	36.9	42.1	38 52.78%
2000	52 3.325%	17.6	43.6	30.6	31.0	36.9	41.8	28 53.85%
2100	30 1.918%	17.3	48.3	31.8	32.3	39.7	47.1	20 66.67%
2200	16 1.023%	11.0	43.7	32.5	34.6	40.8	43.7	11 68.75%
2300	11 0.703%	17.6	40.2	28.0	26.8	37.9	40.2	4 36.36%
----	**1564 100.0%**	**5.5**	**65.4**	**32.7**	**33.9**	**39.0**	**42.2**	**1128 72.12%**

1.4.4.1.2 Westbound Only

Vehicles = 895
Posted speed limit = 30 mph, Exceeding = 637 (71.17%), Mean Exceeding = 36.29 mph
Maximum = 65.4 mph, **Minimum** = 9.0 mph, **Mean** = 32.8 mph
85% Speed = 39.03 mph, **95% Speed** = 42.75 mph, **Median** = 33.78 mph
10 mph Pace = 29 - 39, **Number in Pace** = 546 (61.01%)
Variance = 50.65, **Standard Deviation** = 7.12 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	1 0.112%	40.6	40.6	40.6	40.6	40.6	40.6	1 100.0%
0100	2 0.223%	59.3	60.0	59.7	59.7	60.0	60.0	2 100.0%
0200	2 0.223%	20.1	37.6	28.8	28.8	37.6	37.6	1 50.00%
0300	3 0.335%	10.9	43.8	28.7	31.3	43.8	43.8	2 66.67%
0400	7 0.782%	29.7	37.0	33.5	33.1	36.5	37.0	6 85.71%
0500	4 0.447%	34.6	37.3	36.2	36.4	37.3	37.3	4 100.0%
0600	19 2.123%	24.1	51.3	36.5	36.1	43.2	51.3	16 84.21%
0700	41 4.581%	16.0	48.5	36.4	36.9	42.9	45.8	37 90.24%
0800	34 3.799%	17.0	42.0	33.5	35.8	39.5	41.5	24 70.59%
0900	51 5.698%	12.9	47.1	33.1	33.3	38.5	43.3	39 76.47%
1000	67 7.486%	10.5	51.8	32.6	32.8	39.4	44.6	47 70.15%
1100	76 8.492%	12.1	47.2	31.3	32.5	39.1	41.2	45 59.21%
1200	62 6.927%	15.3	43.4	33.2	34.7	38.8	40.4	48 77.42%
1300	81 9.050%	11.1	46.7	32.2	33.4	38.0	42.3	57 70.37%
1400	94 10.50%	10.8	65.4	32.0	32.7	38.4	41.9	63 67.02%
1500	75 8.380%	12.4	47.7	32.7	33.7	38.1	41.2	56 74.67%
1600	82 9.162%	21.0	45.7	34.2	34.7	40.1	43.8	64 78.05%
1700	50 5.587%	9.0	41.9	32.0	33.8	38.9	41.3	34 68.00%
1800	48 5.363%	13.7	43.8	33.5	34.7	41.4	43.2	34 70.83%
1900	41 4.581%	14.8	48.3	31.0	32.3	40.3	42.8	23 56.10%
2000	28 3.128%	17.6	43.6	30.6	31.8	35.8	41.1	19 67.86%
2100	14 1.564%	17.5	48.3	31.0	31.0	44.0	48.3	8 57.14%
2200	6 0.670%	11.0	43.7	30.2	31.7	43.5	43.7	4 66.67%
2300	7 0.782%	17.6	40.2	29.1	29.8	39.6	40.2	3 42.86%
----	**895 100.0%**	**9.0**	**65.4**	**32.8**	**33.8**	**39.0**	**42.7**	**637 71.17%**

1.4.4.1.3 Eastbound Only

Vehicles = 669
Posted speed limit = 30 mph, Exceeding = 491 (73.39%), Mean Exceeding = 36.07 mph
Maximum = 47.2 mph, **Minimum** = 5.5 mph, **Mean** = 32.7 mph
85% Speed = 39.09 mph, **95% Speed** = 41.50 mph, **Median** = 34.00 mph
10 mph Pace = 30 - 40, **Number in Pace** = 424 (63.38%)
Variance = 49.32, **Standard Deviation** = 7.02 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 30 mph
0000	2 0.299%	29.2	34.6	31.9	31.9	34.6	34.6	1 50.00%
0100	0 0.000%	0.0	0.0	0.0	0.0	0.0	0.0	0 -%
0200	2 0.299%	30.3	37.3	33.8	33.8	37.3	37.3	2 100.0%
0300	0 0.000%	0.0	0.0	0.0	0.0	0.0	0.0	0 -%
0400	6 0.897%	32.1	43.1	35.7	34.8	42.7	43.1	6 100.0%
0500	4 0.598%	19.4	38.4	31.9	34.9	38.4	38.4	3 75.00%
0600	17 2.541%	24.2	41.0	35.4	36.1	39.6	41.0	16 94.12%
0700	20 2.990%	16.2	40.1	31.0	33.2	38.7	40.1	14 70.00%
0800	35 5.232%	15.4	41.6	31.2	32.0	40.2	41.3	22 62.86%
0900	40 5.979%	14.8	40.6	31.3	33.1	35.7	37.2	30 75.00%
1000	41 6.129%	8.7	45.4	30.5	31.9	39.1	43.0	28 68.29%
1100	57 8.520%	14.1	47.2	34.6	37.1	40.7	44.6	44 77.19%
1200	43 6.428%	7.1	41.2	32.5	34.4	39.2	40.5	33 76.74%
1300	65 9.716%	13.7	45.0	32.2	33.2	39.2	42.1	51 78.46%
1400	53 7.922%	14.4	45.8	35.9	36.2	41.6	44.6	49 92.45%
1500	57 8.520%	15.3	46.1	32.9	34.0	38.6	41.9	38 66.67%
1600	60 8.969%	15.1	43.1	35.3	37.1	40.1	41.8	52 86.67%
1700	42 6.278%	17.2	43.9	32.0	32.6	36.9	43.0	29 69.05%
1800	40 5.979%	5.5	41.3	31.7	33.8	39.5	40.4	29 72.50%
1900	31 4.634%	16.0	38.0	29.4	29.9	36.1	37.8	15 48.39%
2000	24 3.587%	20.8	43.4	30.6	29.3	38.5	42.8	9 37.50%
2100	16 2.392%	17.3	43.8	32.6	33.4	40.0	43.8	12 75.00%
2200	10 1.495%	14.9	42.5	33.9	36.1	40.5	42.5	7 70.00%
2300	4 0.598%	22.4	34.4	26.1	23.8	34.4	34.4	1 25.00%
----	**669 100.0%**	**5.5**	**47.2**	**32.7**	**34.0**	**39.1**	**41.5**	**491 73.39%**

1.4.5 NH 10 south of West Street

1.4.5.1.1 Both Directions of Travel

Vehicles = 29820
Posted speed limit = 40 mph, Exceeding = 25825 (86.60%), Mean Exceeding = 46.06 mph
Maximum = 76.3 mph, **Minimum** = 7.2 mph, **Mean** = 44.8 mph
85% Speed = 49.55 mph, **95% Speed** = 52.57 mph, **Median** = 44.85 mph
10 mph Pace = 40 - 50, **Number in Pace** = 21944 (73.59%)
Variance = 24.49, **Standard Deviation** = 4.95 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 40 mph
0000	190 0.637%	32.5	66.2	45.1	44.5	50.1	56.9	161 84.74%
0100	135 0.453%	34.1	61.8	45.4	44.9	50.8	55.3	121 89.63%
0200	104 0.349%	27.6	61.1	45.9	45.5	50.1	54.2	97 93.27%
0300	104 0.349%	25.7	57.1	46.0	46.0	50.7	53.4	97 93.27%
0400	333 1.117%	26.5	62.1	45.9	45.3	51.3	55.0	307 92.19%
0500	824 2.763%	24.8	63.7	45.6	45.3	49.8	53.8	753 91.38%
0600	1184 3.970%	12.6	65.5	46.5	46.6	51.0	53.9	1107 93.50%
0700	1472 4.936%	26.8	70.9	46.8	46.4	51.6	54.9	1379 93.68%
0800	1636 5.486%	10.7	66.2	45.9	45.9	51.0	54.5	1472 89.98%
0900	1799 6.033%	11.4	61.1	45.2	45.2	49.9	52.6	1605 89.22%
1000	1903 6.382%	19.6	61.1	44.6	44.6	49.3	52.3	1631 85.71%
1100	2047 6.865%	25.0	62.5	44.3	44.5	48.9	51.9	1744 85.20%
1200	2113 7.086%	10.2	64.0	44.2	44.5	48.9	51.8	1756 83.10%
1300	2019 6.771%	7.2	66.6	44.1	44.3	49.1	52.0	1682 83.31%
1400	2023 6.784%	11.8	61.2	44.3	44.4	49.0	51.8	1712 84.63%
1500	2071 6.945%	12.6	76.3	44.5	44.7	49.2	52.1	1764 85.18%
1600	2062 6.915%	14.1	65.7	44.9	45.1	49.2	52.0	1806 87.58%
1700	2010 6.740%	18.3	60.5	44.5	44.7	49.2	52.2	1739 86.52%
1800	1767 5.926%	15.7	62.5	44.8	45.0	49.5	52.6	1537 86.98%
1900	1449 4.859%	25.1	66.5	43.6	43.7	48.9	51.6	1148 79.23%
2000	1079 3.618%	25.0	63.0	44.3	44.1	48.7	51.9	933 86.47%
2100	700 2.347%	26.7	61.8	44.2	44.1	48.5	51.8	600 85.71%
2200	490 1.643%	28.5	64.5	44.5	44.3	49.0	52.7	421 85.92%
2300	306 1.026%	27.4	74.0	44.1	43.4	48.9	53.5	253 82.68%
----	**29820 100.0%**	**7.2**	**76.3**	**44.8**	**44.9**	**49.5**	**52.6**	**25825 86.60%**

1.4.5.1.2 Northbound Only

Vehicles = 15305
Posted speed limit = 40 mph, Exceeding = 13160 (85.98%), Mean Exceeding = 46.09 mph
Maximum = 74.0 mph, **Minimum** = 7.2 mph, **Mean** = 44.8 mph
85% Speed = 49.55 mph, **95% Speed** = 52.68 mph, **Median** = 44.85 mph
10 mph Pace = 40 - 50, **Number in Pace** = 11171 (72.99%)
Variance = 24.65, **Standard Deviation** = 4.96 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 40 mph
0000	77 0.503%	36.4	62.2	46.0	45.0	52.2	58.1	69 89.61%
0100	59 0.385%	37.3	59.2	46.2	45.2	51.8	56.4	55 93.22%
0200	61 0.399%	34.5	58.8	45.8	45.4	50.1	55.1	56 91.80%
0300	70 0.457%	36.5	54.8	46.2	46.1	50.0	53.0	69 98.57%
0400	205 1.339%	34.0	61.0	46.4	45.5	51.9	54.9	194 94.63%
0500	522 3.411%	24.8	63.0	45.6	45.4	49.7	53.1	481 92.15%
0600	754 4.926%	32.9	61.3	46.9	46.9	51.0	54.0	718 95.23%
0700	846 5.528%	29.9	67.9	47.0	46.8	51.6	54.7	805 95.15%
0800	912 5.959%	21.6	66.2	46.0	46.0	50.8	54.5	827 90.68%
0900	962 6.286%	17.9	58.6	45.0	45.0	49.3	52.5	859 89.29%
1000	1007 6.580%	19.6	61.1	44.4	44.3	49.0	52.0	852 84.61%
1100	1071 6.998%	25.0	62.5	44.2	44.4	48.5	51.2	898 83.85%
1200	1068 6.978%	17.7	64.0	43.9	44.1	48.4	51.4	859 80.43%
1300	1039 6.789%	7.2	59.8	43.5	43.8	48.4	51.2	830 79.88%
1400	1016 6.638%	11.8	61.2	44.0	44.2	48.9	51.7	829 81.59%
1500	1000 6.534%	15.7	63.1	44.3	44.4	48.8	51.8	840 84.00%
1600	995 6.501%	14.1	65.7	44.8	45.0	49.2	52.0	866 87.04%
1700	970 6.338%	21.4	59.3	44.6	44.7	49.3	52.5	827 85.26%
1800	864 5.645%	15.7	58.7	44.7	44.7	49.4	52.6	749 86.69%
1900	693 4.528%	25.2	63.1	43.2	43.3	49.0	52.5	521 75.18%
2000	464 3.032%	27.4	63.0	44.5	44.3	49.2	52.6	396 85.34%
2100	311 2.032%	26.7	59.5	44.9	44.7	49.2	52.8	277 89.07%
2200	233 1.522%	28.7	64.5	44.8	44.7	49.5	53.4	197 84.55%
2300	106 0.693%	30.8	74.0	45.1	44.1	51.4	56.0	86 81.13%
----	**15305 100.0%**	**7.2**	**74.0**	**44.8**	**44.9**	**49.5**	**52.7**	**13160 85.98%**

1.4.5.1.3 Southbound Only

Vehicles = 14515
Posted speed limit = 40 mph, Exceeding = 12665 (87.25%), Mean Exceeding = 46.03 mph
Maximum = 76.3 mph, **Minimum** = 10.2 mph, **Mean** = 44.8 mph
85% Speed = 49.55 mph, **95% Speed** = 52.57 mph, **Median** = 44.85 mph
10 mph Pace = 40 - 50, **Number in Pace** = 10773 (74.22%)
Variance = 24.32, **Standard Deviation** = 4.93 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 40 mph
0000	113 0.779%	32.5	66.2	44.5	44.1	48.9	54.2	92 81.42%
0100	76 0.524%	34.1	61.8	44.8	44.3	50.0	54.6	66 86.84%
0200	43 0.296%	27.6	61.1	46.1	45.6	50.6	52.7	41 95.35%
0300	34 0.234%	25.7	57.1	45.6	45.4	52.0	54.4	28 82.35%
0400	128 0.882%	26.5	62.1	44.9	44.5	50.2	55.3	113 88.28%
0500	302 2.081%	30.6	63.7	45.7	45.1	50.1	54.4	272 90.07%
0600	430 2.962%	12.6	65.5	45.8	45.7	50.9	53.7	389 90.47%
0700	626 4.313%	26.8	70.9	46.5	46.0	51.4	55.3	574 91.69%
0800	724 4.988%	10.7	62.4	45.8	45.6	51.1	54.2	645 89.09%
0900	837 5.766%	11.4	61.1	45.4	45.4	50.0	52.9	746 89.13%
1000	896 6.173%	23.7	57.2	44.9	45.1	49.7	52.7	779 86.94%
1100	976 6.724%	27.2	59.9	44.5	44.6	49.2	52.2	846 86.68%
1200	1045 7.199%	10.2	61.3	44.5	44.7	49.2	52.0	897 85.84%
1300	980 6.752%	24.3	66.6	44.7	44.7	49.7	52.5	852 86.94%
1400	1007 6.938%	18.2	59.7	44.6	44.5	49.2	52.0	883 87.69%
1500	1071 7.379%	12.6	76.3	44.7	44.9	49.7	52.3	924 86.27%
1600	1067 7.351%	18.9	58.8	45.0	45.2	49.3	52.0	940 88.10%
1700	1040 7.165%	18.3	60.5	44.5	44.7	49.1	51.9	912 87.69%
1800	903 6.221%	25.8	62.5	44.9	45.1	49.7	52.6	788 87.26%
1900	756 5.208%	25.1	66.5	44.0	44.1	48.8	51.6	627 82.94%
2000	615 4.237%	25.0	60.1	44.1	44.0	48.2	50.9	537 87.32%
2100	389 2.680%	30.8	61.8	43.7	43.6	47.5	50.4	323 83.03%
2200	257 1.771%	28.5	59.5	44.2	44.1	48.7	51.4	224 87.16%
2300	200 1.378%	27.4	62.8	43.6	43.1	48.2	52.8	167 83.50%
----	**14515 100.0%**	**10.2**	**76.3**	**44.8**	**44.9**	**49.5**	**52.6**	**12665 87.25%**

1.4.6 NH 10 at Winchester line

1.4.6.1.1 Both Directions of Travel

Vehicles = 20346
Posted speed limit = 50 mph, Exceeding = 13447 (66.09%), Mean Exceeding = 54.26 mph
Maximum = 97.0 mph, **Minimum** = 6.4 mph, **Mean** = 51.4 mph
85% Speed = 56.37 mph, **95% Speed** = 59.17 mph, **Median** = 51.79 mph
10 mph Pace = 47 - 57, **Number in Pace** = 14879 (73.13%)
Variance = 32.22, **Standard Deviation** = 5.68 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 50 mph
0000	175 0.860%	37.9	66.2	51.7	51.2	58.1	61.3	109 62.29%
0100	110 0.541%	35.1	70.0	51.3	51.1	58.9	60.7	67 60.91%
0200	82 0.403%	34.0	65.3	51.1	51.1	57.5	60.2	47 57.32%
0300	83 0.408%	31.6	64.7	50.4	51.2	56.3	60.4	46 55.42%
0400	219 1.076%	30.3	75.8	52.6	52.7	58.0	61.9	155 70.78%
0500	499 2.453%	13.7	69.4	52.4	52.6	57.8	60.8	370 74.15%
0600	785 3.858%	16.9	72.8	53.1	53.6	58.2	60.7	611 77.83%
0700	999 4.910%	16.6	77.0	52.2	52.7	57.2	59.4	740 74.07%
0800	1104 5.426%	12.7	67.3	51.6	51.9	56.7	59.6	753 68.21%
0900	1184 5.819%	8.0	67.2	50.9	51.6	56.1	58.6	779 65.79%
1000	1277 6.276%	8.5	70.7	51.1	51.4	55.9	58.5	805 63.04%
1100	1329 6.532%	8.6	83.5	50.9	51.1	55.6	58.2	824 62.00%
1200	1374 6.753%	7.1	65.0	51.0	51.3	55.6	58.6	851 61.94%
1300	1379 6.778%	6.4	67.1	50.9	51.4	55.5	58.5	896 64.97%
1400	1406 6.910%	9.6	67.7	51.4	51.8	56.1	59.1	935 66.50%
1500	1443 7.092%	8.0	70.4	51.2	51.7	56.0	58.6	950 65.84%
1600	1441 7.082%	6.4	97.0	51.6	52.0	56.4	58.8	971 67.38%
1700	1325 6.512%	6.7	74.3	52.0	52.1	56.5	59.2	938 70.79%
1800	1145 5.628%	17.4	66.2	52.8	52.8	57.3	60.2	864 75.46%
1900	947 4.654%	13.6	68.4	51.6	51.9	56.5	59.3	617 65.15%
2000	774 3.804%	13.7	67.2	50.7	50.7	55.7	58.3	433 55.94%
2100	610 2.998%	31.5	66.0	50.0	50.3	54.7	57.7	318 52.13%
2200	403 1.981%	16.1	64.2	50.6	50.9	55.9	59.1	231 57.32%
2300	253 1.243%	27.2	64.0	50.0	50.4	55.4	59.2	137 54.15%
----	**20346 100.0%**	**6.4**	**97.0**	**51.4**	**51.8**	**56.4**	**59.2**	**13447 66.09%**

1.4.6.1.2 Northbound Only

Vehicles = 10078
Posted speed limit = 50 mph, Exceeding = 6530 (64.79%), Mean Exceeding = 54.17 mph
Maximum = 97.0 mph, **Minimum** = 6.4 mph, **Mean** = 51.3 mph
85% Speed = 56.15 mph, **95% Speed** = 58.83 mph, **Median** = 51.56 mph
10 mph Pace = 47 - 57, **Number in Pace** = 7434 (73.76%)
Variance = 32.27, **Standard Deviation** = 5.68 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 50 mph
0000	77 0.764%	39.3	62.5	50.5	50.2	56.3	60.4	41 53.25%
0100	48 0.476%	35.1	70.0	51.1	50.4	60.0	64.1	25 52.08%
0200	36 0.357%	34.0	65.3	49.9	49.0	58.5	64.7	16 44.44%
0300	49 0.486%	31.6	64.7	50.3	51.6	56.0	58.0	28 57.14%
0400	160 1.588%	35.4	66.1	52.8	52.9	57.8	61.9	115 71.88%
0500	303 3.007%	13.7	69.4	52.2	52.5	57.3	59.5	231 76.24%
0600	508 5.041%	19.1	66.4	53.3	53.7	58.1	61.0	391 76.97%
0700	590 5.854%	23.1	67.1	52.4	52.7	56.7	59.2	448 75.93%
0800	587 5.825%	14.2	63.3	51.2	51.8	56.4	59.1	381 64.91%
0900	615 6.102%	8.0	66.6	50.7	51.3	55.8	58.7	399 64.88%
1000	650 6.450%	8.5	65.2	50.7	51.1	55.4	57.7	404 62.15%
1100	672 6.668%	8.6	83.5	50.5	50.8	54.9	57.5	389 57.89%
1200	662 6.569%	7.1	64.7	50.7	51.2	55.3	58.1	404 61.03%
1300	660 6.549%	6.4	67.1	50.6	51.2	55.3	58.0	423 64.09%
1400	673 6.678%	9.6	67.7	51.2	51.7	56.0	58.9	443 65.82%
1500	680 6.747%	8.0	70.4	50.8	51.2	55.8	58.3	428 62.94%
1600	661 6.559%	6.4	97.0	51.5	52.0	56.1	58.3	422 63.84%
1700	613 6.083%	12.1	65.0	51.8	52.1	56.4	58.8	430 70.15%
1800	521 5.170%	31.8	66.2	52.6	52.7	56.9	59.7	385 73.90%
1900	435 4.316%	13.6	68.4	51.6	51.9	56.8	59.8	271 62.30%
2000	351 3.483%	28.9	65.9	50.9	50.8	55.6	59.2	199 56.70%
2100	265 2.629%	33.7	64.8	49.6	49.8	54.4	57.5	124 46.79%
2200	153 1.518%	38.1	59.7	50.0	50.2	55.5	58.3	80 52.29%
2300	109 1.082%	36.3	61.7	49.4	49.9	55.2	58.9	53 48.62%
----	**10078 100.0%**	**6.4**	**97.0**	**51.3**	**51.6**	**56.1**	**58.8**	**6530 64.79%**

1.4.6.1.3 Southbound Only

Vehicles = 10268
Posted speed limit = 50 mph, Exceeding = 6917 (67.36%), Mean Exceeding = 54.34 mph
Maximum = 77.0 mph, **Minimum** = 6.7 mph, **Mean** = 51.6 mph
85% Speed = 56.59 mph, **95% Speed** = 59.39 mph, **Median** = 51.90 mph
10 mph Pace = 47 - 57, **Number in Pace** = 7462 (72.67%)
Variance = 32.11, **Standard Deviation** = 5.67 mph

Hour Bins

Time	Bin	Min	Max	Mean	Median	85%	95%	>PSL 50 mph
0000	98 0.954%	37.9	66.2	52.6	52.4	59.2	62.9	68 69.39%
0100	62 0.604%	37.4	60.9	51.5	52.0	58.5	59.7	42 67.74%
0200	46 0.448%	40.8	59.5	52.0	52.1	57.0	59.3	31 67.39%
0300	34 0.331%	35.3	64.7	50.4	50.9	57.7	62.8	18 52.94%
0400	59 0.575%	30.3	75.8	52.2	51.4	59.1	67.3	40 67.80%
0500	196 1.909%	32.5	64.4	52.7	53.2	58.5	61.7	139 70.92%
0600	277 2.698%	16.9	72.8	52.9	53.4	58.2	60.3	220 79.42%
0700	409 3.983%	16.6	77.0	51.7	52.6	57.7	60.1	292 71.39%
0800	517 5.035%	12.7	67.3	52.0	52.1	57.1	60.1	372 71.95%
0900	569 5.541%	17.1	67.2	51.2	51.8	56.4	58.5	380 66.78%
1000	627 6.106%	14.7	70.7	51.6	51.8	56.2	59.1	401 63.96%
1100	657 6.399%	14.3	67.1	51.3	51.7	56.1	59.2	435 66.21%
1200	712 6.934%	12.4	65.0	51.2	51.4	56.0	58.9	447 62.78%
1300	719 7.002%	15.0	66.5	51.1	51.6	55.7	58.8	473 65.79%
1400	733 7.139%	16.5	65.1	51.6	51.9	56.1	59.1	492 67.12%
1500	763 7.431%	16.8	69.9	51.6	52.0	56.3	59.0	522 68.41%
1600	780 7.596%	14.2	67.7	51.8	52.0	56.6	59.3	549 70.38%
1700	712 6.934%	6.7	74.3	52.1	52.1	56.6	59.9	508 71.35%
1800	624 6.077%	17.4	64.8	52.9	53.0	57.4	60.6	479 76.76%
1900	512 4.986%	16.5	63.4	51.7	51.9	56.1	58.8	346 67.58%
2000	423 4.120%	13.7	67.2	50.5	50.6	55.7	57.9	234 55.32%
2100	345 3.360%	31.5	66.0	50.3	50.7	55.3	57.9	194 56.23%
2200	250 2.435%	16.1	64.2	51.0	51.4	56.0	60.0	151 60.40%
2300	144 1.402%	27.2	64.0	50.5	50.8	55.5	61.8	84 58.33%
----	**10268 100.0%**	**6.7**	**77.0**	**51.6**	**51.9**	**56.6**	**59.4**	**6917 67.36%**

1.5 GAP STUDY RESULTS

A review of the separation between vehicles during the peak morning and evening weekday commuting periods can provide insight into the relative ease of a car or truck to enter or cross NH 10 from a stop-controlled intersection or a driveway. The results are summarized based on thresholds identified in transportation research that are likely to be adequate for cars and trucks entering the roadway from a stop-controlled approach[3]. The threshold values for these critical gaps criteria are as follows:

- There was a 50 percent probability of a passenger vehicle drive "accepting" a gap for both right or left at 6.5 seconds. The probability increased to 85 percent at 8.25 second gap.
- There was a 50 percent probability of a truck driver "accepting" a gap at 8.5 seconds. The probability increased to 85 percent at a 10 second gap.

In general, the busier evening commuting periods had fewer opportunities to safely join or cross NH 10. The most difficult location along the corridor was the area south of Base Hill Road. For a complete comparison of the relative number of gaps meeting the criteria above, see Table 5 and Figure 5.

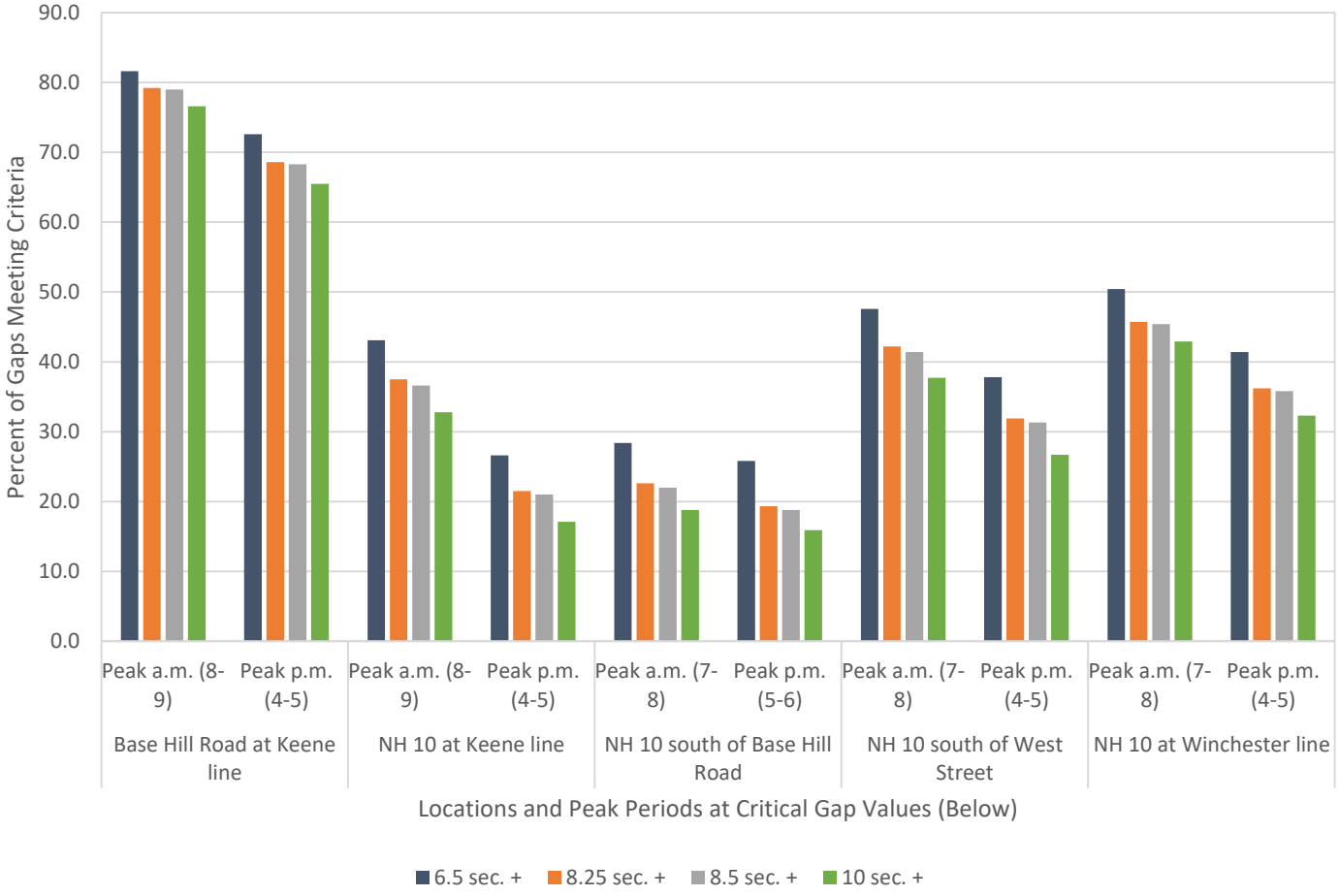
Table 5 - Comparison of the frequency of gaps in traffic on NH 10

Location	Time Period	Average Gap in Seconds	Gaps by Size							
			6.5 sec. +		8.25 sec. +		8.5 sec. +		10 sec. +	
			#	%	#	%	#	%	#	%
Base Hill Road at Keene line	Peak a.m. (8-9)	47.0	373	81.6	262	79.2	361	79.0	350	76.6
	Peak p.m. (4-5)	27.8	563	72.6	532	68.6	530	68.3	508	65.5
NH 10 at Keene line	Peak a.m. (8-9)	12.7	1,275	43.1	1,111	37.5	1,084	36.6	971	32.8
	Peak p.m. (4-5)	7.7	1,277	26.6	1,033	21.5	1,008	21.0	819	17.1
NH 10 south of Base Hill Road	Peak a.m. (7-8)	8.8	1,262	28.4	1,006	22.6	976	22.0	834	18.8
	Peak p.m. (5-6)	6.0	1,238	25.8	926	19.3	900	18.8	763	15.9
NH 10 south of West Street	Peak a.m. (7-8)	17.9	1,088	47.6	965	42.2	947	41.4	862	37.7
	Peak p.m. (4-5)	12.8	1,337	37.8	1,126	31.9	1,106	31.3	945	26.7
NH 10 at Winchester line	Peak a.m. (7-8)	90.3	692	50.4	627	45.7	623	45.4	589	42.9
	Peak p.m. (4-5)	23.8	865	41.4	756	36.2	749	35.8	675	32.3

[3] Fitzpatrick, K. (1991). GAPS ACCEPTED AT STOP-CONTROLLED INTERSECTIONS. Transportation Research Record. *http://onlinepubs.trb.org/Onlinepubs/trr/1991/1303/1303-011.pdf*

Note that due to the low volume on Sawyers Crossing Road, statistics were not compiled for the site.

Figure 5 - Summary of locations by percentage of gaps meeting critical gap values



1.5.1 Base Hill Road at Keene line

1.5.1.1 Wednesday, August 19, 2020 to Friday, August 21, 2020

1.5.1.1.1 Separation Statistics (8:00 a.m. to 9:00 a.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	84	18.4%	84	18.4%	373	81.6%	0.00	0.00
6.50 - **8.25**	11	2.4%	95	20.8%	362	79.2%	0.00	0.00
8.25 - **8.50**	1	0.2%	96	21.0%	361	79.0%	0.00	0.00
8.50 - **10.00**	11	2.4%	107	23.4%	350	76.6%	0.00	0.00
10.00 - **1000.00**	350	76.6%	457	100.0%	0	0.0%	0.00	0.00

1.5.1.1.2 Separation Statistics (4:00 p.m. to 5:00 p.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	213	27.4%	213	27.4%	563	72.6%	0.00	0.00
6.50 - **8.25**	31	4.0%	244	31.4%	532	68.6%	0.00	0.00
8.25 - **8.50**	2	0.3%	246	31.7%	530	68.3%	0.00	0.00
8.50 - **10.00**	22	2.8%	268	34.5%	508	65.5%	0.00	0.00
10.00 - **1000.00**	508	65.5%	776	100.0%	0	0.0%	0.00	0.00

1.5.1.1.3 Separation Statistics by Hour

Time	Bin	Mean	Sep 0.0 - 6.5	Sep 6.5 - 8.3	Sep 8.3 - 8.5	Sep 8.5 - 10.0	Sep 10.0 - 1000.0
0000	12	1153.3	1	0	0	0	5
0100	12	1697.9	1	0	0	0	4
0200	20	1247.2	0	0	0	0	13
0300	26	887.5	0	0	0	0	19
0400	47	601.1	2	0	0	0	41
0500	131	167.8	11	1	1	5	112
0600	358	64.5	52	2	1	4	298
0700	496	43.4	99	12	2	14	369
0800	457	47.0	84	12	1	11	349
0900	578	37.0	161	12	3	20	382
1000	584	36.8	130	14	2	12	426
1100	581	37.2	131	12	2	14	422
1200	633	33.7	141	32	0	15	445
1300	644	33.1	131	24	2	16	471
1400	723	30.0	180	22	1	21	499
1500	779	27.4	198	32	4	27	518
1600	776	27.8	213	32	3	25	503
1700	692	30.8	168	26	4	19	475
1800	422	51.0	89	6	0	9	318
1900	319	67.5	50	8	0	6	255
2000	229	90.4	16	5	2	0	206
2100	141	152.1	12	2	0	1	126
2200	75	269.4	1	0	0	0	73
2300	38	507.7	2	0	0	0	29
----	**8773**		**1873**	**254**	**28**	**219**	**6358**

1.5.2 NH 10 at Keene line

1.5.2.1 Monday, September 7, 2020 to Friday, September 11, 2020

1.5.2.1.1 Separation Statistics (8:00 a.m. to 9:00 a.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	1684	56.9%	1684	56.9%	1275	43.1%	0.00	0.00
6.50 - **8.25**	164	5.5%	1848	62.5%	1111	37.5%	0.00	0.00
8.25 - **8.50**	27	0.9%	1875	63.4%	1084	36.6%	0.00	0.00
8.50 - **10.00**	113	3.8%	1988	67.2%	971	32.8%	0.00	0.00
10.00 - **1000.00**	968	32.7%	2956	99.9%	3	0.1%	0.00	0.00

1.5.2.1.2 Separation Statistics (4:00 p.m. to 5:00 p.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	3524	73.4%	3524	73.4%	1277	26.6%	0.00	0.00
6.50 - **8.25**	244	5.1%	3768	78.5%	1033	21.5%	0.00	0.00
8.25 - **8.50**	25	0.5%	3793	79.0%	1008	21.0%	0.00	0.00
8.50 - **10.00**	189	3.9%	3982	82.9%	819	17.1%	0.00	0.00
10.00 - **1000.00**	816	17.0%	4798	99.9%	3	0.1%	0.00	0.00

1.5.2.1.3 Separation Statistics by Hour

Time	Bin	Mean	Sep 0.0 6.5	Sep 6.5 8.3	Sep 8.3 8.5	Sep 8.5 10.0	Sep 10.0 1000.0
0000	139	549.6	11	1	1	2	118
0100	108	262.0	6	1	0	0	97
0200	76	860.5	2	1	0	1	65
0300	88	1345.4	3	2	0	0	72
0400	293	146.2	45	7	1	3	231
0500	942	94.5	303	26	4	23	579
0600	2003	18.3	1010	95	16	58	822
0700	2933	16.1	1748	148	16	102	915
0800	2959	12.7	1684	164	27	113	968
0900	3159	10.5	1848	170	25	120	995
1000	3558	43.0	2202	192	30	138	991
1100	4014	7.2	2624	244	28	171	947
1200	4232	19.2	2871	235	36	146	938
1300	4225	17.4	2843	241	28	173	935
1400	4413	10.4	3051	295	23	155	884
1500	4814	12.0	3515	290	31	153	820
1600	4801	7.7	3524	244	25	189	816
1700	4050	14.6	2721	235	29	149	911
1800	2775	11.3	1459	153	21	120	1021
1900	2157	17.5	1026	93	13	86	937
2000	1189	65.0	362	58	7	36	723
2100	609	46.2	110	16	0	15	468
2200	407	89.5	59	11	2	5	328
2300	267	101.8	29	3	0	9	225
----	**54211**		**33056**	**2925**	**363**	**1967**	**15806**

1.5.3 NH 10 south of Base Hill Road

1.5.3.1 Monday, September 23, 2020 to Thursday, September 26, 2020

1.5.3.1.1 Separation Statistics (7:00 a.m. to 8:00 a.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	3181	71.6%	3181	71.6%	1262	28.4%	0.00	0.00
6.50 - **8.25**	256	5.8%	3437	77.4%	1006	22.6%	0.00	0.00
8.25 - **8.50**	30	0.7%	3467	78.0%	976	22.0%	0.00	0.00
8.50 - **10.00**	142	3.2%	3609	81.2%	834	18.8%	0.00	0.00
10.00 - **1000.00**	830	18.7%	4439	99.9%	4	0.1%	0.00	0.00

1.5.3.1.2 Separation Statistics (5:00 p.m. to 6:00 p.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	3553	74.2%	3553	74.2%	1238	25.8%	0.00	0.00
6.50 - **8.25**	312	6.5%	3865	80.7%	926	19.3%	0.00	0.00
8.25 - **8.50**	26	0.5%	3891	81.2%	900	18.8%	0.00	0.00
8.50 - **10.00**	137	2.9%	4028	84.1%	763	15.9%	0.00	0.00
10.00 - **1000.00**	763	15.9%	4791	100.0%	0	0.0%	0.00	0.00

1.5.3.1.3 Separation Statistics by Hour

Time	Bin	Mean	Sep 0.0 6.5	Sep 6.5 8.3	Sep 8.3 8.5	Sep 8.5 10.0	Sep 10.0 1000.0
0000	201	147.2	23	1	1	4	171
0100	121	227.7	14	1	1	0	105
0200	131	223.8	14	3	0	1	111
0300	153	194.9	14	2	0	1	133
0400	478	61.8	92	21	2	12	351
0500	1542	72.6	662	91	10	60	717
0600	3018	42.6	1858	186	26	115	826
0700	4443	8.8	3181	256	30	142	830
0800	4220	9.6	2937	262	22	161	834
0900	3254	30.0	1988	197	24	114	928
1000	3204	13.3	1909	208	24	127	931
1100	3304	35.2	2017	227	16	130	912
1200	3479	17.4	2133	247	34	141	918
1300	3721	11.3	2390	271	28	152	879
1400	3960	7.3	2655	268	24	172	841
1500	4734	7.7	3495	310	23	142	763
1600	5093	8.0	3820	302	34	168	768
1700	4791	6.0	3553	312	26	137	763
1800	3025	9.5	1814	203	19	118	871
1900	1983	33.6	919	115	19	84	844
2000	1326	21.4	493	73	9	53	698
2100	880	39.9	252	37	9	32	549
2200	511	55.8	100	17	2	7	385
2300	312	88.7	43	8	1	9	251
----	**57884**		**36376**	**3618**	**384**	**2082**	**15379**

1.5.4 NH 10 south of West Street

1.5.4.1 Tuesday, August 25, 2020 to Friday, August 28, 2020

1.5.4.1.1 Separation Statistics (7:00 a.m. to 8:00 a.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	1199	52.4%	1199	52.4%	1088	47.6%	0.00	0.00
6.50 - **8.25**	123	5.4%	1322	57.8%	965	42.2%	0.00	0.00
8.25 - **8.50**	18	0.8%	1340	58.6%	947	41.4%	0.00	0.00
8.50 - **10.00**	85	3.7%	1425	62.3%	862	37.7%	0.00	0.00
10.00 - **1000.00**	860	37.6%	2285	99.9%	2	0.1%	0.00	0.00

1.5.4.1.2 Separation Statistics (4:00 p.m. to 5:00 p.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	2197	62.2%	2197	62.2%	1337	37.8%	0.00	0.00
6.50 - **8.25**	211	6.0%	2408	68.1%	1126	31.9%	0.00	0.00
8.25 - **8.50**	20	0.6%	2428	68.7%	1106	31.3%	0.00	0.00
8.50 - **10.00**	161	4.6%	2589	73.3%	945	26.7%	0.00	0.00
10.00 - **1000.00**	940	26.6%	3529	99.9%	5	0.1%	0.00	0.00

1.5.4.1.3 Separation Statistics by Hour

Time	Bin	Mean	Sep 0.0 - 6.5	Sep 6.5 - 8.3	Sep 8.3 - 8.5	Sep 8.5 - 10.0	Sep 10.0 - 1000.0
0000	133	216.5	7	1	0	4	120
0100	80	577.8	5	0	0	0	67
0200	80	378.4	5	0	0	0	67
0300	92	318.3	9	0	0	2	76
0400	328	91.4	50	6	0	7	265
0500	922	142.4	246	31	8	27	607
0600	1666	33.9	765	74	15	56	753
0700	2287	17.9	1199	123	18	85	860
0800	2155	20.0	1030	139	20	90	871
0900	2281	16.6	1122	126	22	106	904
1000	2421	18.7	1218	173	11	103	911
1100	2696	14.2	1401	198	21	138	935
1200	2900	13.3	1584	182	42	135	952
1300	2822	13.1	1539	204	18	128	930
1400	2890	11.9	1613	196	30	124	925
1500	3321	13.4	1998	220	21	148	930
1600	3534	12.8	2197	211	20	161	940
1700	3217	94.6	1909	209	22	147	926
1800	2111	21.5	953	125	20	85	923
1900	1646	21.8	685	104	10	62	783
2000	1051	30.8	366	43	4	34	602
2100	587	58.6	134	8	1	10	433
2200	417	67.2	75	9	4	5	324
2300	247	113.0	38	5	2	6	193
----	**39884**		**20148**	**2387**	**309**	**1663**	**15297**

1.5.5 NH 10 at Winchester line

1.5.5.1 Tuesday, August 11, 2020 to Friday, August 14, 2020

1.5.5.1.1 Separation Statistics (7:00 a.m. to 8:00 a.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	680	49.6%	680	49.6%	692	50.4%	0.00	0.00
6.50 - **8.25**	65	4.7%	745	54.3%	627	45.7%	0.00	0.00
8.25 - **8.50**	4	0.3%	749	54.6%	623	45.4%	0.00	0.00
8.50 - **10.00**	34	2.5%	783	57.1%	589	42.9%	0.00	0.00
10.00 - **1000.00**	586	42.7%	1369	99.8%	3	0.2%	0.00	0.00

1.5.5.1.2 Separation Statistics (4:00 p.m. to 5:00 p.m.)

Headway	Bin		Below		Above		sMult	n * sMult
0.00 - **6.50**	1225	58.6%	1225	58.6%	865	41.4%	0.00	0.00
6.50 - **8.25**	109	5.2%	1334	63.8%	756	36.2%	0.00	0.00
8.25 - **8.50**	7	0.3%	1341	64.2%	749	35.8%	0.00	0.00
8.50 - **10.00**	74	3.5%	1415	67.7%	675	32.3%	0.00	0.00
10.00 - **1000.00**	672	32.2%	2087	99.9%	3	0.1%	0.00	0.00

1.5.5.1.3 Separation Statistics by Hour

Time	Bin	Mean	Sep 0.0 6.5	Sep 6.5 8.3	Sep 8.3 8.5	Sep 8.5 10.0	Sep 10.0 1000.0
0000	102	243.3	6	1	0	0	92
0100	61	1290.3	2	0	0	0	56
0200	42	415.4	2	0	0	0	36
0300	61	420.9	5	0	0	0	53
0400	193	115.6	19	3	1	5	165
0500	533	40.3	116	21	2	15	379
0600	1007	21.3	406	42	3	40	516
0700	1372	90.3	680	65	4	34	586
0800	1258	67.3	570	56	5	40	585
0900	1241	34.4	543	54	7	55	579
1000	1395	16.3	676	58	9	42	609
1100	1457	14.8	714	72	9	40	622
1200	1547	18.6	771	83	7	54	631
1300	1560	95.6	781	84	9	52	631
1400	1753	24.9	941	94	14	61	642
1500	1956	11.0	1120	81	12	80	663
1600	2090	23.8	1225	109	7	74	672
1700	1861	29.4	1041	96	6	75	640
1800	1307	22.7	603	48	5	50	600
1900	1004	32.7	427	43	7	25	500
2000	732	30.3	258	18	3	31	422
2100	523	41.3	137	24	2	13	347
2200	300	106.8	60	2	0	4	233
2300	173	275.2	23	3	1	1	143
----	**23528**		**11126**	**1057**	**113**	**791**	**10402**

2 TURNING MOVEMENT STUDIES

Traffic volume studies at intersections require a different approach than automatic traffic recorder studies and require visits to the subject sites in-person during times of day that are of interest. Traffic volumes were manually recorded over 120 minutes at a morning and evening period for each approach and movement (left, through or right) and were aggregated to 15-minute intervals. Recorded data also contain information about vehicle type. This simplified version of vehicle classification includes cars (classes 1-3) and trucks (classes 4 and up).

The two intersections that were selected for study included NH 10 at Base Hill Road and NH 10 at Sawyers Crossing Road. They are beneficial for planning-level decisions and as context to a variety of traffic concerns.

2.1 NH 10 AT BASE HILL ROAD

The NH 10 at Base Hill Road intersection is a 3-leg unsignalized intersection with dedicated turn lanes at each approach. The minor approach (Base Hill Road) is stop-controlled.

The peak a.m. period was identified to occur from 7:00 a.m. to 8:00 a.m. It featured a total volume of 883 vehicles and was marked by a northbound flow of traffic (429 vehicles continued north on NH 10 through the intersection compared with 256 vehicles continuing south on NH 10).

The peak p.m. period was identified to occur from 3:30 p.m. to 4:30 p.m. It featured a total volume of 1,216 vehicles and was marked by a southbound flow of traffic (539 vehicles continued south on NH 10 compared to 395 continuing north on NH 10).

The following pages include complete reports on the a.m. and p.m. turning movement studies conducted on Tuesday, August 11, 2020 and Wednesday, August 12, 2020, respectively.

2.2 NH 10 AT SAWYERS CROSSING ROAD

The NH 10 at Sawyers Crossing Road intersection is a 3-leg unsignalized intersection without dedicated turn lanes. The northbound right turn from NH 10 to Sawyers Crossing features a deceleration or slip lane 100-120 feet in length. The minor approach (Saywers Crossing Road) is stop-controlled.

The peak a.m. period was identified to occur from 7:00 a.m. to 8:00 a.m. It featured a total volume of 811 vehicles and was marked by a northbound flow of traffic (499 vehicles continued north on NH 10 through the intersection compared with 281 vehicles continuing south on NH 10). Only 11 vehicles turned left or right onto NH 10 from Sawyers Crossing Road during this period.

The peak p.m. period was identified to occur from 3:30 p.m. to 4:30 p.m. It featured a total volume of 1,042 vehicles and was marked by a southbound flow of traffic (592 vehicles continued south on NH 10 through the intersection compared to 418 continuing north). Peak traffic from the Sawyers Crossing Road approach remained low at 17 vehicles.

The following pages include complete reports on the a.m. and p.m. turning movement studies conducted on Tuesday, August 11, 2020 and Wednesday, August 12, 2020, respectively.

3 RIDESHARE STUDIES

A number of organizations, including the NHDOT and the Monadnock Alliance for Sustainable Transportation support an increase in ridesharing in the Region. Ridesharing provides societal benefits including less traffic, air pollutant emissions, greenhouse gas emissions, auto-related pollutant runoff in soils and waters, and demand for capacity expansion or maintenance improvements to highways, bridges and parking infrastructure. On the other hand, carpooling/ridesharing can translate into certain societal disincentives such as less gas tax revenue and flexibility of people to contribute to the economy as workers or shoppers.

Since 2013, SWRPC has conducted visual surveys focused on the number of people at set points around the region at peak morning and evening commuting periods. The purpose of the studies is to quantify the extent of ridesharing (also known as carpooling) and to document longitudinal trends based on a fuel price index associated with each period. The figures show ridesharing trends for all vehicles as opposed to only people commuting to work. One such location is directly in the project study area (i.e. NH 10 south of Base Hill Road).

3.1 NH 10 SOUTH OF BASE HILL ROAD SUMMARY AND REGIONAL COMPARISON

The following table provides an overview of the data collected in 2013, 2016 and 2019 (Table 6). The results show that overall between 16.9% and 19.3% of vehicles carried more than one occupant. While gas prices fluctuated between $2.22 and $3.53 during the period, the higher cost of gas did not seem to have a relationship to the prevalence of ridesharing based on the data collected by SWRPC.

Table 6 - Summary of Rideshare Study Results (NH 10 south of Base Hill Road)

Year	2019	2016	2013
Corridor	NH 10 South	NH 10 South	NH 10 South
Fuel Price	$2.650	$2.224	$3.531
AM Date	7/16/2019	7/7/2016	9/26/2013
AM Start	7:30 AM	7:30 AM	7:00 AM
AM End	8:30 AM	8:30 AM	8:00 AM
AM Duration	1:00	1:00	1:00
PM Date	7/18/2019	7/5/2016	9/24/2013
PM Start	4:30 PM	4:30 PM	4:00 PM
PM End	5:30 PM	5:30 PM	5:00 PM
PM Duration	1:00	1:00	1:00
1 Passenger Vehicles	1,759	1,779	1,882
2 Passenger Vehicles	375	374	324
3 Passenger Vehicles	17	40	45
4+ Passenger Vehicles	9	12	13
Total Vehicles	2,160	2,205	2,264
Average Vehicle Occupancy	1.20	1.22	1.20
% People Ridesharing	32.2%	34.0%	30.7%
% Vehicles Ridesharing	18.6%	19.3%	16.9%

Source: SWRPC

However, compared to other studies conducted in the region during the same years, regional figures suggest that the site had a higher frequency of people ridesharing compared to other study sites in 2019 and 2016 (Table 7). More work is needed to assess the statistical significance of this finding and reasons for this difference.

Table 7 - Regional Comparison of Rideshare Study Results

	2019		2016		2013	
	NH 10 south of Base Hill Road	Region Average (based on 8 locations)	NH 10 south of Base Hill Road	Region Average (based on 10 locations)	NH 10 South of Base Hill Road	Region Average (based on 8 locations)
Average Vehicle Occupancy	1.20	1.18	1.22	1.21	1.20	1.20
% People Ridesharing	32.2%	28.1%	34.0%	32.8%	30.7%	30.8%
% Vehicles Ridesharing	18.6%	15.6%	19.3%	18.6%	16.9%	17.2%

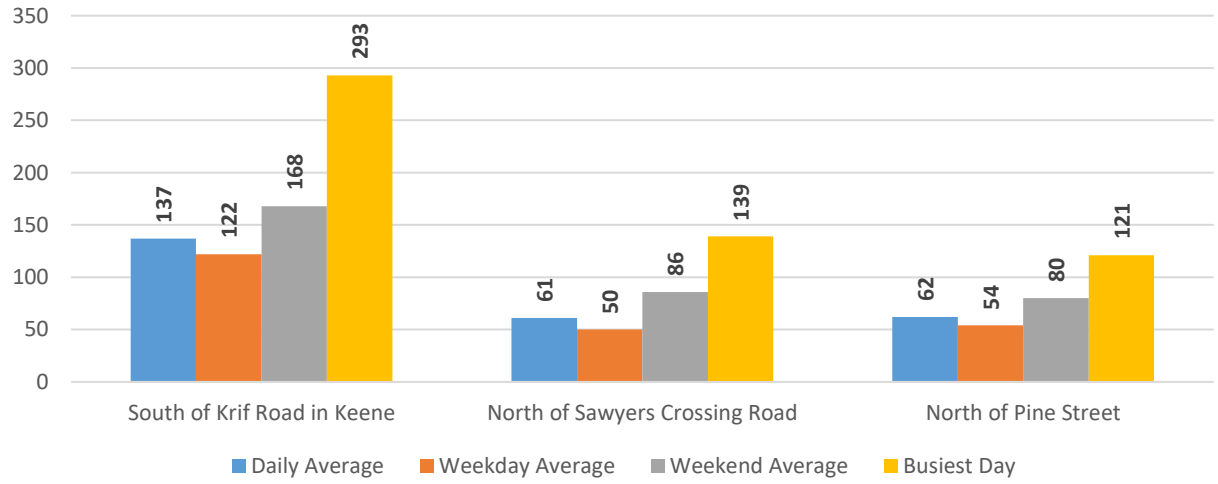
Source: SWRPC

4 Bicycle and Pedestrian Traffic Studies

4.1 Ashuelot Rail Trail Studies

No new counts of people walking or biking were conducted as part of the project. However, there are three recent studies of people walking and biking along the Ashuelot Rail Trail that are relevant to the project. The trail parallels NH 10 to the east throughout the Town of Swanzey and serves as an alternate route to the highway and highway shoulder that lacks dedicated facilities for walking and biking. Results indicated daily volumes of between 50 trips per day and 293 trips per day depending on the location and day of the week (Figure 6).

Figure 6 - Count Location Summary (Trips per Day)



The following pages include detailed reports about each study.

4.2 Strava Metro and Strava Global Heatmap

Software developer Strava offers Strava Metro to Departments of Transportation, counties, cities and others interested in quantifying the relative popularity of routes for walking and biking. A review of Strava Metro data by SWRPC indicated relatively strong popularity for trips by bike with State facilities (NH 10, Base Hill Road, Sawyers Crossing Road, Ashuelot Rail Trail) as well as local roads (including Eaton Road and California Street). The popularity of routes for walking and running was dominated by the Ashuelot Rail Trail (particularly north from West Swanzey) and other local roads. Even without access to Strava Metro, individuals are free to utilize Strava's Global Heatmap to view similar data.

Appendix 4:

Crash Trends and Intersection Field Review Analysis

Evaluation of GIS Crash Data and Trends

SWRPC staff compiled available Geographic Information Systems (GIS) crash data from the NH Department of Transportation (NHDOT) to analyze past motor vehicle crashes, with special attention to fatalities, injuries and high crash trends. The analysis included mapping activities and consideration of crash attribute information such as seasonal trends, time of day, weather, crash types, and other information.

Data Sources and Limitations

Since 2002, the NHDOT Bureau of Planning and Community Assistance has catalogued, analyzed, and distributed crash data from reports submitted by both local and State police. The information is utilized both internally and by a variety of agencies like regional planning commissions via two general methods, both of which are addressed in this evaluation:

1. NHDOT has utilized crash data internally along with statistical methods contained in the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (1st Edition) to better understand which sections of highway or which intersections have experienced *statistically higher occurrences of injuries and deaths*. These sites have the most potential for reducing crash frequency and/or severity.

2. GIS data provided by NHDOT were utilized by SWRPC to map the locations of crashes in the study area. These include records referred to as "locatable" crashes. Other crashes, labelled as "not locatable," lack sufficient detail to be mapped. Since the Swanzey NH 10 Corridor Study is a relatively small area, the focus of this evaluation will be "locatable" crashes from the ten-year period 2007 to 2016[1] located within ¼ mile of NH 10 (West Swanzey Road). There were 192 locatable crashes for the time period.

Evaluation Findings (Statistical Methods)

An evaluation of the two sources of data above yielded the following findings:

1. There were two highway segments on NH 10 (West Swanzey Road) in the GIS database that had a statistically higher observed rate of crashes and injuries and therefore have more potential for reducing crashes and injuries. The two segments were part of a list of the top 5% segments provided to SWRPC by NHDOT in 2015:
    a. GIS Segment 59835 recorded 61 crashes during the time period analyzed. This is the section of NH 10 (West Swanzey Road) between Sawyers Crossing Road and North Winchester Street (shown in Appendix A).
    b. GIS Segment 59425 recorded 11 crashes during the time period analyzed. This is the section of NH 10 (West Swanzey Road) between Base Hill Road and Whittemore Farm Road (shown in Appendix A).

2. There was one intersection, NH 10 (West Swanzey Road) at Base Hill Road in the GIS database that had a statistically higher observed rate of crashes and injuries and therefore has more potential for reducing crashes and injuries (GIS Node 66436 is shown in Appendix A). The intersection ranked 27th worst of 100 rural intersection around the State as part of a list of the top 100 intersection provided to SWRPC by NHDOT (and based on data from 2002 to 2011).

[1] The period 2007 through 2016 was the most recent period with records for each month of the year.

Evaluation Findings (GIS Data)

1. Regardless of whether crashes were "locatable" or "not locatable," the total number of crashes in the entire Town is on a downward trend over the period analyzed (when considering a 5-year rolling average).

Figure 1 - Swanzey, NH Crashes (2007-2016)

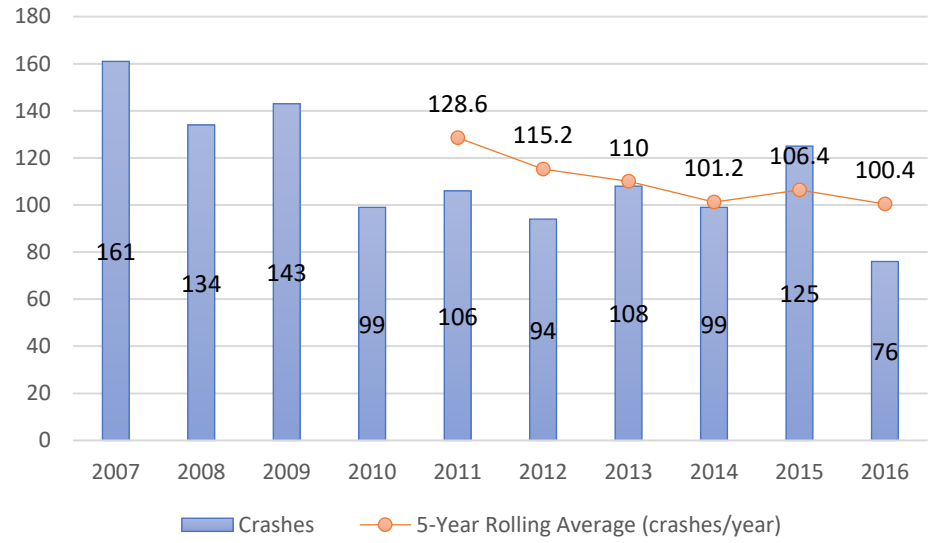


Table 1 - Swanzey, NH Crashes (2007-2016)

	Crashes	5-Year Rolling Average (crashes/year)
2007	161	
2008	134	
2009	143	
2010	99	
2011	106	128.6
2012	94	115.2
2013	108	110
2014	99	101.2
2015	125	106.4
2016	76	100.4

2. Within the ¼ mile study area of NH 10 (West Swanzey Road), the "locatable" crash record showed a significant decrease in crashes starting in 2011.

Figure 2 - NH 10 Corridor Study Area "Locatable" Crashes (2007-2016)

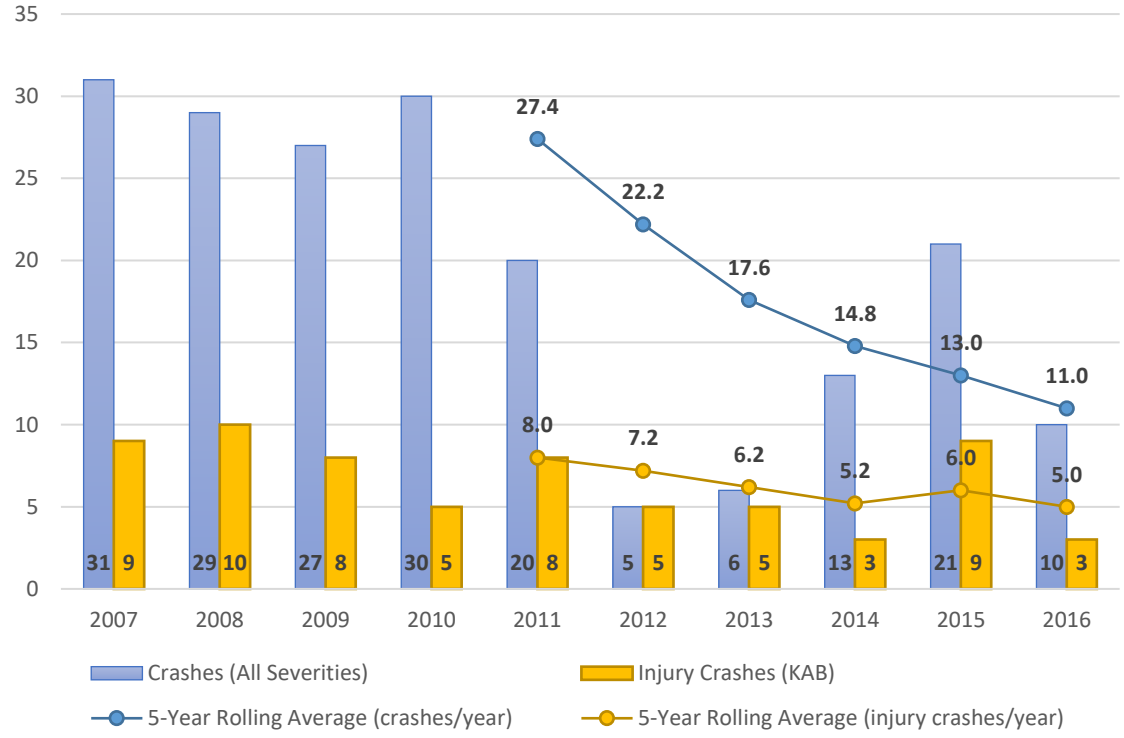


Table 2 - NH 10 Corridor Study Area "Locatable" Crashes (2007-2016)

	Crashes (All Severities)	5-Year Rolling Average (crashes/year)	Injury Crashes (K, A, B Severity Only)	5-Year Rolling Average (injury crashes/year)
2007	31		9	
2008	29		10	
2009	27		8	
2010	30		5	
2011	20	27.4	8	8.0
2012	5	22.2	5	7.2
2013	6	17.6	5	6.2
2014	13	14.8	3	5.2
2015	21	13.0	9	6.0
2016	10	11.0	3	5.0

3. An evaluation of the crashes based on the severity of injuries for "locatable" crashes in the study area showed a lower proportion of "no injury" crashes starting in 2012, however the proportion of "unknown" crashes increased in 2014.

Figure 3 - Comparison of "Locatable" Crashes (2007-2016) by Severity

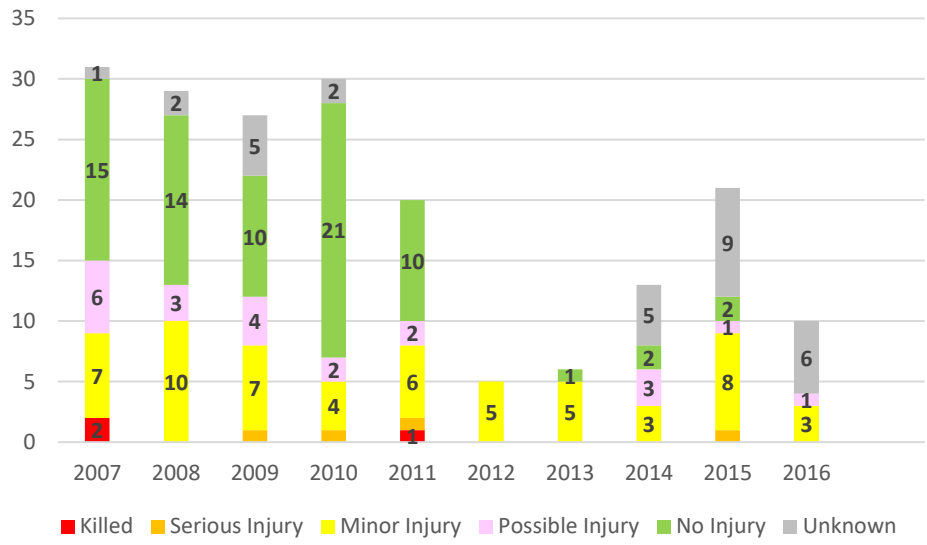


Table 3 - Comparison of "Locatable" Crashes (2007-2016) by Severity

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Killed	2[2]				1[3]						3
Serious Injury			1	1	1				1		4
Minor Injury	7	10	7	4	6	5	5	3	8	3	58
Possible Injury	6	3	4	2	2			3	1	1	22
No Injury	15	14	10	21	10		1	2	2		75
Unknown	1	2	5	2				5	9	6	30
Grand Total	31	29	27	30	20	5	6	13	21	10	192

[2] Crash dates were 1/6/07 and 8/27/07

[3] Crash date was 4/15/11

4. A review of crashes by day of week showed that crashes were more likely to occur on Fridays and Saturdays.

Figure 4 - Comparison of "Locatable" Crashes (2007-2016) by Day of Week

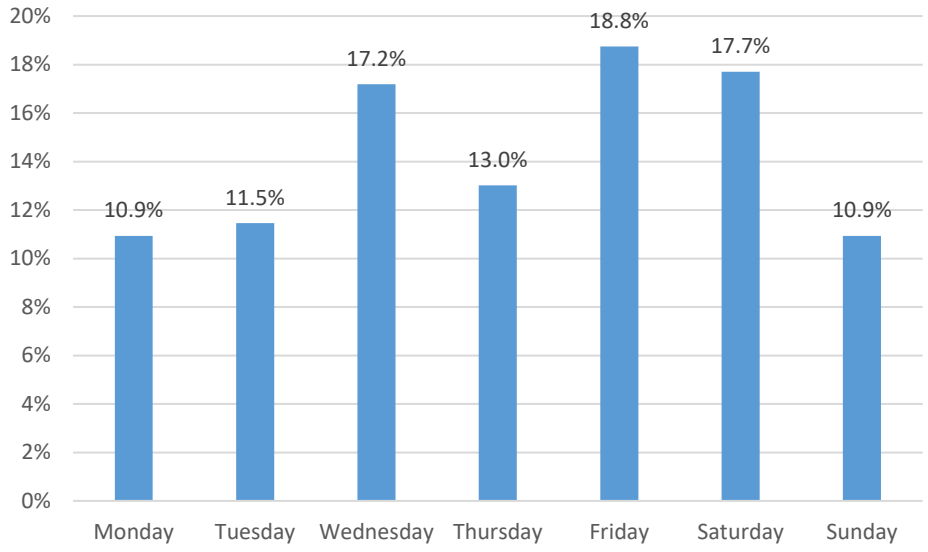


Table 4 - Comparison of "Locatable" Crashes (2007-2016) by Day of Week

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Grand Total
2007	2	3	3	3	7	7	6	31
2008	2	1	7	6	6	2	5	29
2009	2	3	8	5	3	3	3	27
2010	3	1	6	1	8	9	2	30
2011	1	3	1	3	5	5	2	20
2012	2			1	1	1		5
2013	1	1		2		2		6
2014	1	4	2	2		4		13
2015	6	4	3		4	1	3	21
2016	1	2	3	2	2			10
Grand Total	21	22	33	25	36	34	21	192

5. A review of crashes by type of crash determined that the majority of crashes within the study area were with other motor vehicles or a fixed object. Other crash types included animal, other object, other, unknown, overturn, parked motor vehicle, bicyclist and pedestrian. Most fixed object crashes involved a tree.

Figure 5 - Comparison of "Locatable" Crashes (2007-2016) by Type

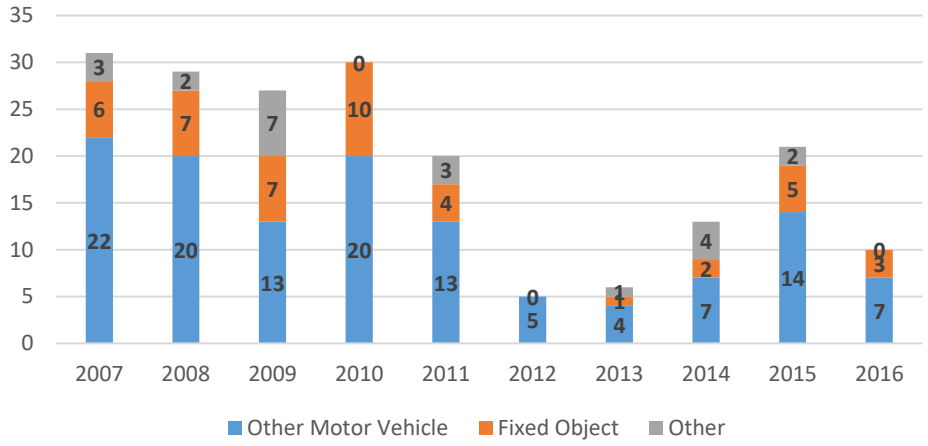


Table 5 - Comparison of "Locatable" Crashes (2007-2016) by Type

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Other Motor Vehicle	22	20	13	20	13	5	4	7	14	7	125
Fixed Object	6	7	7	10	4		1	2	5	3	45
Animal	3	1	2		1			1	1		9
Other Object		1	2				1				4
Other			1						1		2
Unknown			1		1						2
Overturn			1		1						2
Parked Motor Vehicle								1			1
Bicyclist								1			1
Pedestrian								1			1
Grand Total	31	29	27	30	20	5	6	13	21	10	192

Table 6 - Comparison of Fixed Object Impacts of "Locatable" Crashes (2007-2016)

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Tree	1	1	2	4	1				2	2	13
Guard Rail	1		1	1	2				2	1	8
Telephone/Electric Pole		4	1	2							7
Other	2		1	2				1			6
Embankment/Ditch/Curb	1		2					1	1		5
Building/Wall	1	1									2
Sign Post					1		1				2
Barrier/Fence		1									1
Light Pole				1							1
Grand Total	6	7	7	10	4	0	1	2	5	3	45

6. The location of the first harmful event of each crash was most commonly “along the road” followed by “at intersection” and “along road at driveway access”.

Figure 6 - Location of First Harmful Event of "Locatable" Crashes (2007-2016)

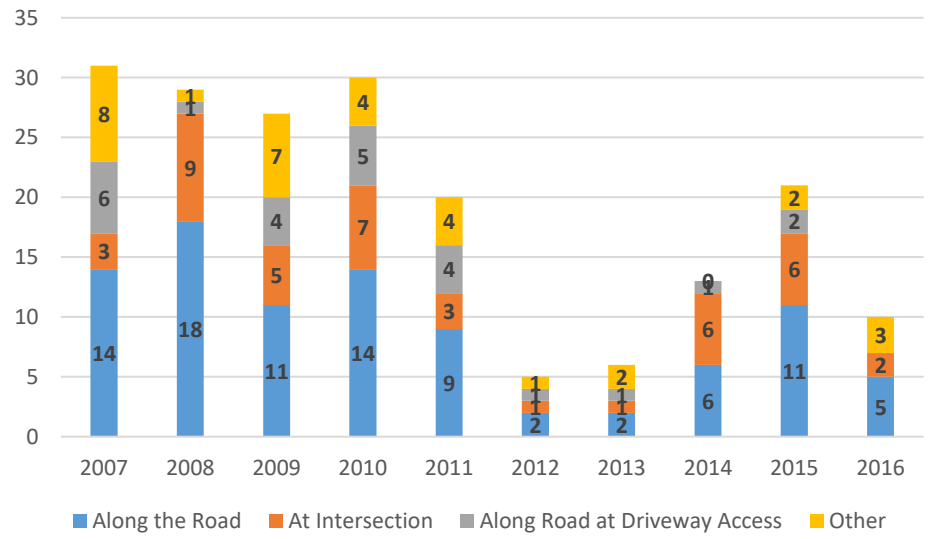


Table 7 - Location of First Harmful Event of "Locatable" Crashes (2007-2016)

	‘07	‘08	‘09	‘10	‘11	‘12	‘13	‘14	‘15	‘16	Grand Total
Along the Road	14	18	11	14	9	2	2	6	11	5	92
At Intersection	3	9	5	7	3	1	1	6	6	2	43
Along Road at Driveway Access	6	1	4	5	4	1	1	1	2		25
Off Roadway beyond Shoulder	4	1	3	1	2						11
Intersection Related	2		3	1	2	1	1			1	11
Off Roadway on Shoulder/Median	1		1	2					1	1	6
In a Parking Lot							1		1	1	3
Unknown	1										1
Grand Total	31	29	27	30	20	5	6	13	21	10	192

7. Crashes on NH 10 occur for the most part in dry conditions. However, wet or slippery road surface conditions played a factor in a significant number of crashes (as many as 54 of 192, or about 28% in the period analyzed).

Figure 7 - Comparison of Surface Conditions of "Locatable" Crashes (2007-2016)

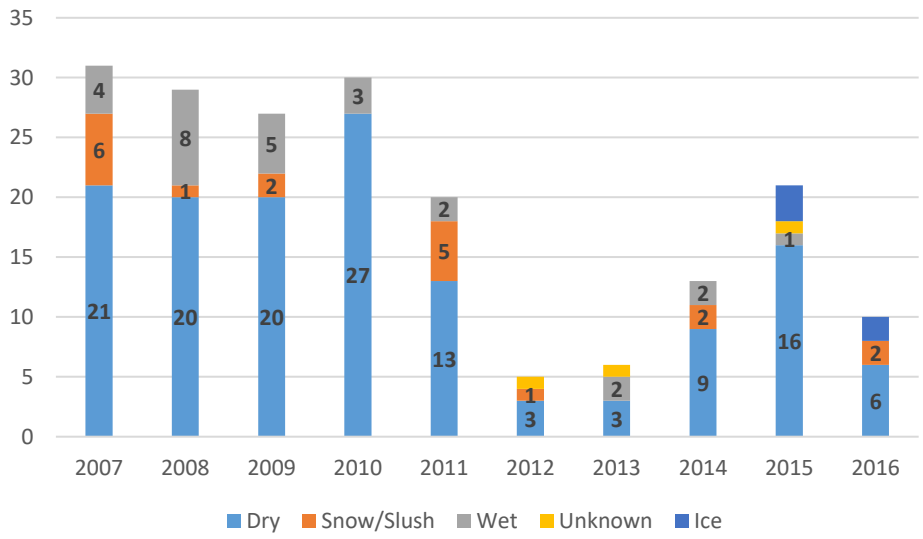


Table 8 - Comparison of Surface Conditions of "Locatable" Crashes (2007-2016)

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Dry	21	20	20	27	13	3	3	9	16	6	138
Snow/Slush	6	1	2		5	1		2		2	19
Wet	4	8	5	3	2		2	2	1		27
Unknown						1	1		1		3
Ice									3	2	5
Grand Total	31	29	27	30	20	5	6	13	21	10	192

8. The majority, over two-thirds of crashes occurred during daylight hours (about 68%).

Figure 8 - Comparison of Surface Conditions of "Locatable" Crashes (2007-2016)

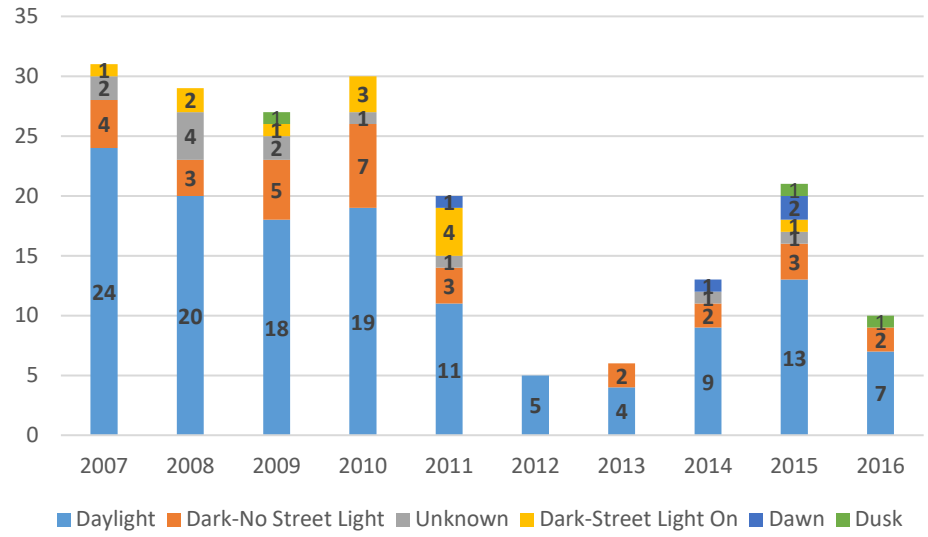


Table 9 - Comparison of Surface Conditions of "Locatable" Crashes (2007-2016)

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Daylight	24	20	18	19	11	5	4	9	13	7	130
Dark-No Street Light	4	3	5	7	3		2	2	3	2	31
Unknown	2	4	2	1	1			1	1		12
Dark-Street Light On	1	2	1	3	4				1		12
Dawn					1			1	2		4
Dusk			1						1	1	3
Grand Total	31	29	27	30	20	5	6	13	21	10	192

9. Over 80% of crashes occurred when there were no adverse weather conditions (either “clear” or “cloudy”).

Figure 9 - Comparison of Weather Conditions of "Locatable" Crashes (2007-2016)

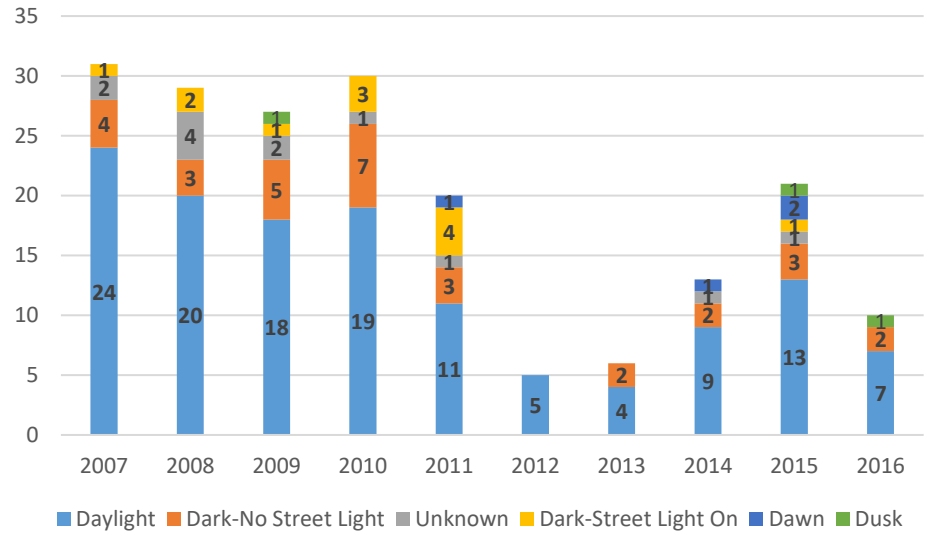


Table 10 - Comparison of Weather Conditions of "Locatable" Crashes (2007-2016)

	‘07	‘08	‘09	‘10	‘11	‘12	‘13	‘14	‘15	‘16	Grand Total
Clear	20	17	15	21	14	2	3	8	16	4	120
Cloudy	3	7	7	5	2	3	1	1	4	4	37
Rain	1	3	4	2			2	1	1		14
Snow	2	2	1		4			2		2	13
Sleet	4										4
No Adverse Conditions				2							2
Rain and Fog								1			1
Fog	1										1
Grand Total	31	29	27	30	20	5	6	13	21	10	192

10. SWRPC also performed an analysis of information about individual injuries. For the 192 crashes in the record, there were a total of 499 individuals involved in the crashes.

Figure 10 - Comparison of "Locatable" Injuries (2007-2016) by Severity

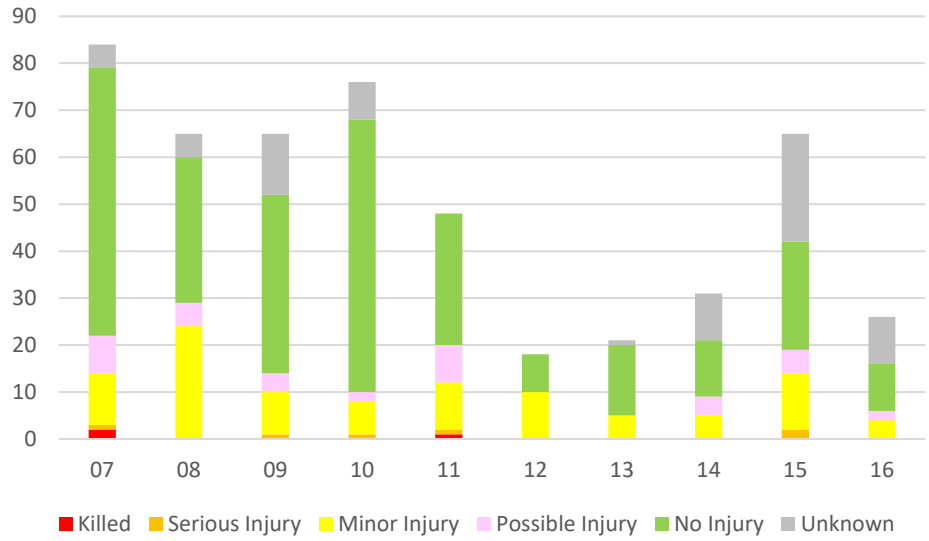


Table 11 - Comparison of "Locatable" Injuries (2007-2016) by Severity

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Killed	2				1						3
Serious Injury	1		1	1	1				2		6
Minor Injury	11	24	9	7	10	10	5	5	12	4	97
Possible Injury	8	5	4	2	8			4	5	2	38
No Injury	57	31	38	58	28	8	15	12	23	10	280
Unknown	5	5	13	8			1	10	23	10	75
Grand Total	84	65	65	76	48	18	21	31	65	26	499

11. Information about the use of safety restraints was also analyzed. Approximately 1 in 4 occupants were not using a safety restraint or helmet during a crash (24.6%). For fatality and injury crashes (KAB), the proportion of occupants not using a safety restraint was 43.4%.

Table 12 – Summary Comparison of "Locatable" Injuries (2007-2016) by Safety Equipment Used

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total	Percent
Restraint/Helmet Used	61	40	50	53	37	7	13	22	27	15	325	65.1%
Restraint/Helmet Not Used or Not Installed	18	20	10	20	11	10	7	3	19	5	123	24.6%
Unknown, Not Applicable	5	5	5	3	0	1	1	6	19	6	51	10.2%
Grand Total	84	65	65	76	48	18	21	31	65	26	499	

Table 13 – Full Comparison of "Locatable" Injuries (2007-2016) by Safety Equipment Used

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total
Restraint Installed - Used	50	26	42	39	22	5	7	20	23	12	246
Restraint Installed - Not Used	12	17	9	15	7	8	7	1	10	2	88
Unknown	5	5	5	3		1	1	5	19	6	50
Air Bag and Seat Restraint Used	6	4	4	1	9	1	2		1	1	29
Restraint Devices not Installed	4	3	1	4	4			2	7	3	28
Child Restraint		3		10	2		4		3	1	23
Air Bag Deployed	3	6	3	3	4	1		1		1	22
Helmet not Used	2			1		2			2		7
Helmet Used	2	1	1					1			5
Clothing DARK								1			1
Grand Total	**84**	**65**	**65**	**76**	**48**	**18**	**21**	**31**	**65**	**26**	**499**

12. An analysis of contributing factors related to each vehicle was conducted. Driver inattention/distraction was the most commonly cited contributing factor in the crash record.

Table 14 - Full Comparison of "Locatable" Crashes (2007-2016) by Vehicle and Apparent Contributing Factor

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total	%
No Improper Driving	20	18	22	25	13	9	3	7	14	8	139	39.4%
Driver Inattention/Distraction	5	8	8	13	5	3	1	4	7	3	57	16.1%
Failure to Yield R-O-W	7	3	6	3	2		2	1	4	1	29	8.2%
Unknown	3	2	1	3	4		3	8	2		26	7.4%
(blank)	2	6	2	2	2			4	2		20	5.7%
Following too Close	8	3		1	2			1			15	4.2%
Physical Impairment	1	4	4	4	1						14	4.0%
Other	1	2	1		2		1	2	2	1	12	3.4%
Skidding	1				1	1		1	4	2	10	2.8%
Illegal/Unsafe Speed	2			1	1					1	5	1.4%
Driver Inexperience	1	2		1							4	1.1%
Defective Equipment		1	1						2		4	1.1%
Improper Passing/Overtaking	1	1	1							1	4	1.1%
Vision Obscurement	1	1					1				3	0.8%
Disregard Traffic Control Device	1	1		1							3	0.8%
Improper Park/Start/Stop			1	1							2	0.6%
Improper Turn	1					1					2	0.6%
Improper/Unsafe Lane Use	1	1									2	0.6%
Unsafe Backing					1						1	0.3%
Centerline Encroachment	1										1	0.3%
Grand Total	**57**	**53**	**47**	**55**	**34**	**14**	**11**	**28**	**37**	**17**	**353**	

13. Vehicle actions prior to the crash were analyzed. Most vehicles were driving along the road prior to the crash. The other most common situations prior to the crash involved a stopped or turning vehicle.

	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Grand Total	%
Following Roadway	32	28	31	24	22	6	3	10	20	9	185	52.4%
Stopped in Traffic	2	7	7	8	3	1		8	1	4	41	11.6%
Making Left Turn	6	7	1	7	1	1	2	2	8	2	37	10.5%
Other Vehicle Action	5	2	2	5	3	1	2	5	1		26	7.4%
Slowing or Stopping	2	2		6	1	4		1	3		19	5.4%
Avoid Something in Roadway		2	2	2	1				2		9	2.5%
Parked Legally	2	1		2				2		1	8	2.3%
Starting in Traffic	3	2	1						1		7	2.0%
Backing	1				1	1			1		4	1.1%
Making Right Turn	1		1	1	1						4	1.1%
Overtaking/Passing	2	1								1	4	1.1%
Passing on Right			1		1						2	0.6%
Unknown							2				2	0.6%
Wrong Way on a 1-Way		1									1	0.3%
Entering Parked Position							1				1	0.3%
Right Turn on Red	1										1	0.3%
Making U-Turn							1				1	0.3%
Parked and Rolled			1								1	0.3%
Grand Total	**57**	**53**	**47**	**55**	**34**	**14**	**11**	**28**	**37**	**17**	**353**	

Recommended Sites for Field Review and Analysis of Crash Reports

1. NH 10 at Base Hill Road (defined as a selection of "locatable" crash records at or within 50 ft. of the intersection).

Table 15 – Count of Crashes by Severity

Fatal Injury	1
Serious Injury	0
Minor Injury	2
Possible Injury	1
No Injury	3
Unknown	0
Total	7

2. NH 10 between Whittemore Farm Road and Base Hill Road (defined as a selection of "locatable" crash records *not* on the intersection node or within 50 ft. of either Whittemore Farm Road or Base Hill Road).

Table 16 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	0
Minor Injury	4
Possible Injury	3
No Injury	6
Unknown	2
Total	15

3. NH 10 at Whittemore Farm Road (defined as a selection of "locatable" crash records at or within 50 ft. of the intersection).

Table 17 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	0
Minor Injury	0
Possible Injury	2
No Injury	4
Unknown	2
Total	8

4. NH 10 at Sawyers Crossing Road (defined as a selection of "locatable" crash records at or within 50 ft. of the intersection).

Table 18 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	1
Minor Injury	4
Possible Injury	3

No Injury	2
Unknown	4
Total	14

5. NH 10 between Sawyers Crossing Road and North Winchester Street (defined as a selection of "locatable" crash records *not* on the intersection node or within 50 ft. of either Sawyers Crossing Road or North Winchester Street).

Table 19 - Count of Crashes by Severity

Fatal Injury	2
Serious Injury	0
Minor Injury	5
Possible Injury	4[4]
No Injury	14
Unknown	2
Total	27

Note: Of the 27 records, 5 "No Injury" crashes include "Base Hill Road" as the description of the intersecting street; 2 crashes include the "Westport Village Road" as the description of the intersection street (1 "No Injury" and 1 "Minor Injury"; 1 crash includes "West Street" as the description of the intersecting street ("No Injury").

6. NH 10 at North Winchester Street (defined as a selection of "locatable" crash records at or within 50 ft. of the intersection).

Table 20 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	1
Minor Injury	0
Possible Injury	0
No Injury	0
Unknown	1
Total	2

7. NH 10 at California Street (defined as a selection of "locatable" crash records at or within 50 ft. of the intersection).

Table 21 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	0
Minor Injury	4
Possible Injury	1
No Injury	0
Unknown	2[5]
Total	7

[4] One crash involved someone walking.
[5] One crash involved someone on a bicycle.

8. NH 10 at West Street (defined as a selection of “locatable” crash records at or within 50 ft. of the intersection).

Table 22 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	0
Minor Injury	1
Possible Injury	1
No Injury	3
Unknown	1
Total	6

9. NH 10 at Cobble Hill Road (defined as a selection of “locatable” crash records at or within 50 ft. of the intersection).

Table 23 - Count of Crashes by Severity

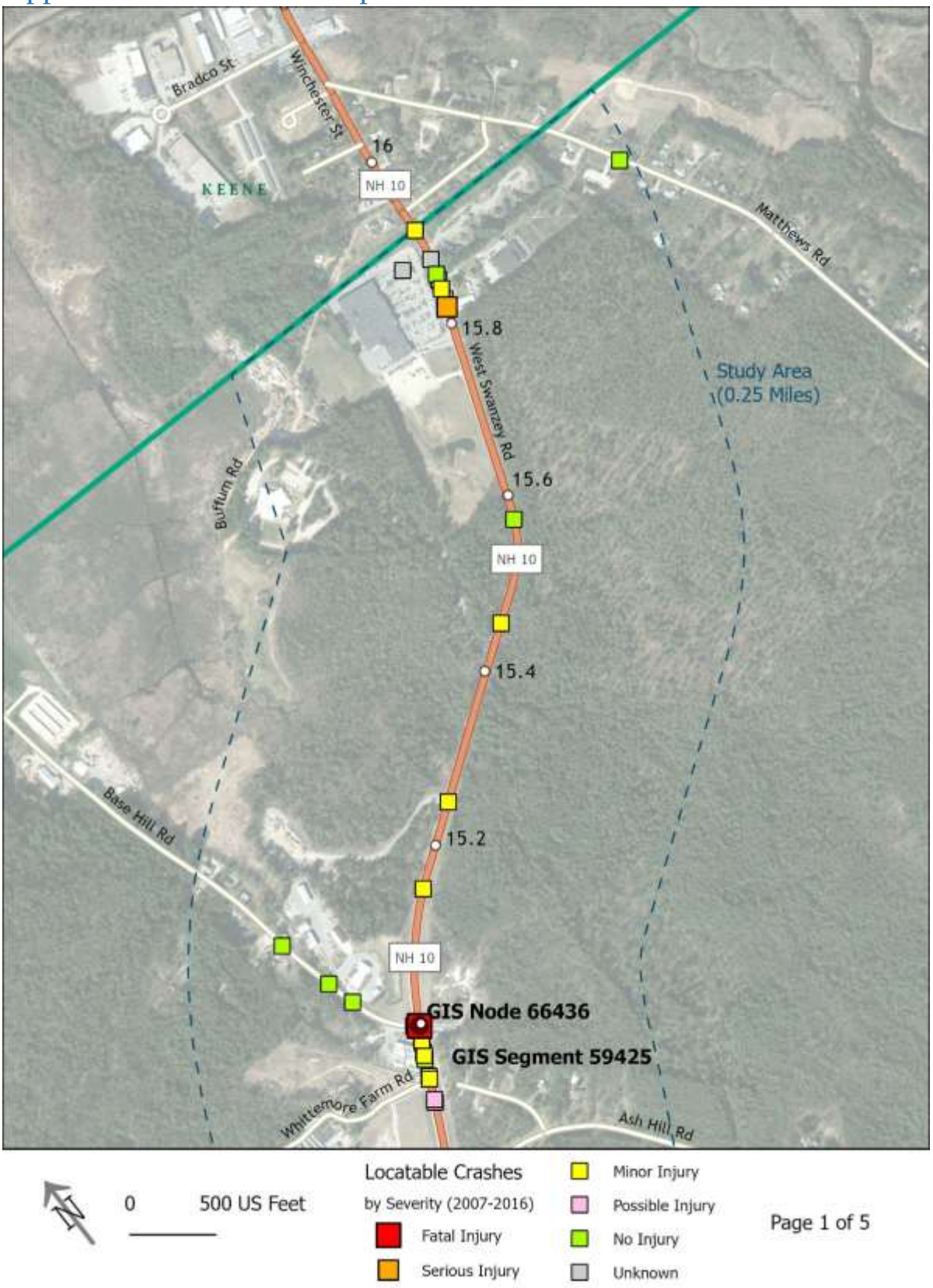
Fatal Injury	0
Serious Injury	0
Minor Injury	3
Possible Injury	1
No Injury	3
Unknown	1
Total	8

10. NH 10 at South Winchester Street (defined as a selection of “locatable” crash records at or within 50 ft. of the intersection).

Table 24 - Count of Crashes by Severity

Fatal Injury	0
Serious Injury	0
Minor Injury	2
Possible Injury	0
No Injury	2
Unknown	0
Total	4

Appendix A: GIS Data Map Series





Appendix A: GIS Data Map Series



Appendix A: GIS Data Map Series



Appendix A: GIS Data Map Series



Appendix A: GIS Data Map Series

NH 10 (West Swanzey Road) at Base Hill Road

Location Description: The Base Hill Road intersection shown in the center of the photo below is located near mile marker 15 on NH 10, about one mile south of the Keene line with the top of the photo oriented towards the north. The most notable development is the T-Bird Mini Mart situated southwest of the intersection.

2015 Aerial Photo:



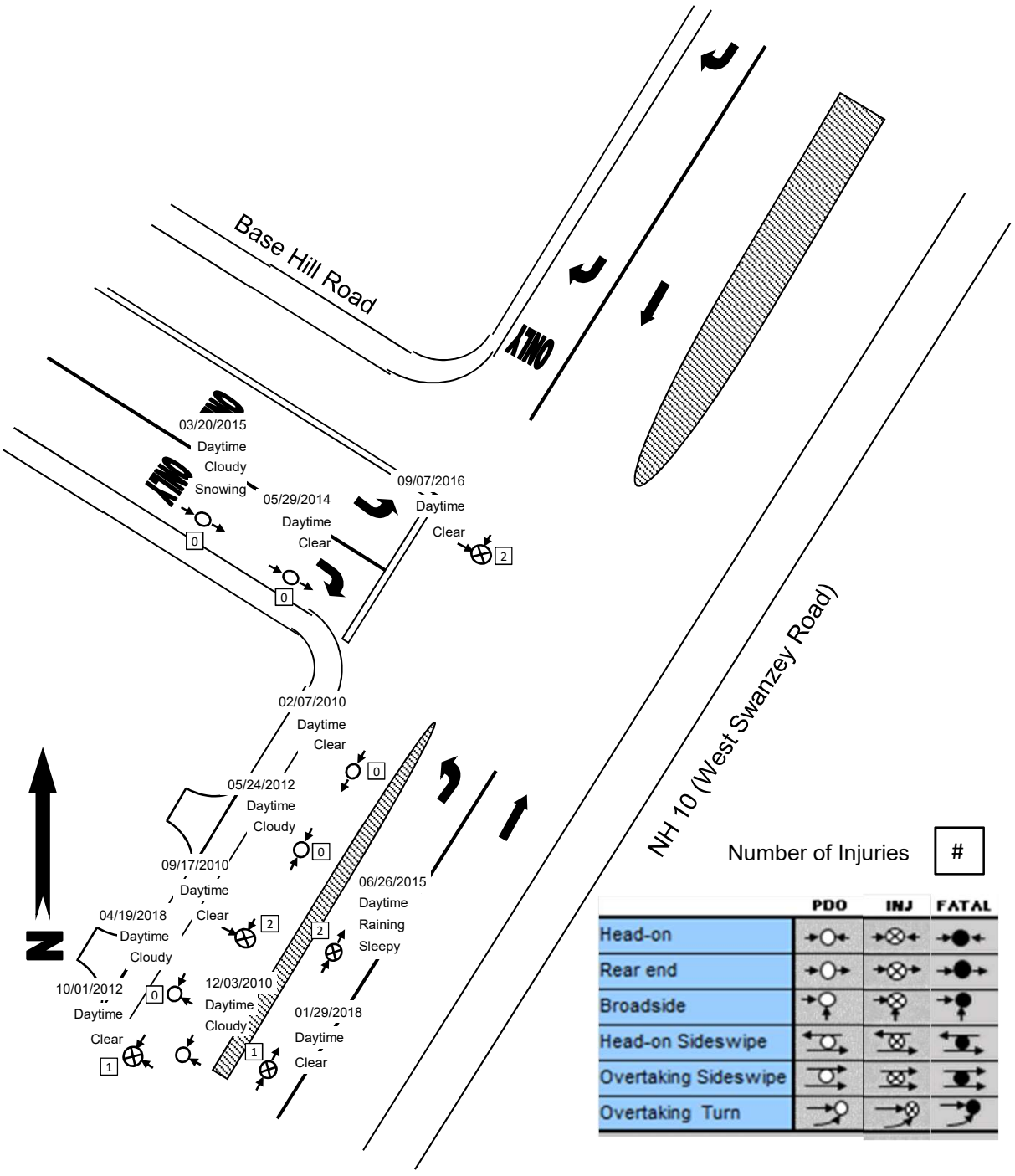
Source: GRANITView

Recent Traffic Studies:

- NH 10 at the Keene line: **14,433** vehicles per day (2019, seasonally-corrected estimate).
- NH 10 south of Base Hill Road: **13,476** vehicles per day (2019, seasonally-corrected estimate).
- Base Hill Road at Keene line: **2,924** vehicles per day (2020, not seasonally-corrected).
- Turning movement study diagrams from a 2020 field observation follow the **Crash Diagram**.

Crash Diagram: The diagram on the following page depicts the types and details of crashes at this location over the 10-year period 2010 through 2019. Note that the diagram is not drawn to scale and that all crash reports were provided by the Swanzey Police Department.

NH 10 at Base Hill Road
Crash Diagram



DIST	COUNTY	ROUTE	POST MILES DESCRPTN.
4	Cheshire	NH 10	15.0

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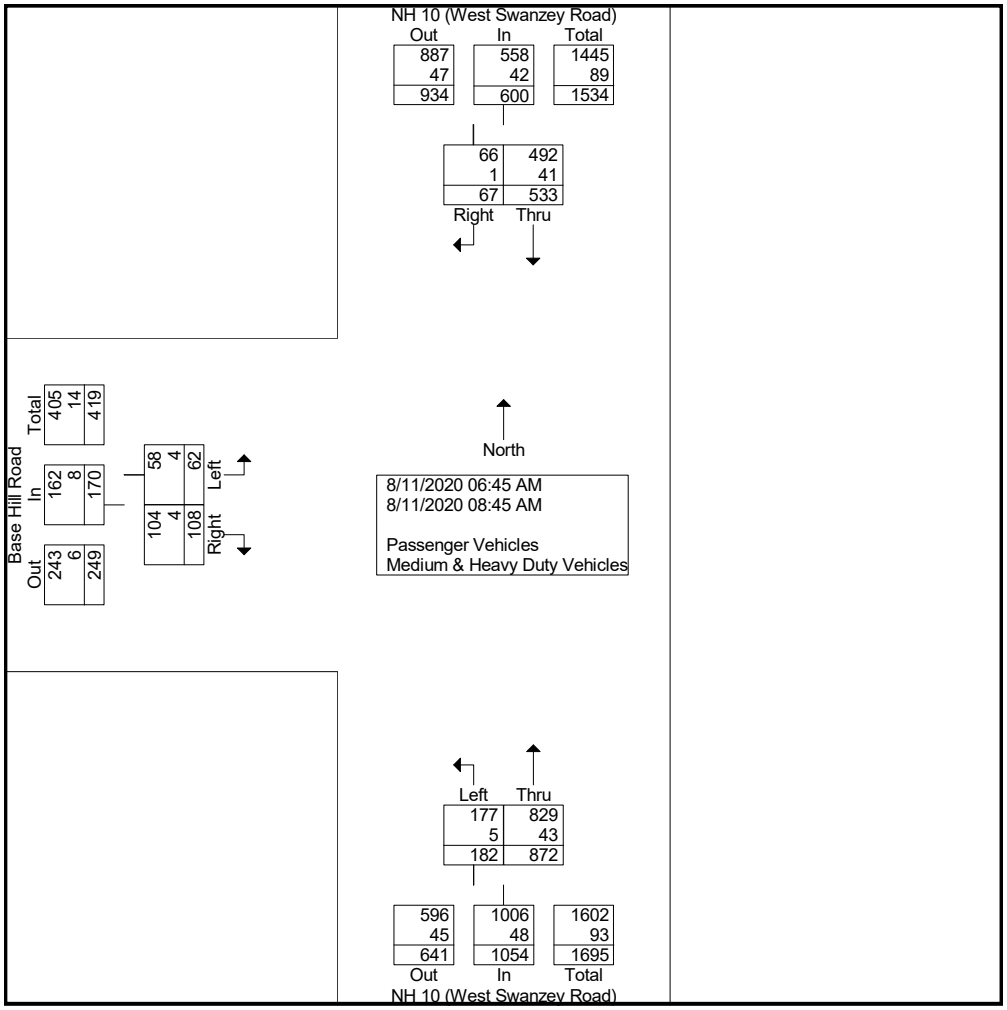
Groups Printed- Passenger Vehicles - Medium & Heavy Duty Vehicles

	NH 10 (West Swanzey Road) From North			NH 10 (West Swanzey Road) From South			Base Hill Road From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
06:45 AM	8	45	53	83	23	106	13	5	18	177
Total	8	45	53	83	23	106	13	5	18	177
07:00 AM	5	55	60	103	25	128	9	13	22	210
07:15 AM	3	52	55	114	19	133	11	7	18	206
07:30 AM	7	79	86	110	30	140	17	7	24	250
07:45 AM	10	70	80	102	21	123	9	5	14	217
Total	25	256	281	429	95	524	46	32	78	883
08:00 AM	6	56	62	106	17	123	9	2	11	196
08:15 AM	8	58	66	79	16	95	13	12	25	186
08:30 AM	11	62	73	79	12	91	17	4	21	185
08:45 AM	9	56	65	96	19	115	10	7	17	197
Total	34	232	266	360	64	424	49	25	74	764
Grand Total	67	533	600	872	182	1054	108	62	170	1824
Apprch %	11.2	88.8		82.7	17.3		63.5	36.5		
Total %	3.7	29.2	32.9	47.8	10	57.8	5.9	3.4	9.3	
Passenger Vehicles	66	492	558	829	177	1006	104	58	162	1726
% Passenger Vehicles	98.5	92.3	93	95.1	97.3	95.4	96.3	93.5	95.3	94.6
Medium & Heavy Duty Vehicles	1	41	42	43	5	48	4	4	8	98
% Medium & Heavy Duty Vehicles	1.5	7.7	7	4.9	2.7	4.6	3.7	6.5	4.7	5.4

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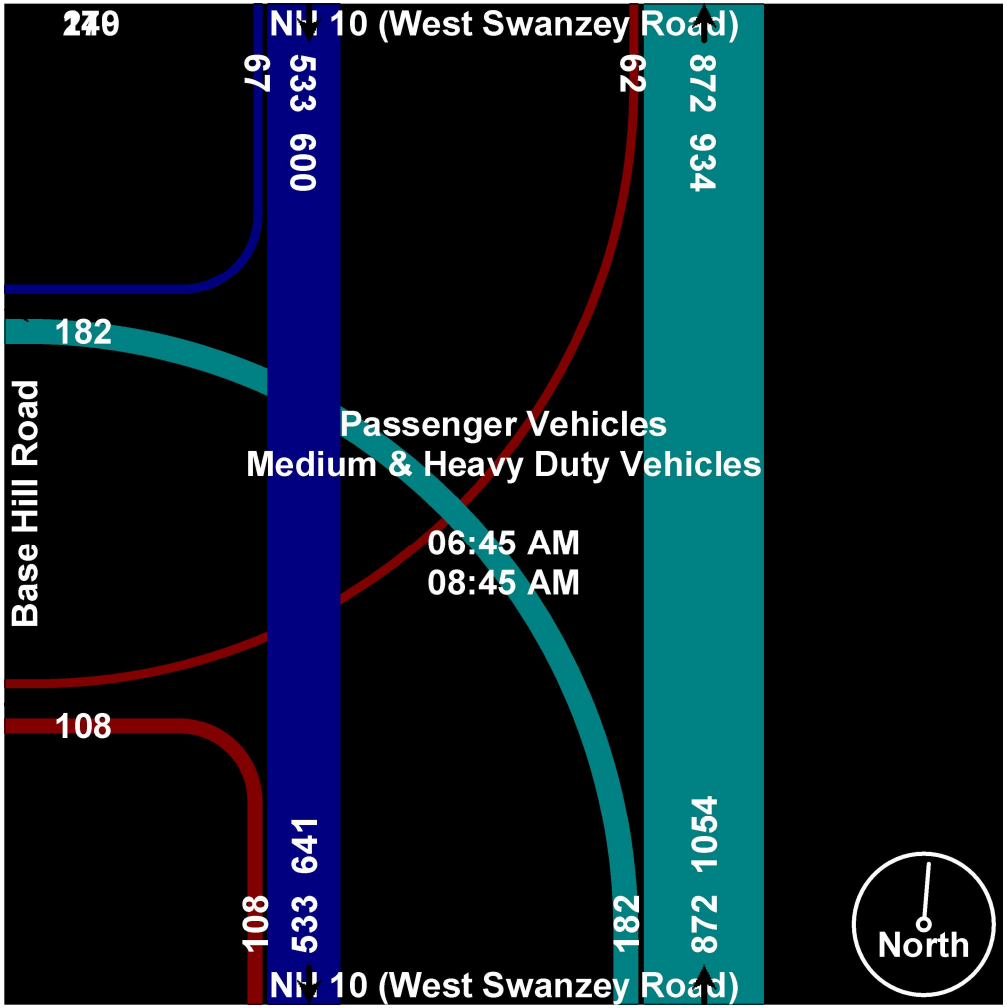
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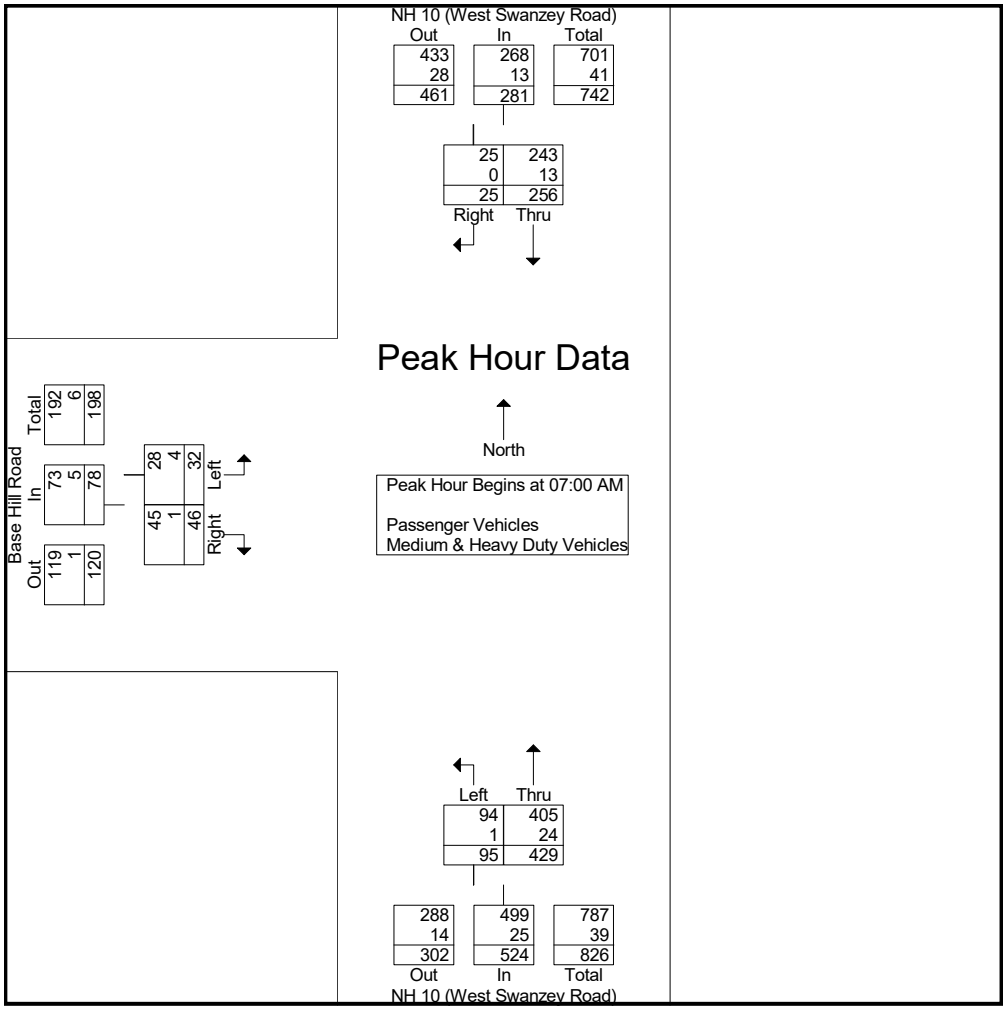
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	NH 10 (West Swanzey Road) From North			NH 10 (West Swanzey Road) From South			Base Hill Road From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	5	55	60	103	25	128	9	**13**	22	210
07:15 AM	3	52	55	**114**	19	133	11	7	18	206
07:30 AM	7	**79**	**86**	110	**30**	**140**	**17**	7	**24**	**250**
07:45 AM	**10**	70	80	102	21	123	9	5	14	217
Total Volume	25	256	281	429	95	524	46	32	78	883
% App. Total	8.9	91.1		81.9	18.1		59	41		
PHF	.625	.810	.817	.941	.792	.936	.676	.615	.813	.883
Passenger Vehicles	25	243	268	405	94	499	45	28	73	840
% Passenger Vehicles	100	94.9	95.4	94.4	98.9	95.2	97.8	87.5	93.6	95.1
Medium & Heavy Duty Vehicles	0	13	13	24	1	25	1	4	5	43
% Medium & Heavy Duty Vehicles	0	5.1	4.6	5.6	1.1	4.8	2.2	12.5	6.4	4.9

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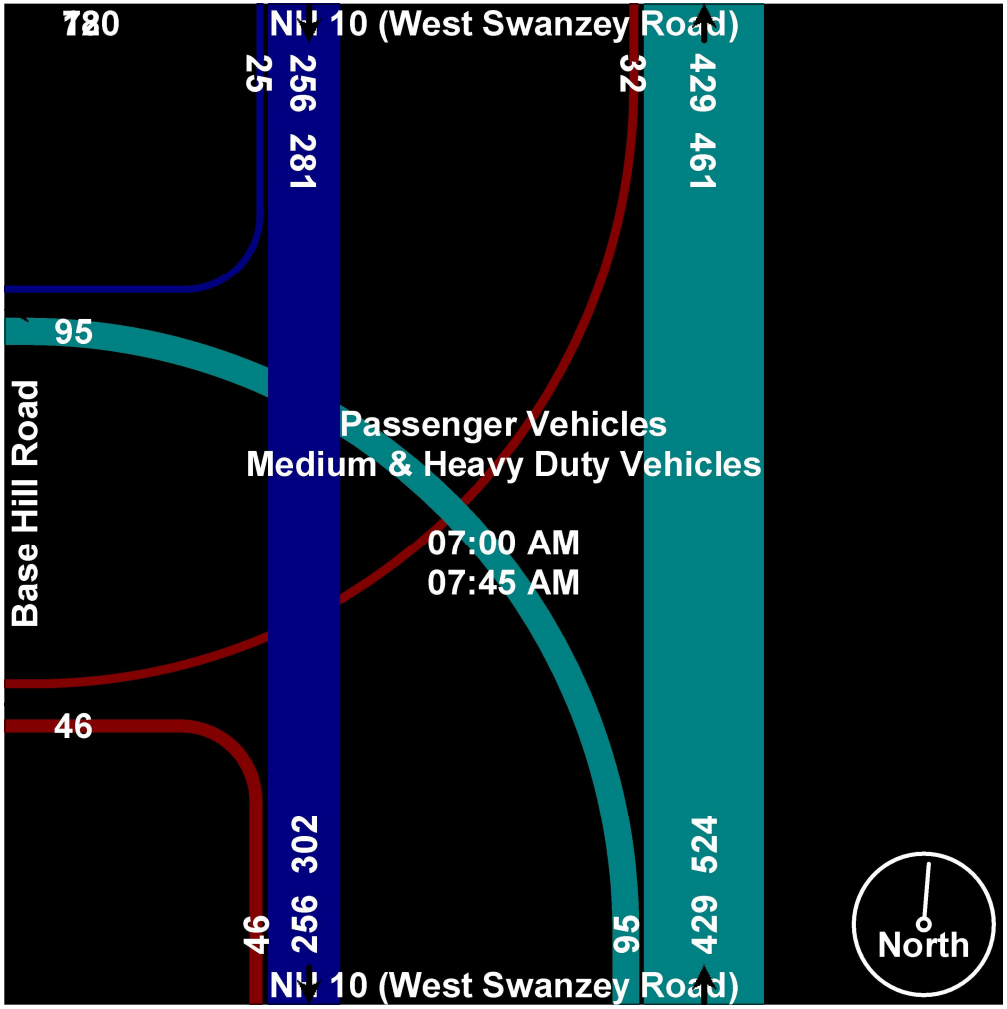
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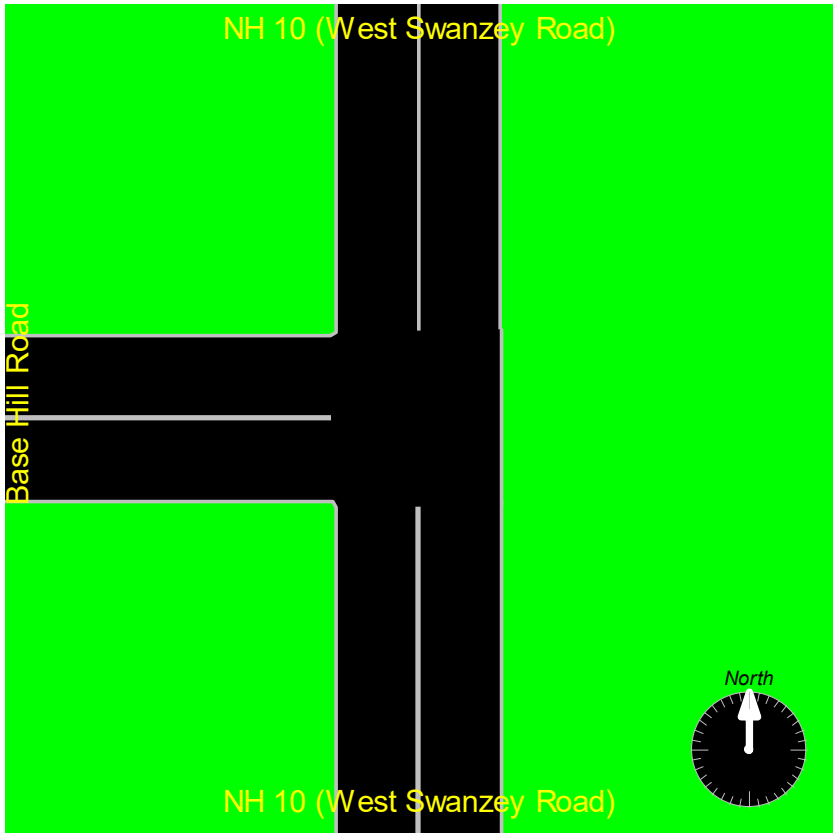
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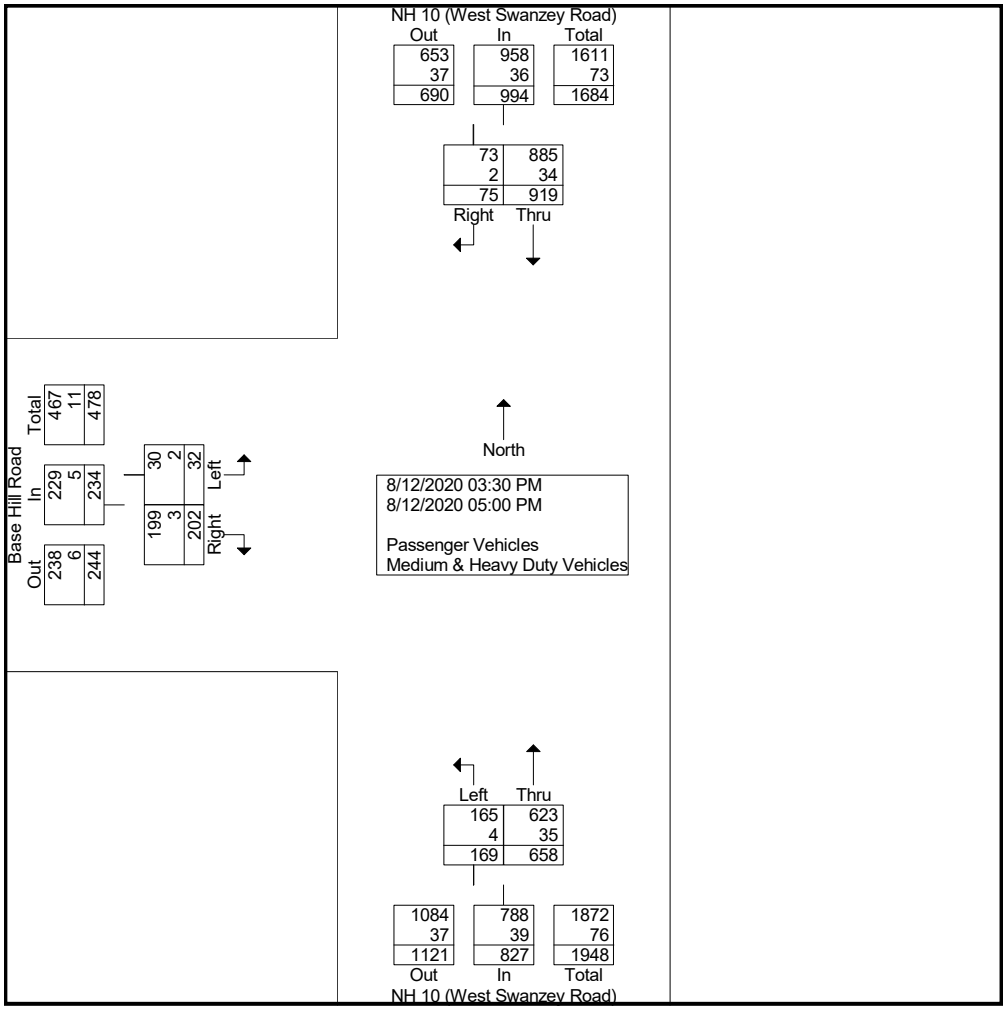
Groups Printed- Passenger Vehicles - Medium & Heavy Duty Vehicles

	NH 10 (West Swanzey Road) From North			NH 10 (West Swanzey Road) From South			Base Hill Road From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
03:30 PM	12	139	151	97	29	126	35	7	42	319
03:45 PM	13	125	138	89	30	119	31	2	33	290
Total	25	264	289	186	59	245	66	9	75	609
04:00 PM	12	145	157	110	16	126	24	5	29	312
04:15 PM	9	130	139	99	27	126	26	4	30	295
04:30 PM	6	123	129	85	21	106	27	4	31	266
04:45 PM	12	118	130	87	22	109	25	6	31	270
Total	39	516	555	381	86	467	102	19	121	1143
05:00 PM	11	139	150	91	24	115	34	4	38	303
Grand Total	75	919	994	658	169	827	202	32	234	2055
Apprch %	7.5	92.5		79.6	20.4		86.3	13.7		
Total %	3.6	44.7	48.4	32	8.2	40.2	9.8	1.6	11.4	
Passenger Vehicles	73	885	958	623	165	788	199	30	229	1975
% Passenger Vehicles	97.3	96.3	96.4	94.7	97.6	95.3	98.5	93.8	97.9	96.1
Medium & Heavy Duty Vehicles	2	34	36	35	4	39	3	2	5	80
% Medium & Heavy Duty Vehicles	2.7	3.7	3.6	5.3	2.4	4.7	1.5	6.2	2.1	3.9

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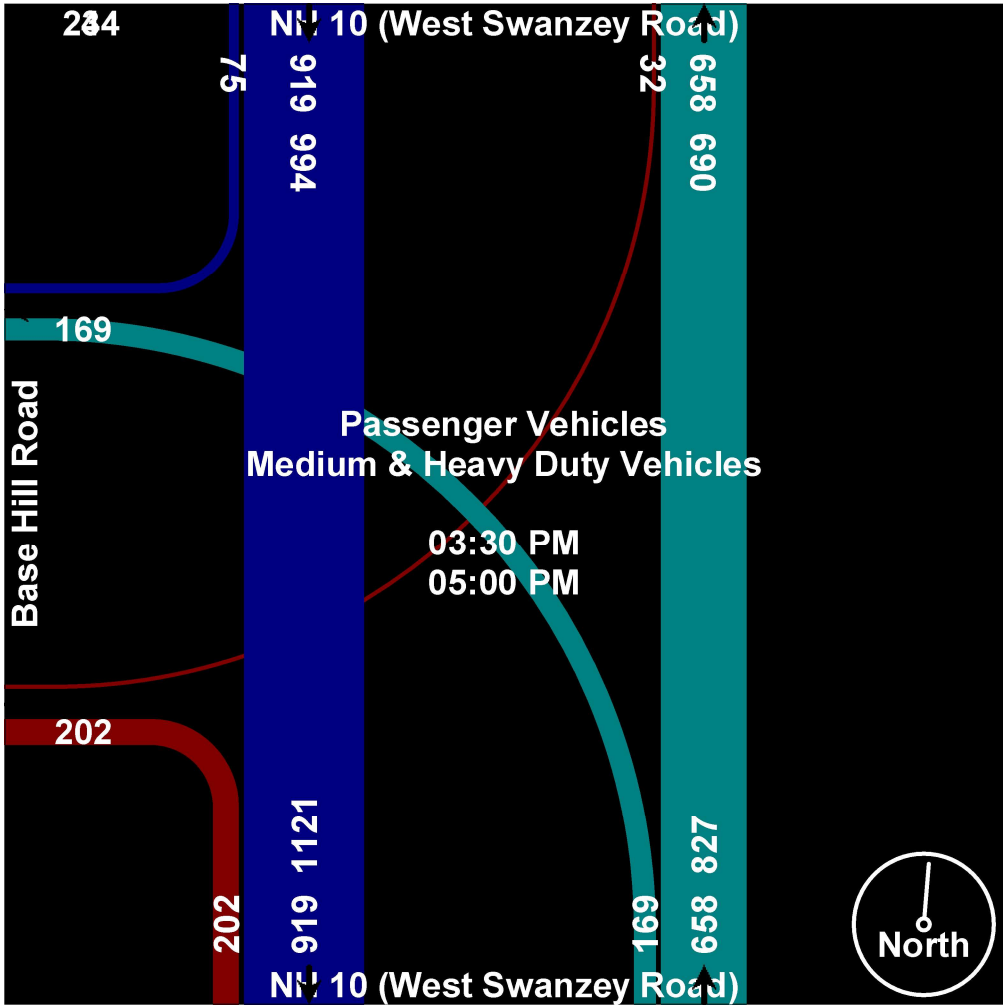
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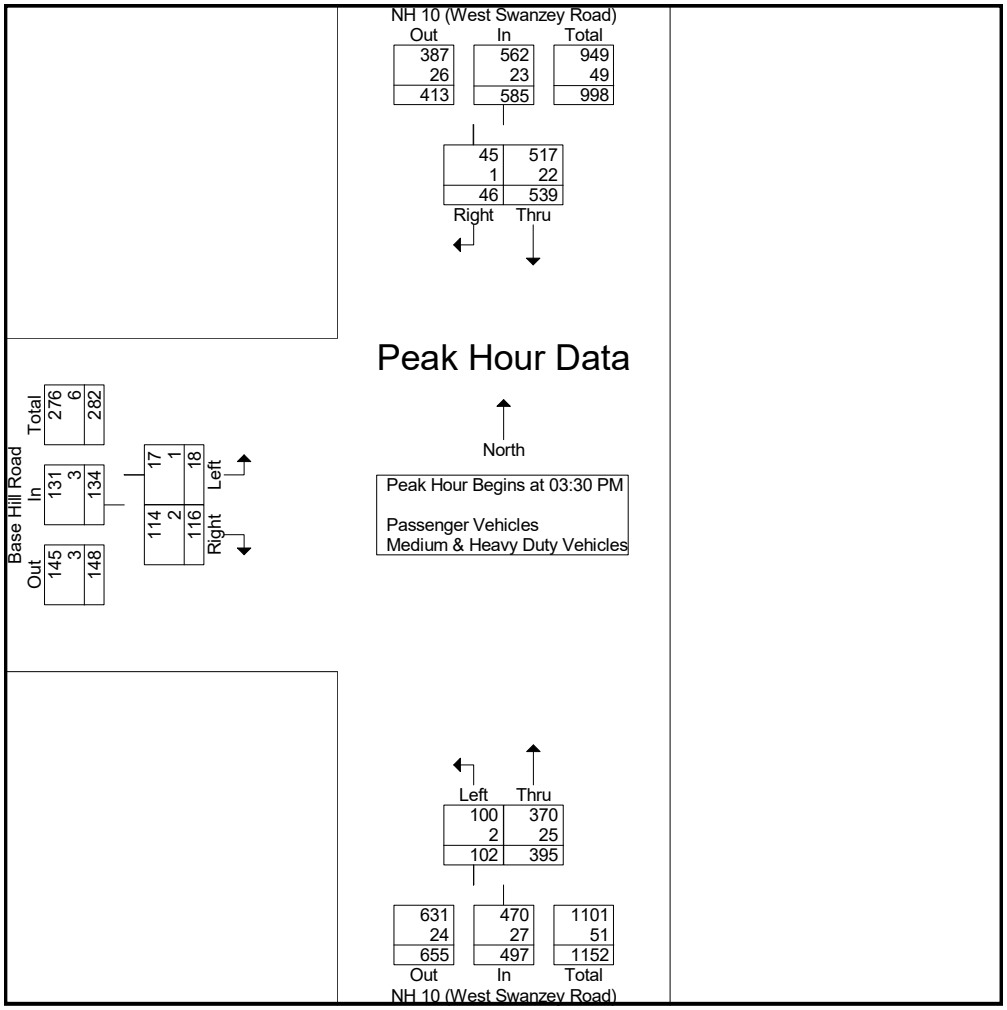
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	NH 10 (West Swanzey Road) From North			NH 10 (West Swanzey Road) From South			Base Hill Road From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:00 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	12	139	151	97	29	**126**	**35**	**7**	**42**	**319**
03:45 PM	**13**	125	138	89	**30**	119	31	2	33	290
04:00 PM	12	**145**	**157**	**110**	16	126	24	5	29	312
04:15 PM	9	130	139	99	27	126	26	4	30	295
Total Volume	46	539	585	395	102	497	116	18	134	1216
% App. Total	7.9	92.1		79.5	20.5		86.6	13.4		
PHF	.885	.929	.932	.898	.850	.986	.829	.643	.798	.953
Passenger Vehicles	45	517	562	370	100	470	114	17	131	1163
% Passenger Vehicles	97.8	95.9	96.1	93.7	98.0	94.6	98.3	94.4	97.8	95.6
Medium & Heavy Duty Vehicles	1	22	23	25	2	27	2	1	3	53
% Medium & Heavy Duty Vehicles	2.2	4.1	3.9	6.3	2.0	5.4	1.7	5.6	2.2	4.4

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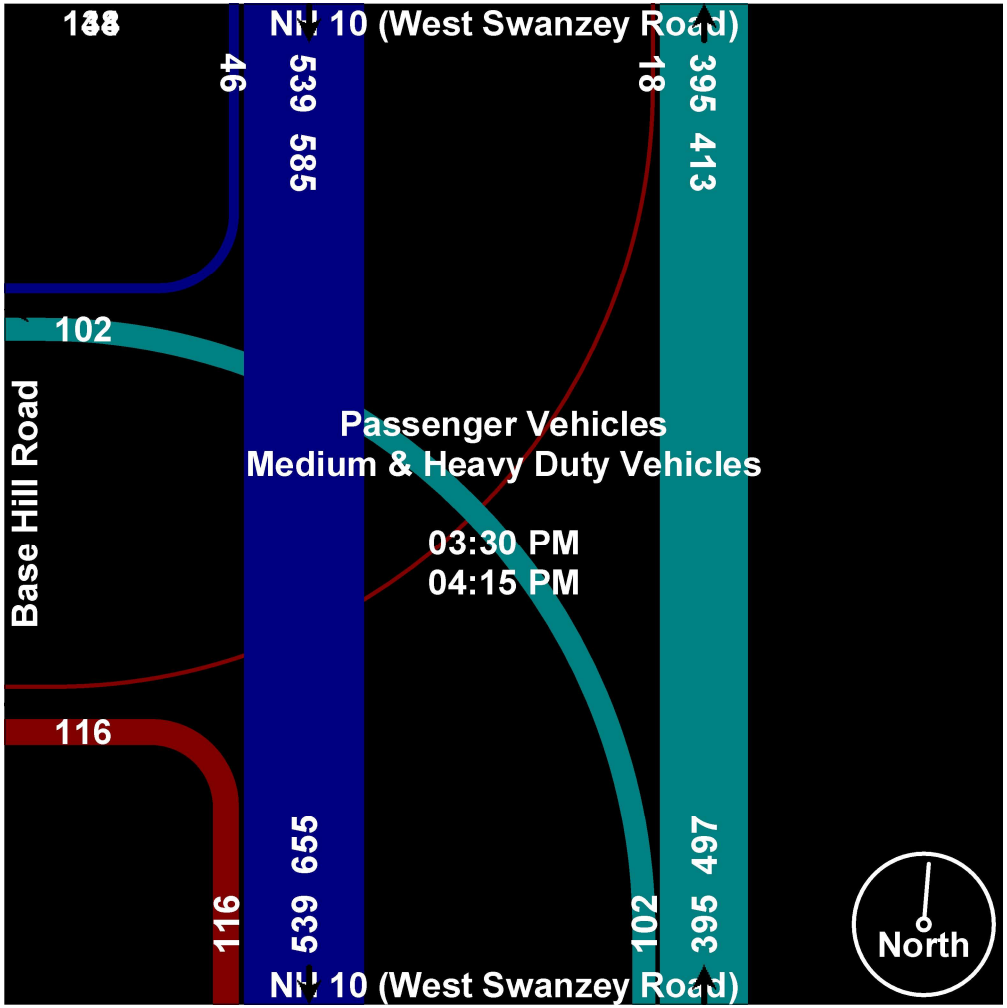
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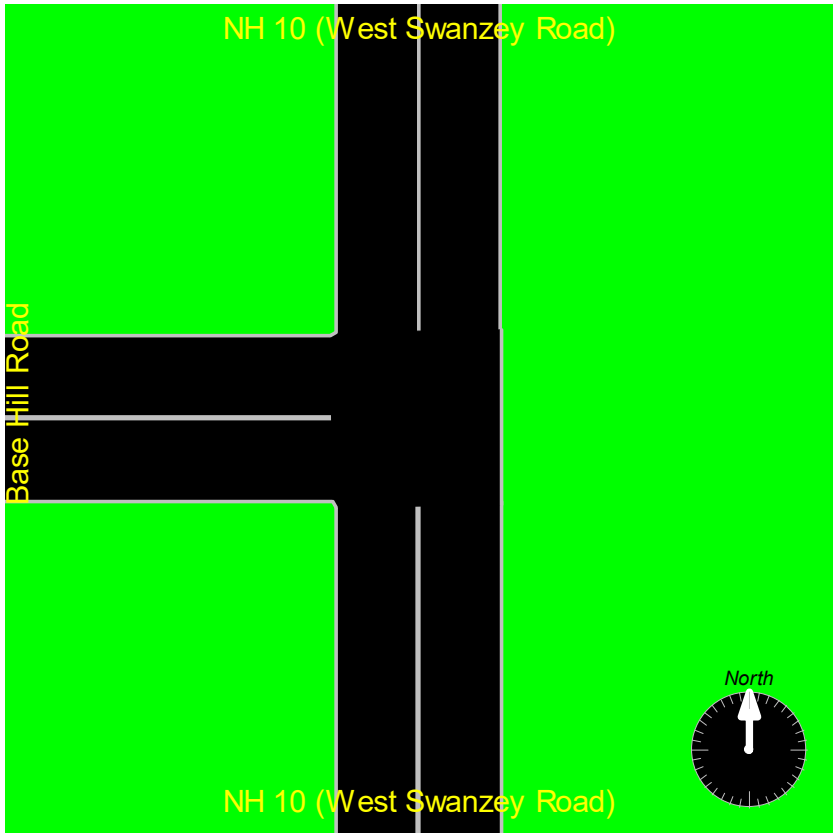
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NH 10 (West Swanzey Road) at Sawyers Crossing Road

Location Description: The Sawyers Crossing Road intersection shown in the center of the photo below is located at between mile marker 13.5 and 13.6 on NH 10 with the top of the photo oriented towards the north. Sawyers Crossing, a State road, approaches NH 10 from the east. Notable features include a slip-lane for northbound NH 10 traffic to head eastbound on Sawyers Crossing Road.

2015 Aerial Photo:



Source: GRANITView

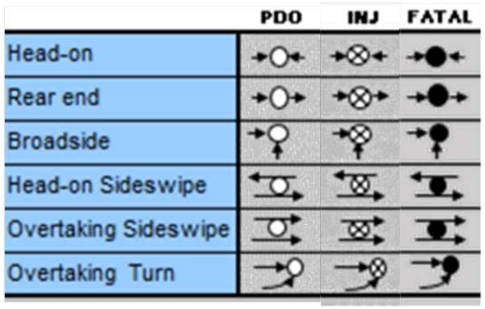
Recent Traffic Studies:

- NH 10 south of Base Hill Road: **13,476** vehicles per day (2019, seasonally-corrected estimate).
- Sawyers Crossing Road east of NH 10: **312** vehicles per day (2020, not seasonally-corrected).
- Turning movement study diagrams from a 2020 field observation follow the **Crash Diagram**.

Crash Diagram: The diagram on the following page depicts the types and details of crashes at this location over the 10-year period 2010 through 2019. Note that the diagram is not drawn to scale and that all crash reports were provided by the Swanzey Police Department.

NH 10 at Sawyers Crossing Road
Crash Diagram

Number of Injuries [#]



DIST	COUNTY	ROUTE	POST MILES DESCRPTN.
4	Cheshire	NH 10	13.5

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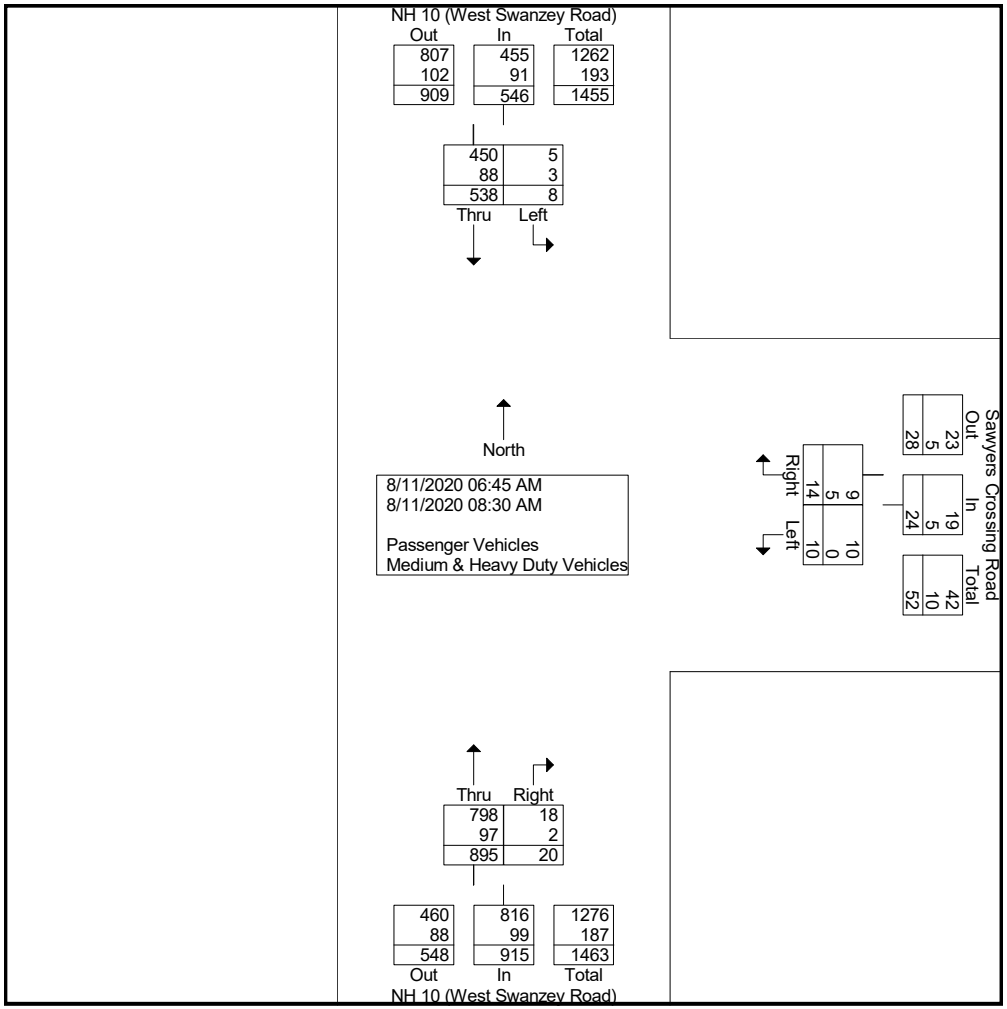
Groups Printed- Passenger Vehicles - Medium & Heavy Duty Vehicles

	NH 10 (West Swanzey Road) From North			Sawyers Crossing Road From East			NH 10 (West Swanzey Road) From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
06:45 AM	55	0	55	2	1	3	2	103	105	163
Total	55	0	55	2	1	3	2	103	105	163
07:00 AM	62	2	64	2	1	3	4	123	127	194
07:15 AM	60	1	61	2	0	2	4	125	129	192
07:30 AM	83	4	87	4	0	4	4	131	135	226
07:45 AM	76	0	76	0	2	2	1	120	121	199
Total	281	7	288	8	3	11	13	499	512	811
08:00 AM	62	0	62	2	2	4	3	110	113	179
08:15 AM	68	0	68	1	2	3	2	98	100	171
08:30 AM	72	1	73	1	2	3	0	85	85	161
Grand Total	538	8	546	14	10	24	20	895	915	1485
Apprch %	98.5	1.5		58.3	41.7		2.2	97.8		
Total %	36.2	0.5	36.8	0.9	0.7	1.6	1.3	60.3	61.6	
Passenger Vehicles	450	5	455	9	10	19	18	798	816	1290
% Passenger Vehicles	83.6	62.5	83.3	64.3	100	79.2	90	89.2	89.2	86.9
Medium & Heavy Duty Vehicles	88	3	91	5	0	5	2	97	99	195
% Medium & Heavy Duty Vehicles	16.4	37.5	16.7	35.7	0	20.8	10	10.8	10.8	13.1

Southwest Region Planning Commission

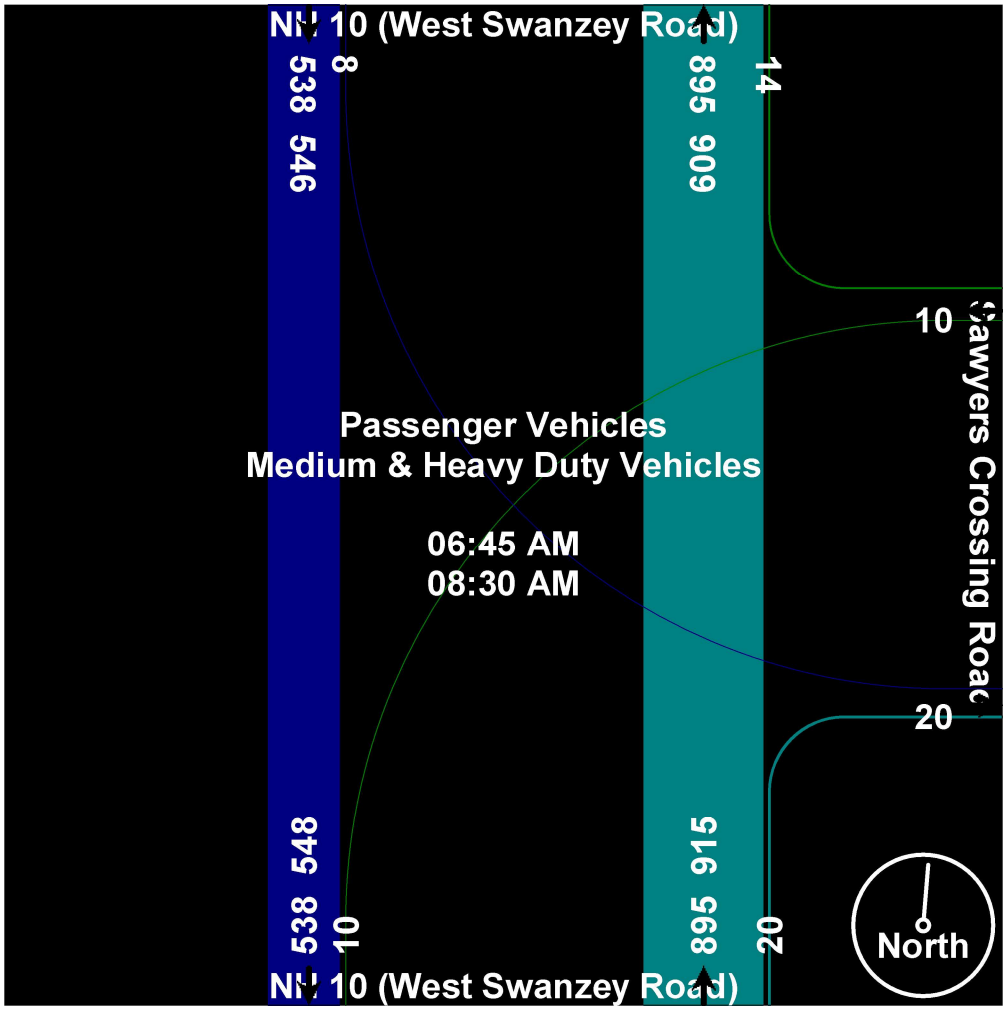
37 Ashuelot Street
Keene, NH 03431
(603) 357-0557
admin@swrpc.org

File Name : NH 10 at Sawyers Crossing Road AM
Site Code : 00000000
Start Date : 8/11/2020
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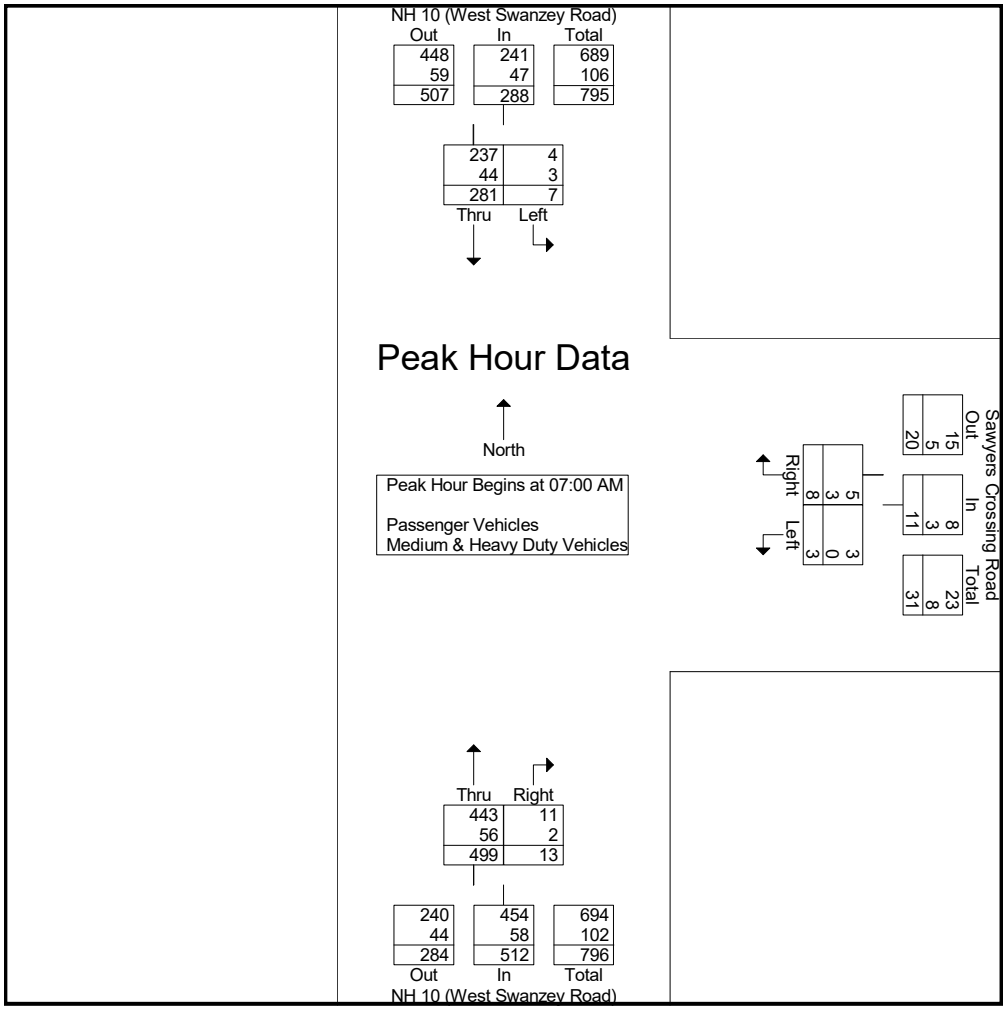
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Site Code : 00000000
Start Date : 8/11/2020

	NH 10 (West Swanzey Road) From North			Sawyers Crossing Road From East			NH 10 (West Swanzey Road) From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 08:30 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	62	2	64	2	1	3	**4**	123	127	194
07:15 AM	60	1	61	2	0	2	4	125	129	192
07:30 AM	**83**	**4**	**87**	**4**	0	**4**	4	**131**	**135**	**226**
07:45 AM	76	0	76	0	**2**	2	1	120	121	199
Total Volume	281	7	288	8	3	11	13	499	512	811
% App. Total	97.6	2.4		72.7	27.3		2.5	97.5		
PHF	.846	.438	.828	.500	.375	.688	.813	.952	.948	.897
Passenger Vehicles	237	4	241	5	3	8	11	443	454	703
% Passenger Vehicles	84.3	57.1	83.7	62.5	100	72.7	84.6	88.8	88.7	86.7
Medium & Heavy Duty Vehicles	44	3	47	3	0	3	2	56	58	108
% Medium & Heavy Duty Vehicles	15.7	42.9	16.3	37.5	0	27.3	15.4	11.2	11.3	13.3

Southwest Region Planning Commission

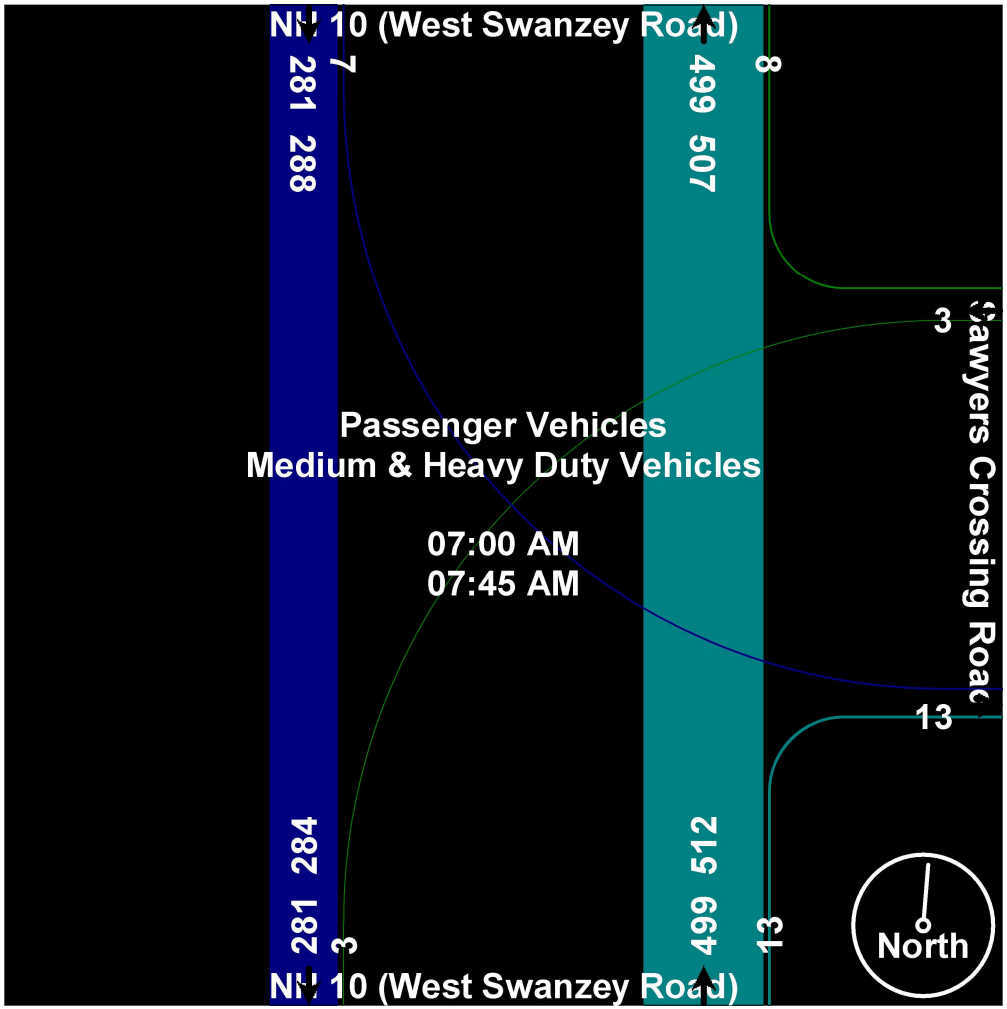
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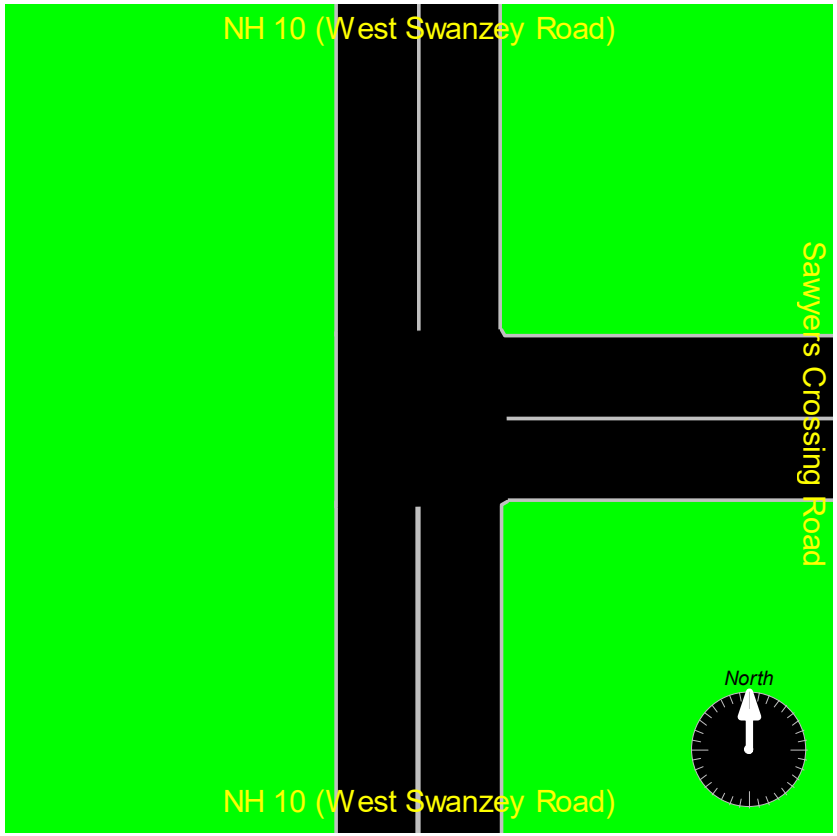
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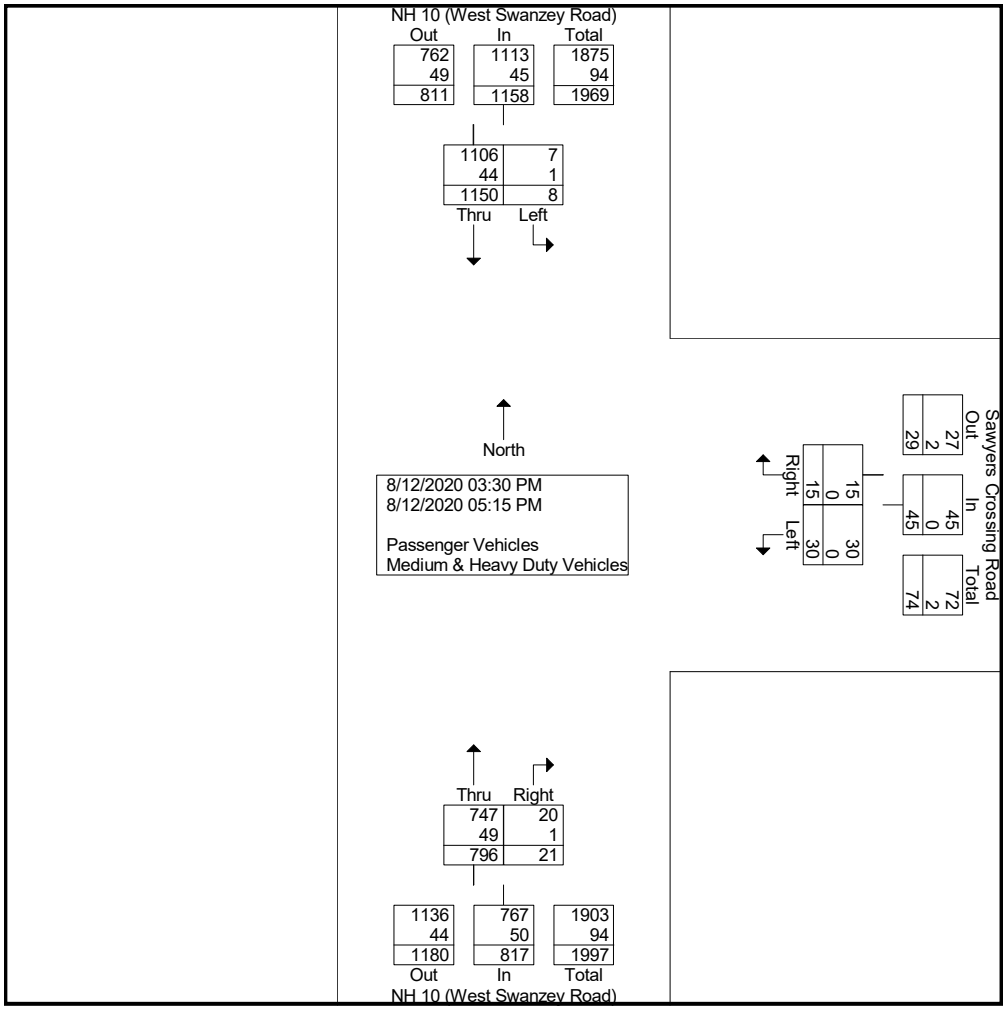
Groups Printed- Passenger Vehicles - Medium & Heavy Duty Vehicles

	NH 10 (West Swanzey Road) From North			Sawyers Crossing Road From East			NH 10 (West Swanzey Road) From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
03:30 PM	157	2	159	0	1	1	1	98	99	259
03:45 PM	149	0	149	3	3	6	4	105	109	264
Total	306	2	308	3	4	7	5	203	208	523
04:00 PM	147	0	147	3	2	5	2	120	122	274
04:15 PM	139	1	140	2	3	5	5	95	100	245
04:30 PM	136	1	137	0	11	11	3	104	107	255
04:45 PM	130	2	132	1	6	7	2	99	101	240
Total	552	4	556	6	22	28	12	418	430	1014
05:00 PM	165	0	165	4	3	7	2	97	99	271
05:15 PM	127	2	129	2	1	3	2	78	80	212
Grand Total	1150	8	1158	15	30	45	21	796	817	2020
Apprch %	99.3	0.7		33.3	66.7		2.6	97.4		
Total %	56.9	0.4	57.3	0.7	1.5	2.2	1	39.4	40.4	
Passenger Vehicles	1106	7	1113	15	30	45	20	747	767	1925
% Passenger Vehicles	96.2	87.5	96.1	100	100	100	95.2	93.8	93.9	95.3
Medium & Heavy Duty Vehicles	44	1	45	0	0	0	1	49	50	95
% Medium & Heavy Duty Vehicles	3.8	12.5	3.9	0	0	0	4.8	6.2	6.1	4.7

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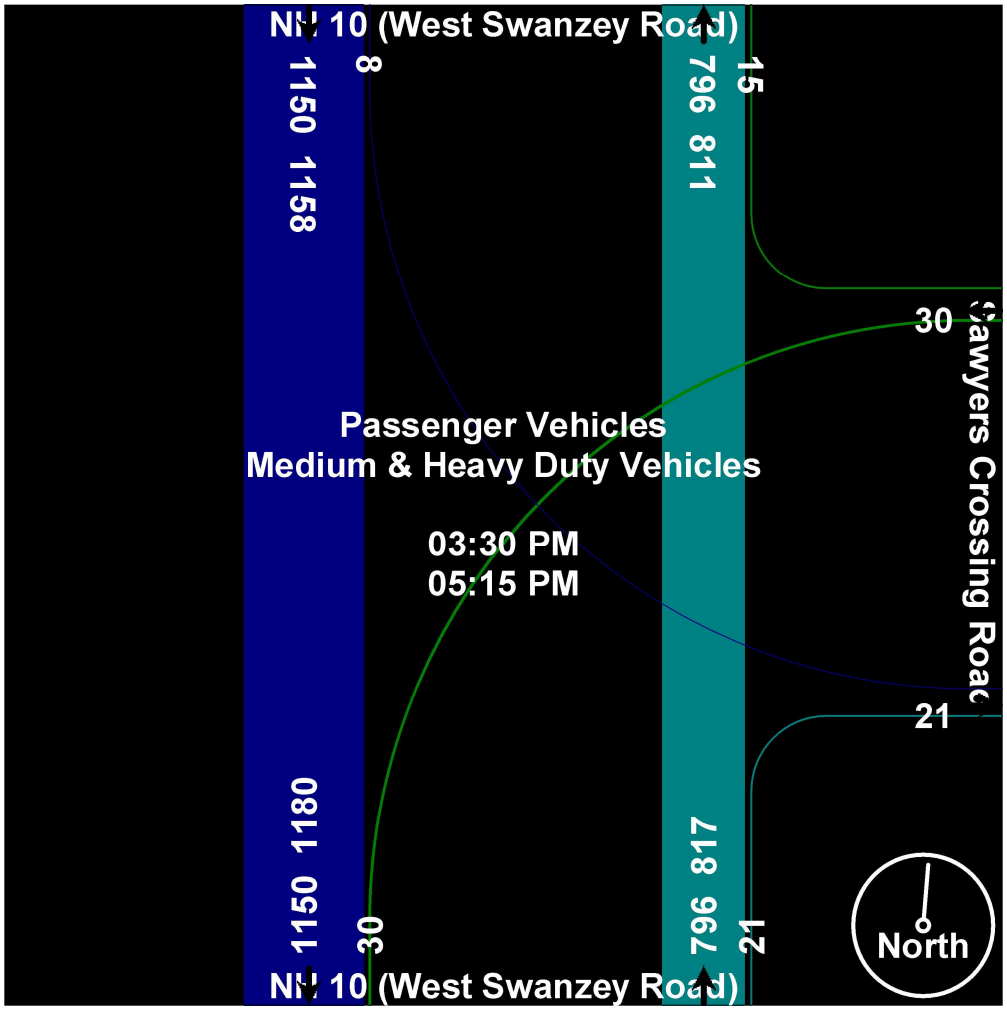
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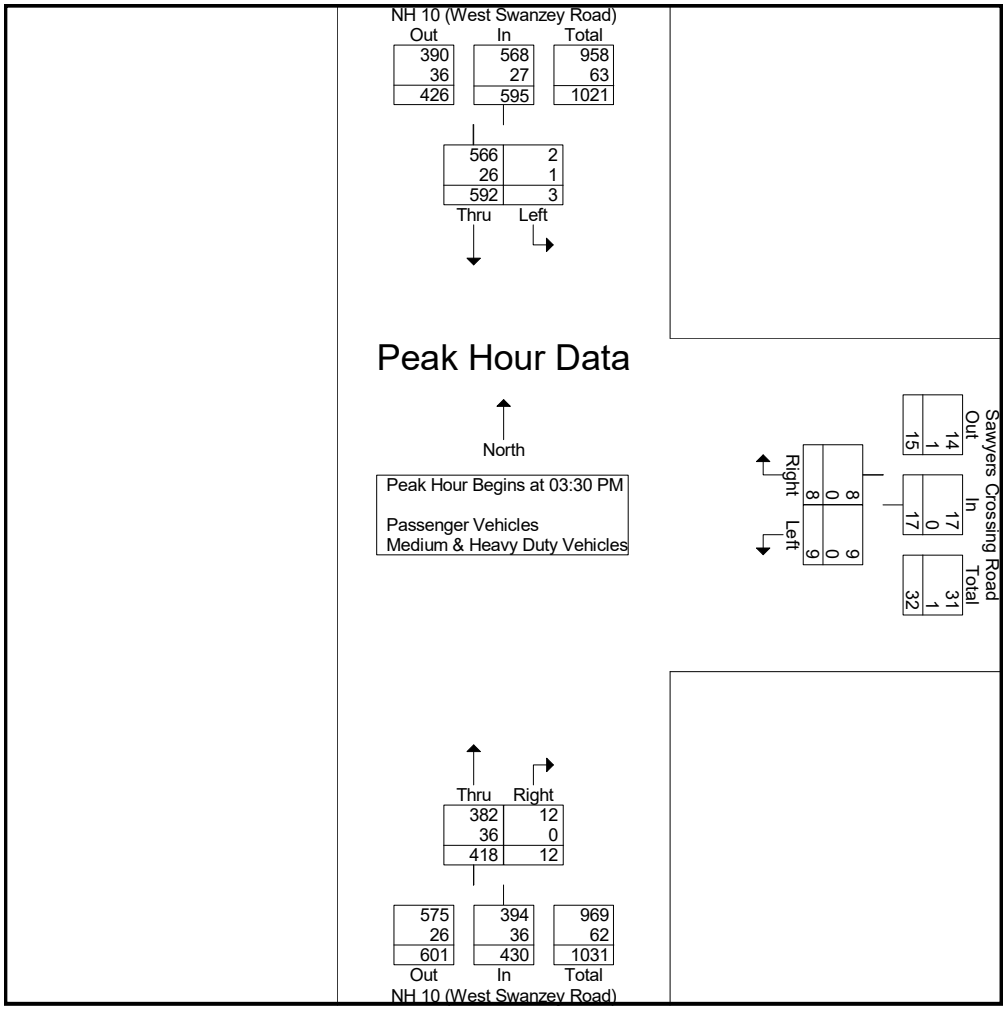
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	NH 10 (West Swanzey Road) From North			Sawyers Crossing Road From East			NH 10 (West Swanzey Road) From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	**157**	**2**	**159**	0	1	1	1	98	99	259
03:45 PM	149	0	149	**3**	**3**	**6**	4	105	109	264
04:00 PM	147	0	147	3	2	5	2	**120**	**122**	**274**
04:15 PM	139	1	140	2	3	5	**5**	95	100	245
Total Volume	592	3	595	8	9	17	12	418	430	1042
% App. Total	99.5	0.5		47.1	52.9		2.8	97.2		
PHF	.943	.375	.936	.667	.750	.708	.600	.871	.881	.951
Passenger Vehicles	566	2	568	8	9	17	12	382	394	979
% Passenger Vehicles	95.6	66.7	95.5	100	100	100	100	91.4	91.6	94.0
Medium & Heavy Duty Vehicles	26	1	27	0	0	0	0	36	36	63
% Medium & Heavy Duty Vehicles	4.4	33.3	4.5	0	0	0	0	8.6	8.4	6.0

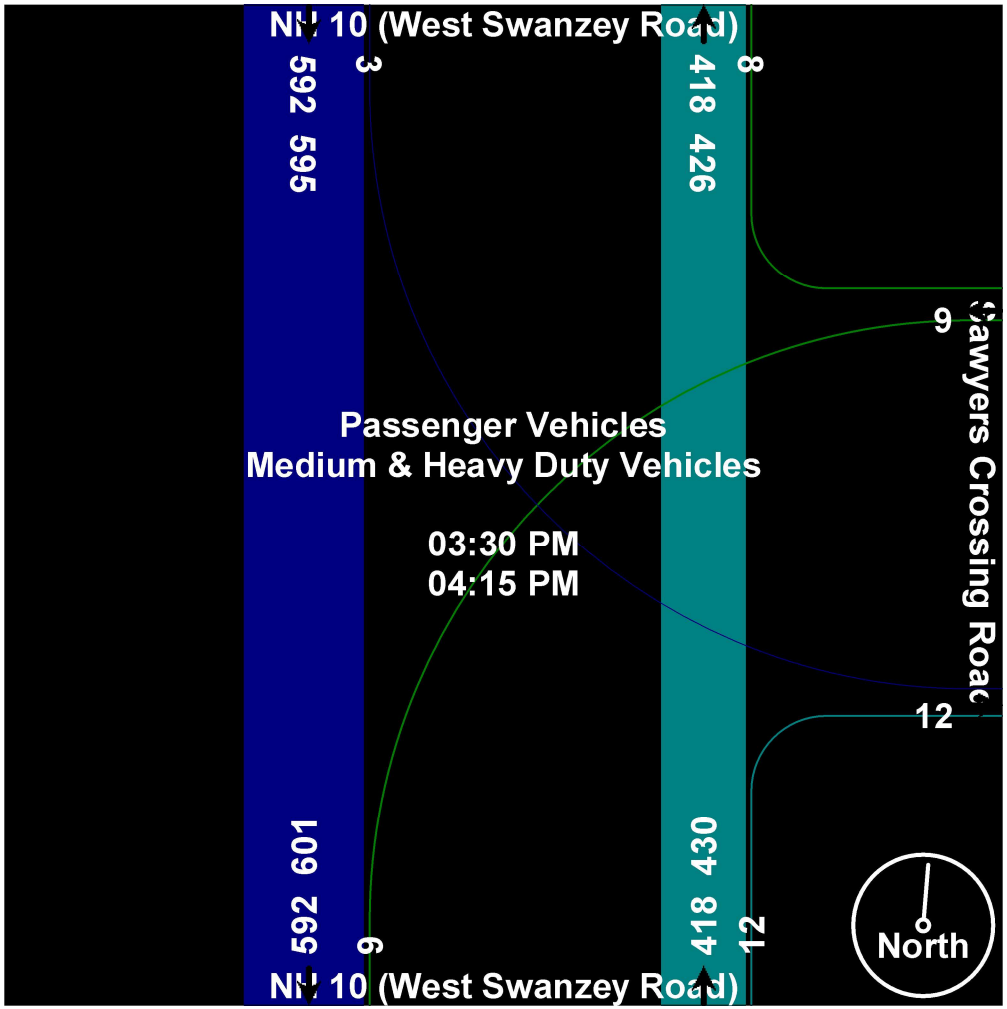
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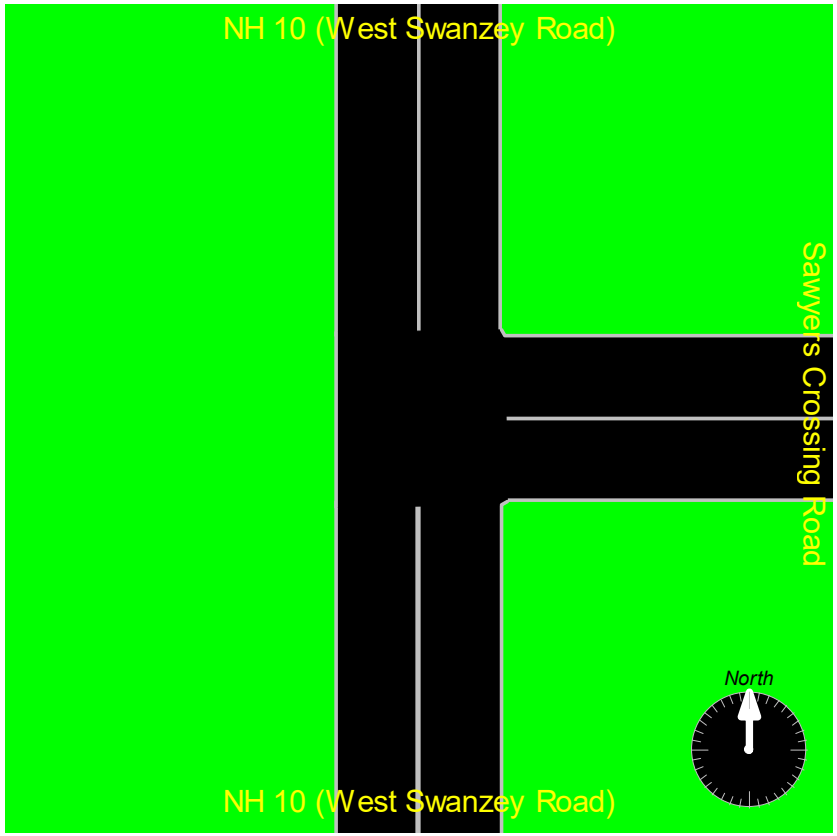
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File Name : NH 10 at Sawyers Crossing Road PM
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NH 10 (West Swanzey Road) at California Street

Location Description: The California Street intersection shown in the center of the photo below is located north of mile marker 12.6 on NH 10 with the top of the photo oriented towards the north. California Street, a local road approaches the intersection from the east and from the west.

2015 Aerial Photo:



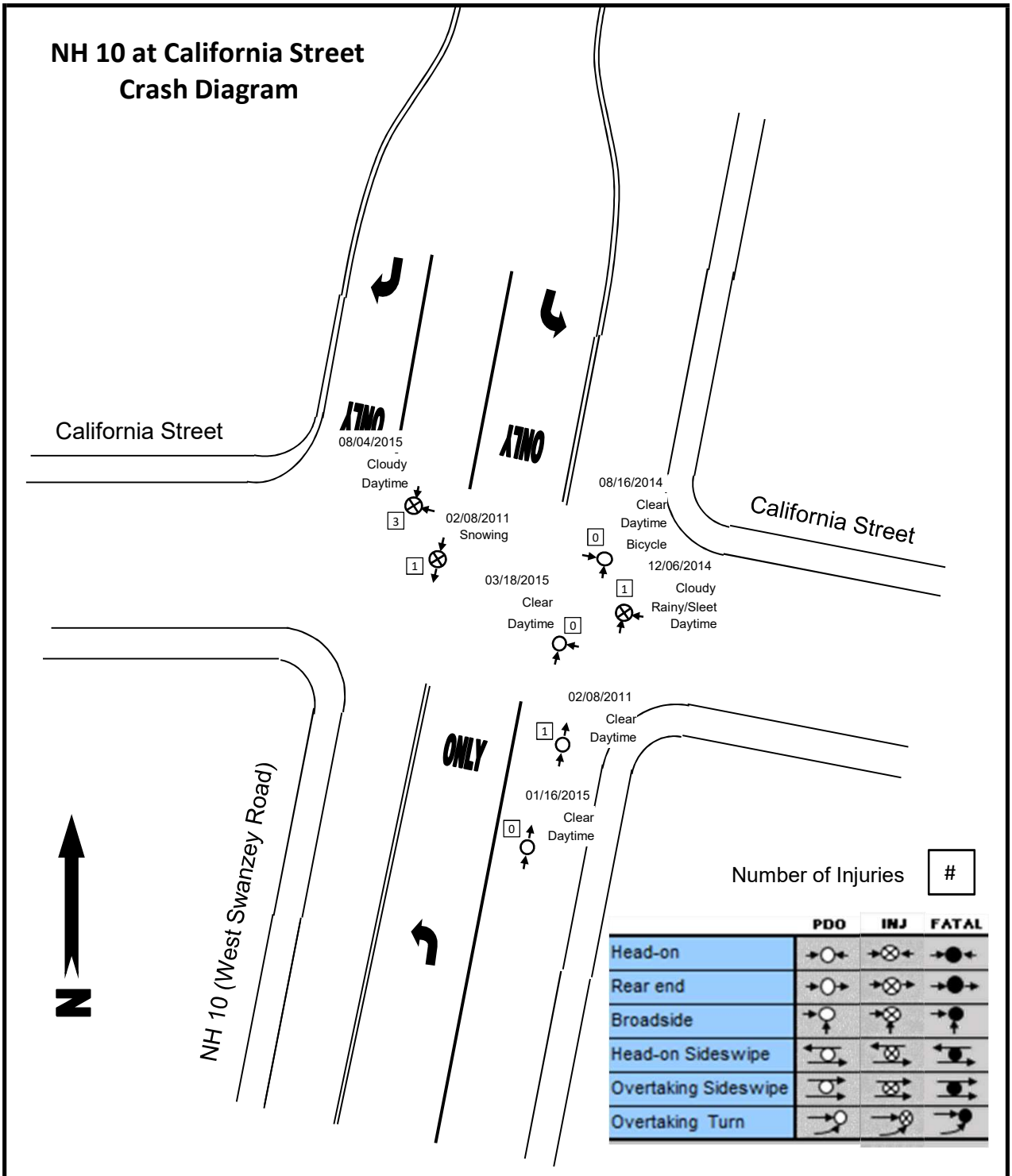
Source: GRANITView

Recent Traffic Studies:

- NH 10 south of West Street: **9,971** vehicles per day (2020, not seasonally-corrected).
    - AM peak hours:
        - 7:30 a.m. to 8:30 a.m. – **590** vehicles
        - 11:45 a.m. to 12:45 p.m. – **715** vehicles
    - PM peak hour: 4:30 p.m. to 5:30 p.m. – **894** vehicles
- Main Street over Ashuelot River: **1,972** vehicles per day (2019, seasonally-corrected estimate). Note that California Street turns into Main Street east of the intersection.
    - AM peak hour: 7:30 a.m. to 8:30 a.m. – **132** vehicles
    - PM peak hour: 3:15 p.m. to 4:15 p.m. – **203** vehicles

Crash Diagram: The diagram on the following page depicts the types and details of crashes at this location over the 10-year period 2010 through 2019. Note that the diagram is not drawn to scale and that all crash reports were provided by the Swanzey Police Department.

NH 10 at California Street Crash Diagram

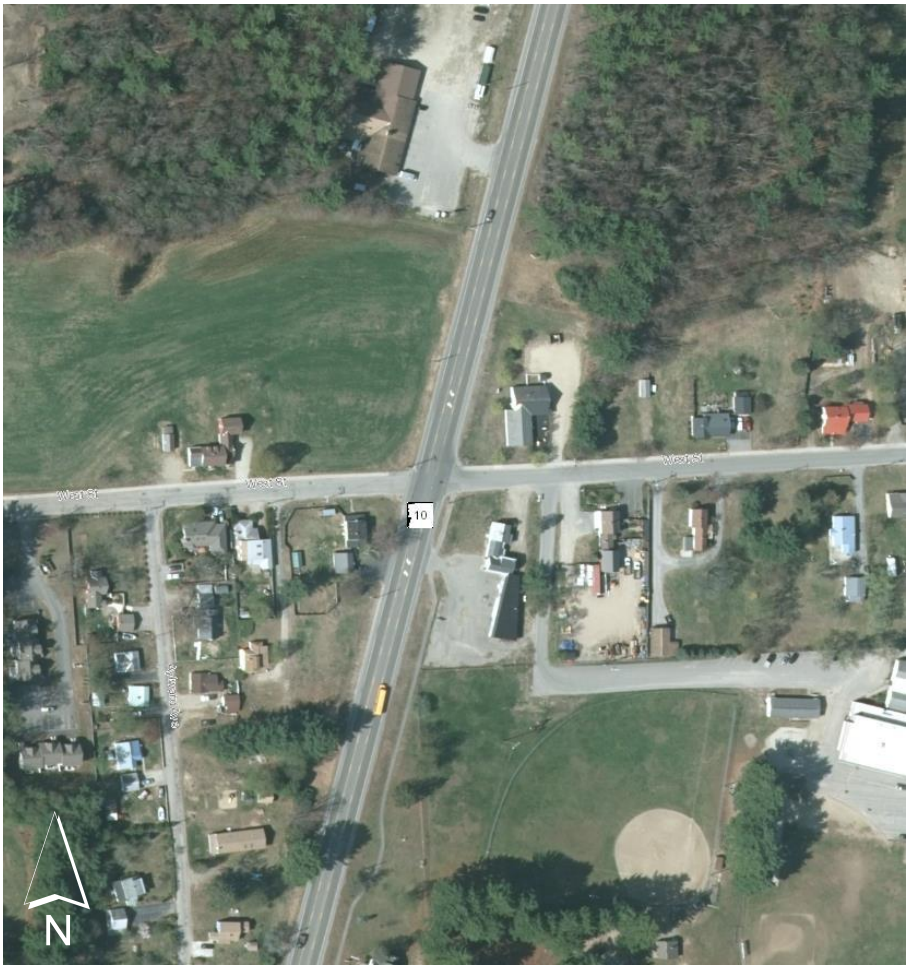


DIST	COUNTY	ROUTE	POST MILES DESCRPTN.
4	Cheshire	NH 10	12.6

NH 10 (West Swanzey Road) at West Street

Location Description: The West Street intersection shown in the center of the photo below is located north of mile marker 12.4 on NH 10 with the top of the photo oriented towards the north. West Street, a local road, approaches the intersection from the east and from the west.

2015 Aerial Photo:



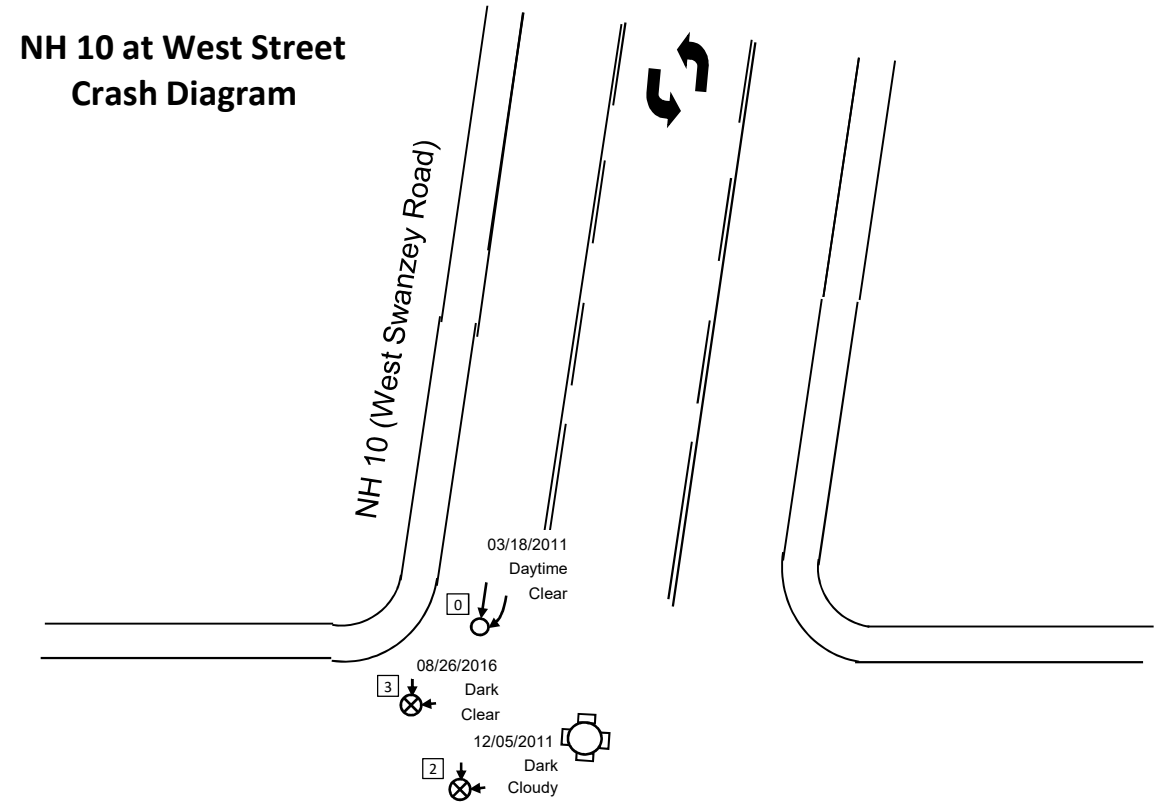
Source: GRANITView

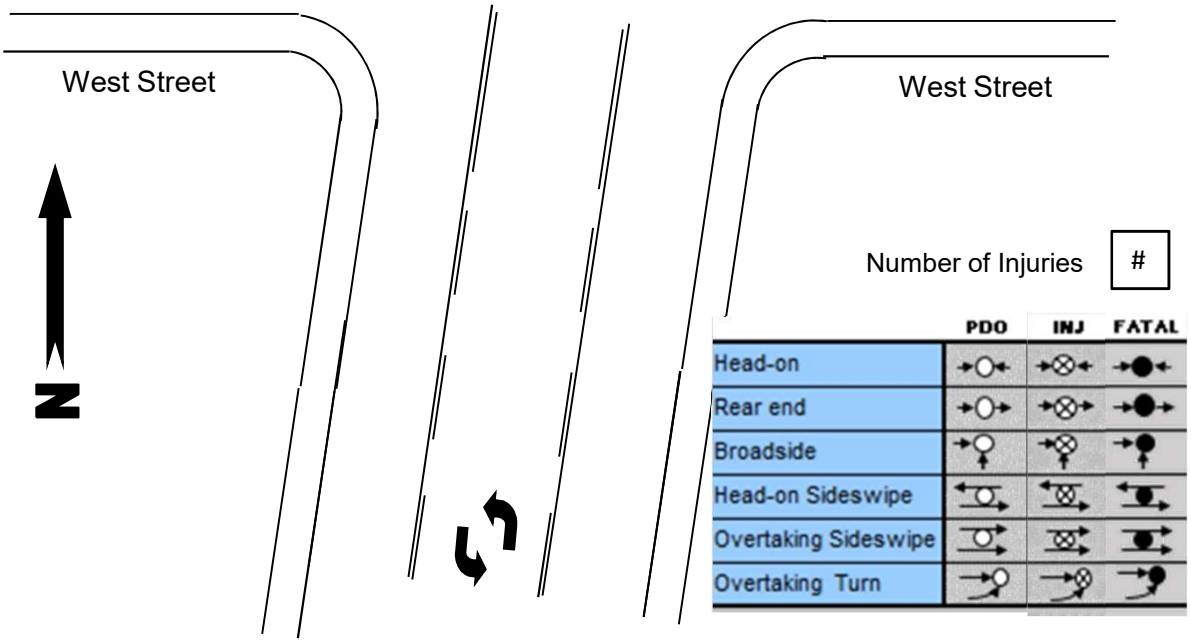
Recent Traffic Studies:

- NH 10 south of West Street: **9,971** vehicles per day (2020, not seasonally-corrected).
  - AM peak hours:
    - 7:30 a.m. to 8:30 a.m. – **590** vehicles
    - 11:45 a.m. to 12:45 p.m. – **715** vehicles
  - PM peak hour: 4:30 p.m. to 5:30 p.m. – **894** vehicles
- West Street east of NH 10: **871** vehicles per day (2018, not seasonally-corrected).
  - AM peak hour: 7:45 a.m. to 8:45 a.m. – **93** vehicles
  - PM peak hour: 2:45 p.m. to 3:45 p.m. – **96** vehicles

Crash Diagram: The diagram on the following page depicts the types and details of crashes at this location over the 10-year period 2010 through 2019. Note that the diagram is not drawn to scale and that all crash reports were provided by the Swanzey Police Department.

NH 10 at West Street
Crash Diagram





Number of Injuries #

	PDO	INJ	FATAL
Head-on			
Rear end			
Broadside			
Head-on Sideswipe			
Overtaking Sideswipe			
Overtaking Turn			

map

DIST	COUNTY	ROUTE	POST MILES DESCRPTN.
4	Cheshire	NH 10	12.4

Appendix 5:
Land Use and Zoning Analysis

Swanzey NH 10 Land Use & Zoning Analysis

Traffic patterns, as well as transportation needs and infrastructure are driven by land use. A single-family home generates different traffic patterns than a supermarket, which in turn generates different traffic patterns when compared to a small-scale manufacturing plant. Therefore, land use regulations determined by municipalities directly influence land use, and the current and future traffic impacts that they place on local roads and regional highways. This section analyzes the existing land uses and the municipal regulations that Swanzey permits in the NH 10 Study Area including future land uses. Analysis in this section includes community planning efforts that may inform future land use regulations, as well as constraints that could shape the distribution of future development. Finally, this section provides an analysis of transportation impacts of both current and future land uses represented by estimated trip generation for different types of land use.

Existing Conditions

Existing Land Uses

The Study Area, which includes parcels within ¼ mile radius of NH Route 10, contains 527 parcels in total, the majority of which are single-family homes, and commercial and industrial properties. Map 1 depicts parcel-level data based on existing land uses and provides a sense of the total land area each land use represents in the Study Area as well as land use patterns along the corridor. To simplify the visualization of land use information, some similar land use codes are grouped together. For example, there are numerous parcels of forest within the land use codes that have been grouped into managed and unmanaged forests. Land use codes are derived from GIS assessing data provided by the Town of Swanzey.

Land uses within the NH 10 Study Area are primarily low density. In the northern half of the Study Area land use is predominately forests managed by Yale University, but there are also a number of low density commercial and industrial properties, and low-density residential properties. Land uses within the southern half of the Study Area are more diverse, with a mix of both single family and multi-family residential, commercial properties, unmanaged forests, and farmland.

Table 1 lists land uses that appear within the Study Area, with land use codes combined in the same manner as Map 1. Single-family residential properties are the most prevalent land use by number of parcels (355 parcels) and acres (451) within the Study Area. In terms of acreage, commercial/industrial (386) and managed forest (341) lands make up the other two predominant forms of land use within the Study Area. Managed forest account for the largest parcels within the Study Area, with only 19 parcels accounting for 341 acres of land within the corridor. Much of this land is contained within the Yale-Toumey forest, which is protected through Yale University as part of their forestry program.

Map 1: Land Use Map

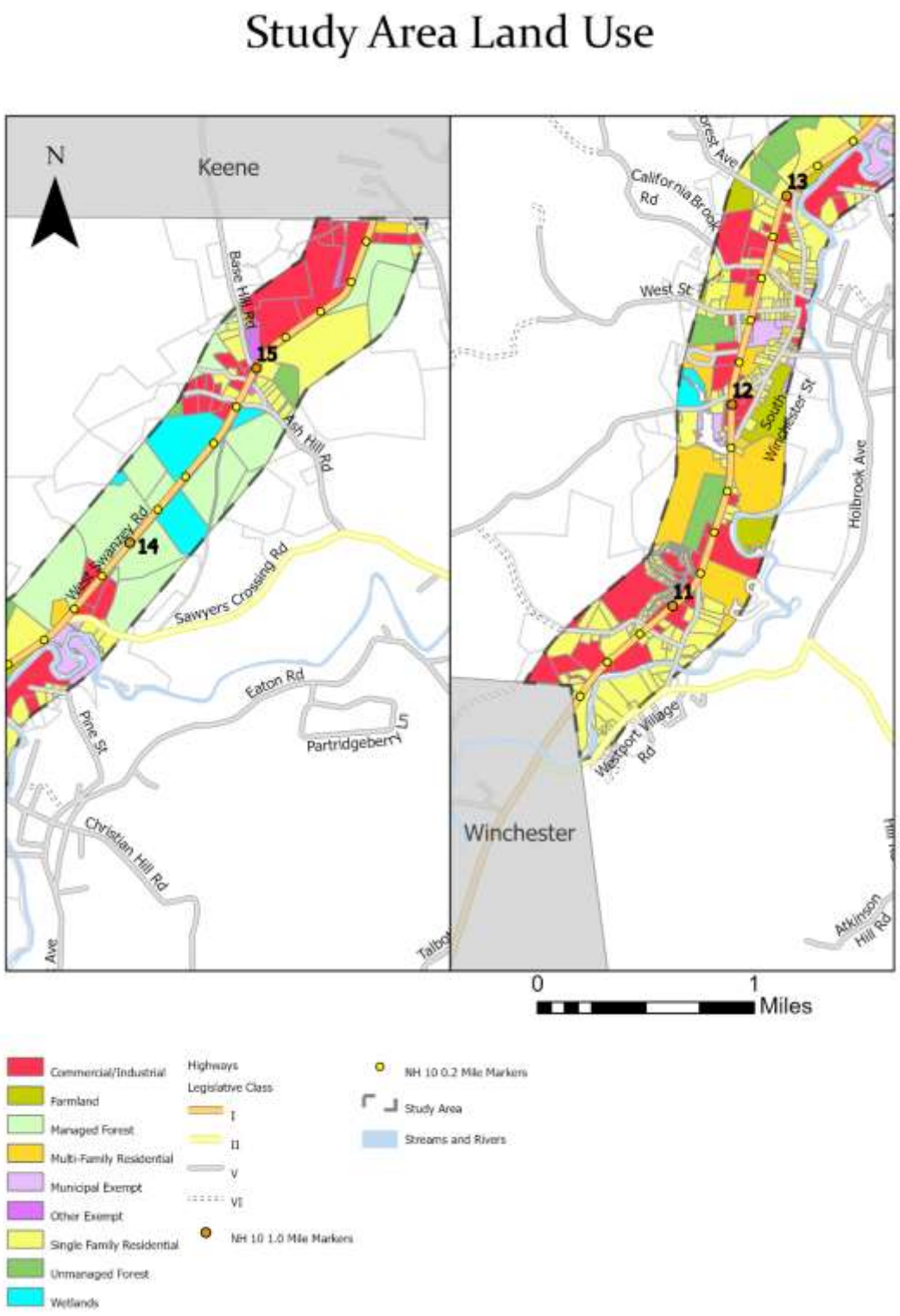


TABLE 1: Table of land uses by type, number of parcels and acerage[1]

Land Use Type	Parcels	Acres	Acreage as Percent of Total Study Area
Single Family Residential	355	451	27%
Multi-Family Residential	30	167	10%
Commercial/Industrial	77	386	23%
Municipal Exempt	19	42	1%
Other Exempt	4	11	4%
Farmland	5	58	4%
Managed Forest	19	341	21%
Unmanaged Forest	8	86	5%
Wetlands	10	90	5%
Total	**527**	**1,632**	**100%**

Town of Swanzey Assessing Data

Zoning

Zoning in Swanzey is divided into seven districts, with four additional overlay zones. Five of these zones are present in the Study Area, which is defined here as land that is a quarter mile radius from NH 10. Zoning districts define the permitted uses for parcels within that zone along with other regulations such as parking requirements, setback requirements and maximum building heights. Overlay districts, as the name implies, overlays on parcels and mandates an additional set of land use regulations for parcels within that district. Overlay district requirements can include additional design or setback regulations or additional processes required to develop in that district, such as additional permitting rules required in floodplains. Three overlay districts apply to the Study Area, which are the Wetlands Conservation District, Shoreland Protection District and the Flood Plain District. The Wetlands Conservation District applies to scattered sites within the Study Area where wetlands are found, while the Shoreland Protection District applies to the Ashuelot River. Flood Plain District applies to those areas within the Study Area which lie within a FEMA designated flood hazard area, further described in "Future Land Uses" later in this document. In combination with subdivision and site plan regulations, zoning plays a major driving force in driving land use decisions over time.

Within the Study Area, the vast majority of land with direct frontage to NH 10 is zoned either Business or Commercial/Industrial. The parcels with direct frontage to NH 10 in the northern half of the corridor are primarily zoned Commercial/Industrial, while the primary zone in the southern half of the corridor is Business. Between Anthony Circle and Kempton Road on the west side of NH 10, there is a stretch of parcels that are zoned Residence. The most diverse mix of zoning within the study area is in West Swanzey Village, where there is a mix of parcels zoned Residence and Village Business I and Village Business II. Of particular note is the zoning of the former Homestead Mills site as Village Business II. Overall, the Town of Swanzey's zoning regulations encourage low-density development, as the three most prominent zoning districts of Business, Commercial/Industrial and Residence require a minimum lot size of one acre. Often,

[1] Acreage is defined through calculations made through existing GIS data, and may differ from official assessing calculations.

lots larger than one acre are required in the case of properties within the Commercial/Industrial districts with direct frontage to NH 10 and multifamily properties not connected to public sewer.

TABLE 2: Zones and Dimensional Requirements[2]

Dimensional Requirements	Rural/Agricultural District	Residence District	Business District	Commercial/Industrial District	Village Business District I	Village Business District II
Minimum Lot Size	3 acres	1 acre	1 acre	3 acres (Route 10) 1 acre (Feeder Road)	0.5 acres	0.5 acres
Minimum Frontage	225 feet	150 feet	125 feet	400 feet (Route 10) 125 feet (Feeder Road)	100 feet	100 feet
Front Setback	30 feet	30 feet	75 feet	75 feet	30 feet	30 feet
Side Setback	20 feet	20 feet	20 feet	20 feet	20 feet	20 feet
Rear Setback	20 feet	20 feet	20 feet	20 feet	20 feet	20 feet

TABLE 3: Acreage by Zoning

Zoning District Name	Total Area (Acres)	Acres as Percent of Total Study Area
Rural/Agricultural	134	8.2%
Business	476	29.2%
Commercial/Industrial	834	51.1%
Residence	173	10.6%
Village Business I	10	0.6%
Village Business II	5	0.3%
Total	**1,632**	**100%**

Traffic Impacts from Existing Land Uses

As noted above, the predominant land use in the Study Area today is the single family home. According to the Institute for Traffic Engineers, traffic generation for single family homes is on average about 10 trips per day on weekdays (5 trips leaving the home and 5 trips returning home) and slightly less on Saturdays and Sundays (7 and 6 trips respectively). Although single family homes have a.m. and p.m. peak hour traffic, this only accounts for about 2 of the 10 trips per day on average during the weekdays, so single family homes tend to generate 80% of their other traffic at other times of day. Among the 371 single family homes, they are estimated to generate about 3,550 trips per day within the corridor area per day on a typical weekday. Multifamily units, on average, generate less traffic than single family homes, averaging about 7 trips per day on all days of the week, Saturdays and Sundays included. Multifamily unit a.m. and p.m. peak hour traffic tends to be less than single family homes ranging from .5 to .6 trips per day respectively, again showing that the majority of residential traffic doesn't occur during the peak hour.

[2] Area and parcel calculations were accomplished using ESRI ArcGIS products and are for planning purposes only. Data presented in this analysis may differ from official assessing data.

The 273 multifamily units in the study area are estimated to generate almost than 1,800 trips per day on a typical weekday. Combined, housing on the corridor is expected to generate about 5,350 trips on the corridor.

Though sophisticated traffic modeling is beyond the scope of the study, the 5,350 trips per day is an insightful, though rough and imperfect metric for understanding the residential related traffic generation on the corridor. Though housing is distributed along the corridor (and much more housing using the NH 10 Corridor is outside the boundaries of the Study Area), one can apply a "back of the napkin" estimate to the AADT measured on the Corridor which ranges from 7,359 AADT in the southern part of the Corridor (NH 10 at the Winchester town line) to 14,443 in the northern part of the Corridor (NH 10 at the Keene town line). 5,350 trips are equivalent to approximately 76% of the net traffic between the two count sites (7,084 trips). Findings from later sections of the report, namely, 1) that most commuters gravitate towards Keene either to work there or go to pass through the Keene area to other destinations[3] and 2) the majority of housing in the study area is in West Swanzey, suggest that residential traffic from the Study Area is likely to contribute a great deal of traffic demand on the Corridor today. However, the capacity for the road to accommodate the traffic is far from congested. The standard reference for maximum saturation flow per lane is 1,900 vehicles per hour[4] and the area with the highest peak hour on the Corridor reaches about 1,470 vehicles for two opposing lanes combined.[5]

The next most common land use in the Study Area are commercial/industrial land uses. Traffic generation for commercial and industrial land uses can vary widely (see Table 4 below).

TABLE 4: Common Land Uses Found in the Study Area Today and ADT Weekday Traffic

Land Use	Unit of Measure	ADT Weekday
Single Family	Per Dwelling Unit	9.57
Multi-Family	Per Occupied Dwelling Unit	6.59
Grocery Store	1,000 sq. ft. gross floor area	102.24
Free-standing Discount Store	1,000 sq. ft. gross floor area	57.24
Restaurant: Sit-Down	1,000 sq. ft. gross floor area	127.15
Restaurant: Fast Food without Drive-Through	1,000 sq. ft. gross floor area	716.00
Business and Professional Office	1,000 sq. ft. gross floor area	11.01
Convenience Store with Gasoline Pumps	1,000 sq. ft. gross floor area	845.60
Gasoline, Car Wash, with Convenience Store	1,000 sq. ft. gross floor area	152.84
Coffee Shop with Drive-Through, no Seating	1,000 sq. ft. gross floor area	1,800.00
Auto Sales and Service	1,000 sq. ft. gross floor area	33.34
Manufacturing	1,000 sq. ft. gross floor area	3.82
Wholesale, Warehouse, Storage Facility	1,000 sq. ft. gross floor area	3.65
Recreational Facility	1,000 sq. ft. gross floor area	22.88

Source: Institute for Traffic Engineers Trip Generation Manual, 8th Edition, 2008.

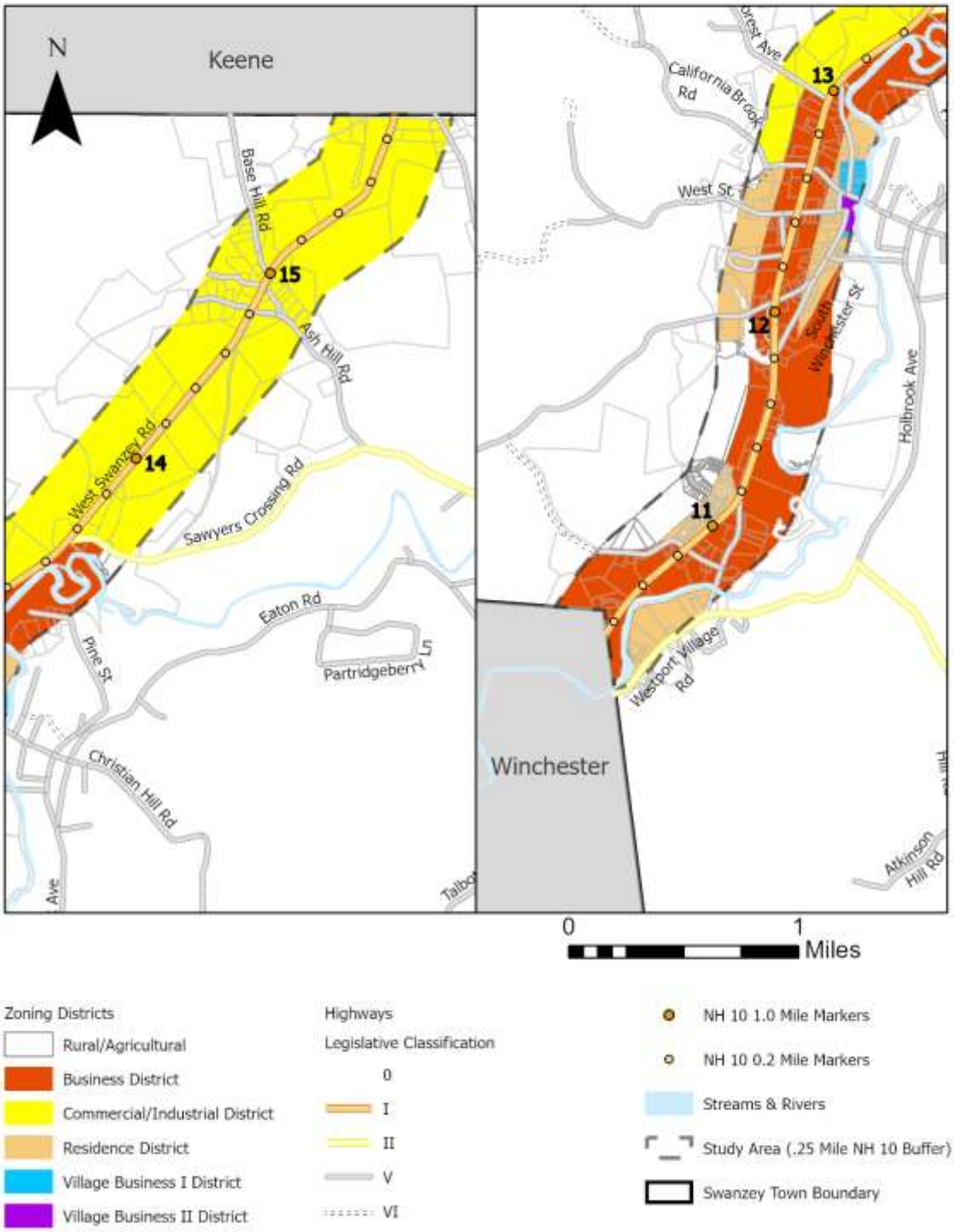
[3] Keene is also an important shopping, medical and government services destination.
[4] Highway Capacity Manual, 6th edition, Transportation Research Board, 2015.
[5] SWRPC 2019 p.m. peak hour count at NH 10 at the Swanzey/Keene town line.

For reference, the Swanzey Market Basket has 97,397 square feet of gross floor area. As a Grocery Store trip generation could be as much as 9,957 trips per day with up to 1,150 vehicles per p.m. peak hour[6]. The Citgo Gas Station, which at 189 West Swanzey Road is 3.520 square feet could generate approximately 2,976 trips per day as a gas station alone with up to 220 vehicles in the p.m. peak hour. Applying only 1/5th of the gross floor area to the store's Coffee Shop/Drive-Through operation is equivalent to 1,267 vehicles per day and approximately 218 vehicles in the a.m. peak hour. A third example used for illustration purposes is the currently closed Nick's Seafood Restaurant, which is 4,624 square feet. If the restaurant opens again, it is likely to attract about 588 trips per day with about 85 vehicles during the p.m. peak hour. As a final example, traffic generation for the Dollar General at 786 West Swanzey Road, which is 9,100 square feet in area, is estimated to generate about 520 trips per day with about 51 trips generated in the p.m. peak hour.

[6] The gross floor area is not entirely dedicated to Market Basket, but for simple illustration the Grocery Store land use code is used.

MAP 2: Existing Zoning Map

Study Area Zoning



Key Existing Zoning & Land Use Findings

Following is a list of key findings relative to land use and zoning:

- Every property along NH 10 north of Forest Avenue on the west side of the corridor and north of Sawyers Crossing Road on the east side of the corridor is zoned Commercial/Industrial. Commercial/Industrial is also exclusive to the NH 10 corridor within Swanzey and does not cover any parcels outside of the ¼ mile Study Area.
- The intent of the Commercial/Industrial district is to "minimize strip development and encourage off road development on portions of Route 10". The district promotes this goal by requiring a 3-acre minimum lot size for properties utilizing access to NH 10 while only requiring a 1-acre minimum lot size for parcels using access to "feeder roads".
- Reduced lot size and frontage requirements within the Commercial/Industrial District were used in the development of businesses along Whittemore Farm Road in the 1980's, which currently is home to several commercial uses. The Town of Swanzey Planning and Economic Development Department is not aware of any other development proposals taking advantage of this zoning flexibility.
- Both the Residence and Business districts have a minimum lot size of one acre.
- West Swanzey Village is a diverse mix of Residence, Village Business I & II, and Commercial/Industrial zoning.
- For sections of the Study Area, particularly West Swanzey Village, current zoning dimensional requirements do not align with existing land use patterns. For example, in West Swanzey Village the majority of parcels are zoned either Residential or Commercial/Industrial, both of which have a minimum lot size of 1 acre. An analysis of parcel sizes in West Swanzey Village identified at least 73 parcels of just over 100 that are under 1 acre in size. In addition, 31 parcels are under half an acre, which is the minimum lot size requirement for the Village Business District I & II. This indicates that there is an existing pattern of development in West Swanzey Village that is not allowable under current zoning regulations.
- Village Business II is a zone almost exclusively applying to the Homestead Woolen Mills properties, while the Village Business I District applies to the properties directly north and south of the Mills.
- Multifamily housing is allowed only by special exception in the Business, Village Business I and Residence Districts but is allowed by-right within the Village Business II District.
- A minimum setback of 75 feet from the NH 10 right-of-way is required for parcels within the Business district.
- Both the Village Business District I & II have a minimum lot size of one-half acre, with the exception of a 1-acre requirement for multifamily properties within Village Business District I.
- There are a number of land uses within the corridor that are nonconforming with existing zoning regulations. For example, the vast majority of the northern half of the Study Area is zoned Commercial/Industrial which does not include any residential uses as a permitted use. However, there are several single-family and a few multi-family properties within the northern half of the Study Area. Single-family dwellings are also not permitted in the Business District, but several single-family properties are intermixed with commercial or industrial uses in that District.
- While 80% of the Study Area is comprised of just two zoning districts, Business and Commercial/Industrial, existing land use within the Study Area is extremely diverse. Existing land

uses in the Study area generate different types of traffic during peak hours and over the course of the day. Existing housing in the study area is expected to generate up to 5,350 trips per day on NH 10. The land use with the greatest single contribution of trips in the Study Area is the likely to be the Market Basket store.

- The capacity for the road to accommodate more traffic is far from congested. The standard reference for maximum saturation flow per lane is 1,900 vehicles per hour[7] and the area with the highest peak hour on the Corridor reaches about 1,470 vehicles for two opposing lanes combined.

[7] Highway Capacity Manual, 6th edition, Transportation Research Board, 2015.

Future Land Uses

Similar to how existing land use shapes the current transportation needs within the Study Area, future development patterns will influence the transportation needs of the corridor and subsequent changes to NH 10. Future land uses are analyzed from both a regulatory and physical perspective, particularly natural resource constraints. The following sections discuss elements that influence the development of future land use including community planning efforts, economic development incentives, infrastructure, and environmental constraints.

Traffic Impacts from Future Land Uses

There are a several types of land uses allowed on the Corridor that can potentially represent noticeable traffic impacts on the Corridor, however, the impacts are likely to have more of a local impact than a regional impact due to available vehicle capacity on NH 10 currently. Some land uses that currently do not appear on the Corridor today, but are allowed uses are show in the table below. Many of these would have their largest peak hour traffic on weekends.

TABLE 5: Select Land Uses Allowed in the Study Area and ADT Weekday and Highest Peak Hour Traffic

Land Use	Unit of Measure	ADT Weekday	Highest Peak Hour
Religious Institution	1,000 sq. ft. gross floor area	9.11	11.76, Sunday
Nursery	1,000 sq. ft. gross floor area	36.08	11.00, Saturday
Daycare	1,000 sq. ft. gross floor area	79.26	13.91, Weekday p.m.
Motel	Per Guest Room	9.11	0.76, Saturday
Hotel	Per Guest Room	8.17	0.72, Saturday
Bank with Drive-Through	1,000 sq. ft. gross floor area	148.15	31.90, Sunday

Source: Institute for Traffic Engineers Trip Generation Manual, 8th Edition, 2008.

Drive-through restaurants, coffee shops and banks are among the land uses that tend to have the highest local traffic impacts. In the existing Zoning Ordinance, there is no reference to drive-through uses, but Swanzey does have at least two drive through establishments in Town (both Dunkin Donuts drive throughs). Some of the types of allowed land uses that tend to include drive-through provisions are not included in the definitions section of the Swanzey Zoning Ordinance including Coffee Shops, Restaurants and Banks. The lack of definition may result in a situation in which a court interprets drive-throughs as an allowed land use if there is a conflict in interpretation between the Town of Swanzey and a land owner or developer.

Community Planning

Similar to how zoning and other regulations shape the existing land use conditions of the Study Area, community planning efforts can shape future land use conditions. The preeminent community planning document that guides future zoning, and subsequently future land use, is the community's Master Plan.

As established in NH RSA 674:18 and 674:2, a municipality must adopt a Master Plan prior to adopting a zoning ordinance, and Master Plans must "set down as clearly and practically as possible the best and most appropriate future development of the area under the jurisdiction of the planning board". The Town of Swanzey last adopted an update to their Master Plan in 2003, and as of writing is in the process of updating the Plan. However, the results of that update process are not finalized and are not included in this analysis.

In the 2003 update of Swanzey's Master Plan, NH 10 is prominently featured in the land use chapter. A specific goal cited for future land use within the Plan is to encourage commercial and retail growth along NH 10. In addition, the land use chapter includes a specific recommendation to encourage higher density development in West Swanzey Village and North Swanzey, both within the Study Area. The land use chapter and recommends "discourag[ing] new residential development in the existing Commercial/Industrial and Business Zoning Districts." The vast majority of the Study Area is zoned Commercial/Industrial or Business, which discourages housing development. Provisions for housing are made outside of the Study Area, with parcels fronting West Street, Forest Avenue, Main Street, and Westport Village Road primarily zoned Residence. For parcels not directly fronting those streets, the vast majority of land immediately outside of the Study Area is zoned Rural/Agricultural.

Finally, listed below are specific strategies outlined by the 2003 Master Plan that directly speak to land use in the study area:

- Recognizing that water frontage along the South Branch and Ashuelot Rivers will become more valuable, determine what steps will best protect the public's aesthetic and recreational access to these areas.
- Future development of Yale Forest lands may be detrimental to the underlying high yield aquifer. Determine how to protect the Town's interest in this area, including consideration of an aquifer protection district. This aquifer protection district has not yet been established.
- Promote the installation of sewer lines for the Wilson Pond area and North Swanzey. Promote upgrading of the roads and drainage system and water system in this area as part of the sewer line installation. This has occurred since the 2003 update.

While the transportation chapter is critical to understanding the future goals for NH 10, the route is not directly mentioned in the goals and objectives of the chapter. The overall goal for Swanzey's transportation system is to "provide for a safe, efficient and diversified transportation system that is sensitive to the Town's rural character". The transportation chapter of the Plan also outlines a strong emphasis on access management in coordination with NHDOT, as well as continual assessment of the impact of land use development on the transportation system and the coordination of land use and transportation decisions.

The Plan also contains a chapter on utilities, which can have a significant impact on land use within the Study Area. A major goal of the utilities chapter is the continued expansion of sewage treatment facilities in West Swanzey Village and North Swanzey. As of writing, the recommendations made for improvement of sewer infrastructure in West Swanzey Village and North Swanzey were implemented, which has expanded capacity in North Swanzey and ensured continued operation of the system in West Swanzey Village. However, the major goal in the utilities chapter of the Plan, to combine all community water

services into one Town Water Department, has not yet occurred, which is a major limitation to the effective coordination and potential expansion of water infrastructure within the Study Area.

While not a document with regulatory authority, a *West Swanzey Charrette* report was produced by Plan New Hampshire documenting a design charette with local stakeholders on land use within West Swanzey Village. The charette took place in November of 2012, and envisioned potential future outcomes for West Swanzey Village. Through two listening sessions, a desired outcome was the redevelopment of Homestead Woolen Mills and the establishment of a more vibrant, walkable village with the growth of commercial uses along Main Street in West Swanzey Village. The report also specifically recommends the expansion of the Village Business I and II Districts as well as expanding the uses allowed in Village Business I & II Districts. In addition, the listening sessions indicated a desire to improve the connection between NH 10 and West Swanzey Village center. Specifically, four "gateways" were proposed along NH 10 to create a visual connection to the Village and provide additional wayfinding. Since the publication of the report, the recommendation to allow multifamily housing as an accessory use has been incorporated into Swanzey's zoning code. While the *West Swanzey Charette* report is produced by a third-party entity and does not hold regulatory authority, it indicates a community desire for a major change in the character of the land use within West Swanzey Village. Any significant land use change in West Swanzey Village would change the relationship between NH 10 and the Village, as well as the transportation needs of the corridor.

Economic Revitalization Zone

Detailed by NH RSA 162-N:6, the Economic Revitalization Zone (ERZ) is a short-term business tax credit program established to stimulate economic redevelopment, expand the commercial and industrial base, create new jobs, reduce sprawl, and increase tax revenues. The State of New Hampshire allocates approximately $850,000 annually in tax credits through the ERZ program. Eligible areas for ERZs are unused or underutilized industrial parks as well as vacant land or structures previously used for industrial, commercial, or retail purposes that represent a contiguous area. A community can apply for the establishment of an ERZ to the NH Department of Business and Economic Affairs. When established, businesses can apply for tax credits based on the creation of jobs within the ERZ. Currently, Swanzey has three established ERZs. Within the study area, Swanzey has one ERZ, the Homestead Woolen Mills District established in 2010, which covers the Homestead Woolen Mills property as well as parcels directly north on both sides of North Winchester Street as well as several parcels extending east along Main Street. Currently, there have not been any businesses that have taken advantage of the job creation tax credits offered by the Homestead Woolen Mills ERZ.

Development Constraints

As much as community planning shapes the regulatory landscape, natural conditions and the availability of water and sewer infrastructure play a key role in future land use development along the corridor. This study provides an analysis of water and sewer availability and natural resource constraints including

conservation and protected lands, problematic and sensitive soils and Federal Emergency Management Agency (FEMA) designated flood zones.

Water and Sewer Availability

Within the Study Area, water and sewer availability is almost entirely limited to the West Swanzey Village area. North Winchester Street and Main Street east of the West Swanzey Street intersection are provided sewer by the Town of Swanzey and water by a series of public wells. Town sewer service extends to much of West Swanzey Village just outside of the Study Area across the Ashuelot River. South Winchester Street and West Street from South Winchester Street to approximately Aylward Avenue is provided both water by the West Swanzey Water Company and sewer from the Town of Swanzey. West Street and part of California Brook Road west of NH 10 is also served water by the West Swanzey Water Company. Sewer is provided partially along NH 10 by the Town of Swanzey from West Street to Perry Lane. The Pine Grove Mobile Home Park Cooperative operates a water system which serves their community. In the very northern section of the Study Area adjacent to the Keene town line, North Water and Fire Precinct provides water service along Matthews Road.

Access to public sewer is critical for achieving density for residential development. In the Residence, Business and Village Business I Districts, two-family and multifamily properties have reduced lot size requirements for parcels connected to public sewer. In the Residence District, multifamily buildings have a minimum lot size of one acre if connected to public sewer, as opposed to one acre for the first unit and one-half acre for each additional unit. In addition, in Village Business Districts II and I, two-family and multi-family properties are subject to one-half acre and one acre minimum lot sizes, respectively, as opposed to one and one-half acre for a two-family residence without public sewer access and one acre plus one-half acre for each unit in a multifamily property without sewer access.

Natural Resource Constraints

The following sections outline the role of natural resource constraints on future land use within the Study Area. Constraints identified include conservation and protected lands, problematic and sensitive soils, FEMA flood zones and stratified drift aquifers.

Conservation and Protected Lands

Conserved and protected land serves as an important control on development, deflecting development pressure away from certain parcels within the Study Area. Data from NH GRANIT representing natural areas in the State of New Hampshire over two acres show that approximately 582 acres of natural land lie within the Study Area (36%). Conservation land is distributed among 37 properties, all of which except one are protected through fee ownership, which means that protection is secured through direct ownership by an organization with the mission of conservation. The majority of conservation lands in fee

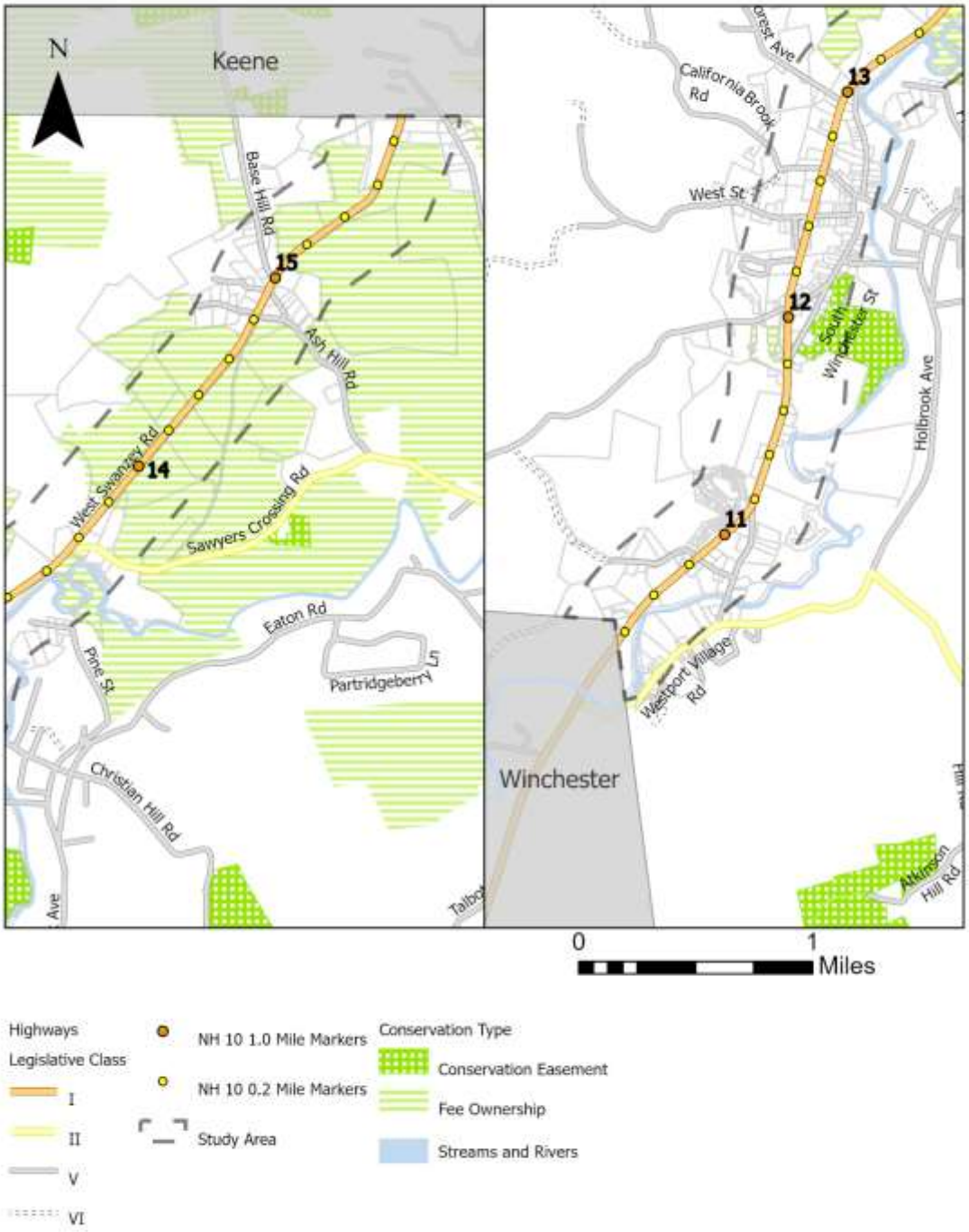
ownership (26 out of 35) are owned by Yale University as part of the Yale-Toumey forest. The Forest also comprises 505 of the 587 acres of conservation land in the Study Area. The Yale-Toumey Forest is used for the University's Forestry program and is the site of active educational and research activities, including collaboration with institutes of higher education within the Monadnock Region. However, Yale-Toumey Forest is protected through fee ownership, and does not have a deed restriction or conservation easement on the lands within the Study Area. The rest of the properties under fee ownership are either owned by the Town of Swanzey or the Monadnock Humane Society with the exception of one property owned by an entity identified as "Robjohn LLC". Only one property, which does not have a street address but is located off of the southern end of Winchester Street, is protected through a conservation easement on the property, (tax ID of 72-43) which is used as farmland by Windyhurst Farm.

TABLE 4: Conserved and protected lands within the Study Area by parcel and type of conservation or protection method.

Parcel Tax Map ID	Street	Owner	Protection Type
71-17	COBBLE HILL RD	SWANZEY, TOWN OF	Fee Ownership
71-17	COBBLE HILL RD	SWANZEY, TOWN OF	Fee Ownership
72-43	WINCHESTER ST	WINDYHURST FARM PARTNERSHIP	Conservation Easement
56-4	SAWYERS CROSSING RD	SWANZEY, TOWN OF	Fee Ownership
57-124	PINE ST	SWANZEY, TOWN OF	Fee Ownership
56-4	SAWYERS CROSSING RD	SWANZEY, TOWN OF	Fee Ownership
56-4	SAWYERS CROSSING RD	SWANZEY, TOWN OF	Fee Ownership
50-4	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-14	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-13	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-3	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-12	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-2	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-11	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-1	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-3	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-13	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
55-7	FOREST AVE	HUMANE SOCIETY OF THE US	Fee Ownership
51-12	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-6	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
50-5	SAWYERS CROSSING RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
54-4	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-9	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-1	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-9	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-11	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-11	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-11	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-7	ASH HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
51-1-8	WHITTEMORE FARM RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
38-5	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
52-26	WEST SWANZEY RD	ROBJOHN LLC	Fee Ownership
38-8	MATTHEWS RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
38-4	WEST SWANZEY RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership
52-27	WEST SWANZEY RD	MONADNOCK HUMANE SOCIETY	Fee Ownership
38-22	MATTHEWS RD	SWANZEY, TOWN OF	Fee Ownership
52-9	BASE HILL RD	YALE UNIVERSITY FORESTRY SCHL	Fee Ownership

Map 3: Conservation Lands

Study Area Conservation Lands



Shallow Depth to Bedrock

Bedrock near the soil surface can pose construction difficulties. Pouring foundations, excavating basements, or installing utilities can be complicated or rendered prohibitively expensive. For the purpose of this analysis, soils with less than 100 centimeters depth from surface to bedrock were considered a natural constraint. It should be noted that the highest resolution data available for bedrock depth, sourced from the USDA Soil Survey Geographic Database (SSURGO), may fail to capture localized ledges or outcroppings with exposed or shallow bedrock.

Within the Study Area, there are two clusters of soils with shallow depth to bedrock which affect a total of 60 parcels. The first cluster is located roughly between Sawyers Crossing Road and Ash Hill Road and does not affect properties with direct frontage to NH 10. The second cluster affects several properties near the northern Westport Village Road and affect properties with frontage to Westport Village Road and NH 10. The parcels lie within the Business and Residence Districts.

Poorly Drained Soils

Poorly drained soils can constrain development because they can raise site work costs and/or risk of flooding during extreme precipitation events. They also frequently coincide with designated wetlands, presenting regulatory hurdles.

Poorly drained soils impact a total of 121 parcels within the Study Area across a number of scattered locations throughout the corridor. Several parcels between Sawyers Crossing Road and Ash Hill Road are affected, as well as several parcels north of Base Hill Road, all of which are zoned Business. Much of the current land use in these areas is undeveloped forest. SWRPC observed a handful of already developed commercial and industrial properties fronting Whittemore Farm Road consist of poorly drained soils. Areas with poorly drained soils north of Base Hill Road are entirely undeveloped forest.

Another significant cluster of poorly drained soils is located between Forest Avenue and West Street which affects a number of parcels fronting NH 10 on both sides of the road. Primarily, affected parcels are zoned Commercial/Industrial. Many of these parcels are already developed with existing commercial land uses. There are several smaller scattered areas of poorly drained soil south of West Street to the Winchester town line, including at the intersection of South Winchester Street and NH 10 and Westport Village Road and NH 10.

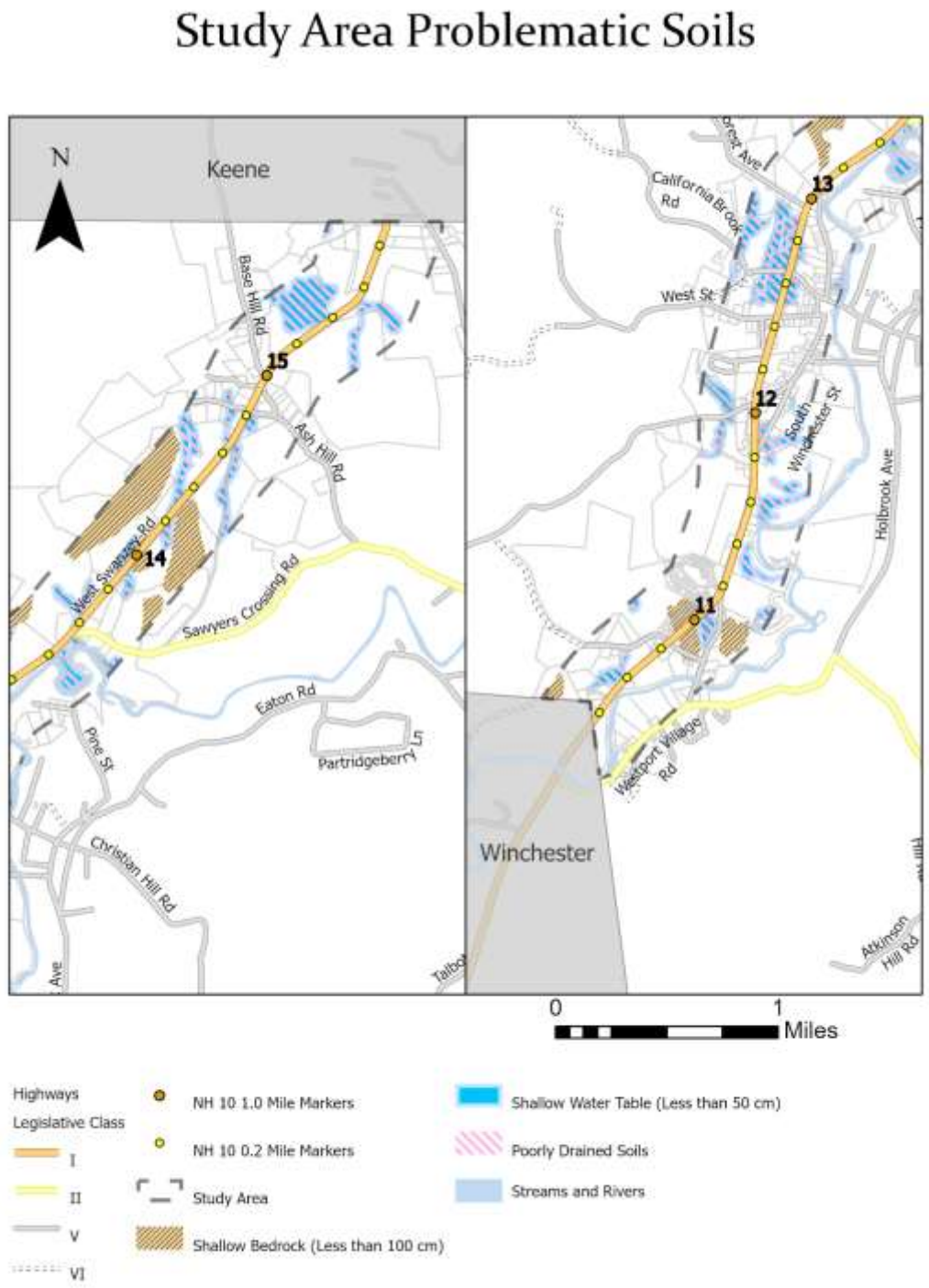
Additional details on poorly drained soils can be found on Map 4 below.

Shallow Water Tables

Shallow water tables often coincide with poorly drained soils and pose similar development challenges. For the purpose of this analysis, shallow water tables are defined as water tables being 50 centimeters or closer to the surface. Within the Study Area, shallow water tables are present in all areas with poorly

drained soils, affecting 121 parcels. Additional details on the geographic distribution of shallow water tables can be found on Map 4.

MAP 4: Problematic Soils



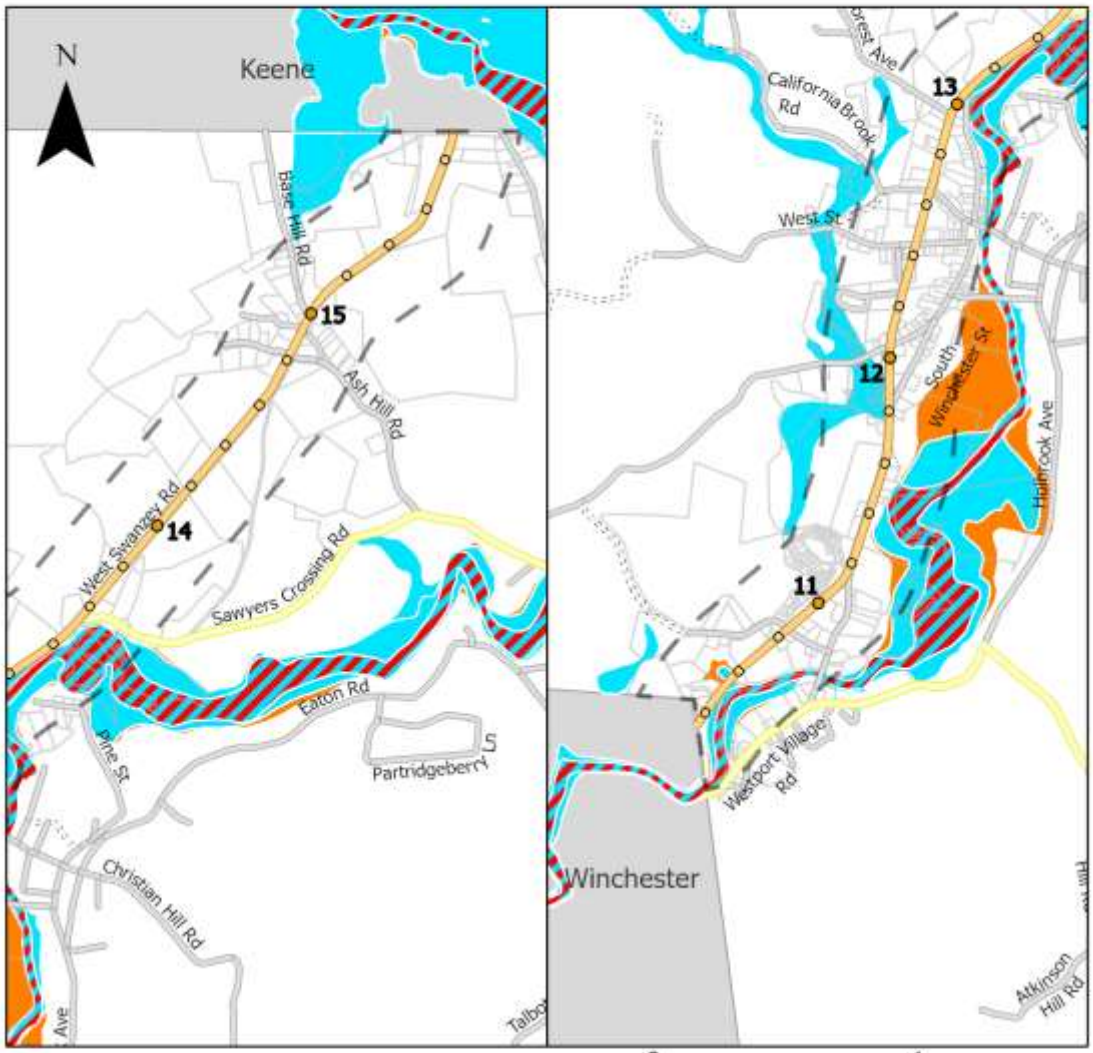
FEMA Designated Flood Zones

The Federal Emergency Management Agency (FEMA) maps areas susceptible to flooding, including regulatory floodways, 100-year and 500-year floodplains. Regulatory floodways are streams, channels and adjacent land areas that must be reserved in order to discharge floodwaters without flood water elevations exceeding a certain height. Development in regulatory floodways is subject to a review process meant to determine whether new development would obstruct floodwaters. Regulatory floodways are included in the 100-year floodplain, the area of land where there is a one percent annual chance of a flood event occurring each year. Property owners in the 100-year floodplain are required to buy flood insurance if they acquired a mortgage through a program that is federally assisted or insured. The 500-year floodplain is the area of land where there is a 0.2 percent annual chance of a flood event occurring each year. Properties in the 500-year floodplain are not subject to flood insurance requirements, but given the rising probability of intense rainfall events, properties in the 500-year floodplain may be subject to increased risk of experiencing flood events.

Within the Study Area, flood zones designated by the FEMA can be found along the California Brook and the Ashuelot River. Flood zones within the California Brook system represent 100-year floodplains. Properties on the western edge of Perry Lane and directly south of the Cobble Hill Road and NH 10 intersection are impacted by the California Brook floodplain. The Ashuelot River floodplain includes 100 - year floodplains and regulatory floodways, which typically carry more prohibitive development regulations. The Ashuelot River floodplains primarily impact properties on the east side of NH 10 between Sawyer's Crossing Road and North Winchester Street, and impacts some residential properties along North Winchester Street. The area directly south of West Swanzey Village bordered roughly by Holbrook Avenue, NH 10 and Westport Village Road contains both 500-year and 100-year floodplains as well as regulatory floodways. A more detailed overview of the location and distribution of FEMA designated flood zones within the Study Area can be found on the Map 5.

MAP 5: FEMA Flood Zones

Study Area Flood Zones



Highways
Legislative Classification
0
I
II
V
VI

NH 10 1.0 Mile Markers
NH 10 0.2 Mile Markers
Study Area (.25 Mile NH 10 Buffer)

FEMA Flood Zones
1% Annual Chance Flood Hazard
Regulatory Floodway
Special Floodway
Area of Undetermined Flood Hazard
0.2% Annual Chance Flood Hazard
Future Conditions 1% Annual Chance Flood Hazard
Area with Reduced Risk Due to Levee

Stratified Drift Aquifers

According to the United State Geological Survey (USGS), a stratified drift aquifer is "a coarse-grained sand or sand and gravel deposit that contains a usable supply of water." Stratified drift aquifers are an important source of drinking water for public wells in the Town of Swanzey. Stratified drift aquifers are an important natural resource and development constraint to consider because certain types of development might jeopardize water quality. According to the *Town of Swanzey's Phase I Natural Resources Inventory Report* prepared in December of 2018, West Swanzey Village lies on a productive Stratified Drift Aquifer, as does much of the southern half of the NH 10 corridor south of North Sawyers Crossing Road.

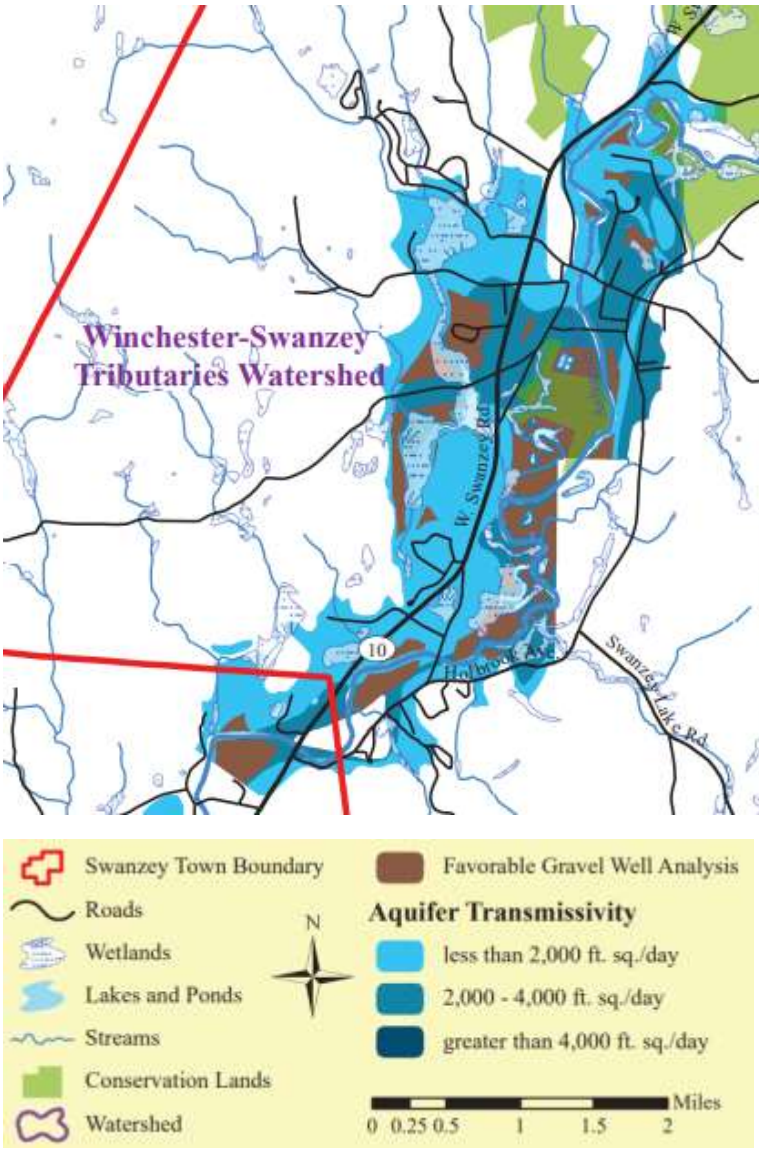


Figure 1: Productive Aquifers within the NH 10 Study Area and the corresponding legend. Source: Town of Swanzey Phase I Natural Resources Inventory Report, page 21.

Key Future Land Use Findings

Following is a list of key findings relative to future land use.

- While much of the northern half of the Study Area is currently protected as conservation land, very few parcels are protected through easements or other legal restrictions on the use of the property. Yale-Toumey Forest is the preeminent source of conservation land in the Study Area and is managed as conservation land entirely through fee ownership by Yale University.
- The Ashuelot River floodplain represents a significant natural and regulatory barrier to development within the Study Area. However, there are relatively few parcels that fall within the floodplain, and most are concentrated along North Winchester Street, NH 10 between North Winchester Street and Sawyers Crossing Road, and parcels directly south of West Swanzey Village.
- Water and sewer availability is almost exclusively concentrated within West Swanzey Village, which heavily influences the potential for future residential and commercial development within the Study Area due to the Town of Swanzey's zoning regulations. However, a large portion of the Study Area south of the Forest Avenue and NH 10 intersection falls within some form of aquifer, which presents some opportunity for the development of wells.
- Soils that are poorly drained with shallow water tables represent another significant natural barrier to development and affect multiple parcels north of Base Hill Road and Sawyers Crossing Road, as well as several parcels between Forest Avenue and West Street.
- The intersection of Westport Village Road and NH 10 overlies of a number of problematic soils that would pose a barrier to development. In addition, the area bounded between NH 10 and Westport Village Road is crossed by the Ashuelot River and contains considerable floodplain areas that restrict development.
- Many of the Town of Swanzey's community planning efforts support additional commercial and mixed-use development in West Swanzey Village. This includes the Town of Swanzey's most recent Master Plan update (currently underway), planning efforts undertaken by Plan NH to gauge citizen input on West Swanzey Village, as well as the establishment of an Economic Revitalization Zone on the Homestead Woolen Mills property.
- The Town of Swanzey's current Master Plan discourages the development of housing in the Business and Commercial/Industrial Districts, which comprise in total over 80% of the Study Area. The existing regulatory framework points primarily to West Swanzey Village as the location most suitable for future residential development within the Study Area.

Appendix 6:
Demographic, Economic Activity and Housing Analysis

Access Management Analysis

Introduction

"Access management" describes the systematic control of the location, spacing, design and operations of all access points to a roadway including driveways, medians, and intersections[1]. Well-coordinated access management is essential to extending the life of public infrastructure, increasing highway safety, reducing congestion, and preserving and improving the built environment. All users of a roadway, from pedestrians and cyclists to motorists and the freight industry, benefit from effective access management. In addition, the issues caused by a lack of well-coordinated access management can be expensive and difficult to solve and can adversely impact local homes and businesses.

As part of this study, SWRPC staff conducted an analysis of access management along the NH 10 corridor in Swanzey by identifying suspected nonconformities with current state and local access management regulations and inventorying access management features on the roadway itself. This analysis aims to provide insight into where attention and effort should be directed by local officials in coordination with the NH Department of Transportation (NHDOT) to improve access management when opportunities arise, such as in the case of properties changing their use. Effective access management will require local and state coordination and should include the careful management of both the transportation system as well as abutting land uses to the highway. Where NHDOT has authority over extensive portions of the transportation system, local government has regulatory authority over land use and the ability to implement a community vision for future land use. Strong partnership between the two is key to maximizing the efficiency and effectiveness of an access management program.

Methodology

SWRPC staff utilized data from the NH Department of Transportation (NHDOT), the Town of Swanzey, and NH GRANIT to conduct an analysis of access management features and potential nonconformities along the NH 10 corridor in Swanzey. Analysis of aerial imagery and digitization via the use of ArcGIS Online was the primary method used to analyze current conditions along the Corridor. Suspected corner clearance and driveway width violations are identified through the use of the measuring tool in ArcGIS Online in combination with 2015 areal imagery. Other nonconformities, such as miscellaneous objects in the right of way and nonpermitted access points, are identified through visual review of aerial imagery. On-road access management features are digitized also using 2015 imagery, and cross referenced with the most recent Google Maps imagery for the NH 10 corridor.

[1] Transportation Research Board, *Access Management Manual,* 2003

Driveway Permitting Process

As established by NH RSA 236:13 and adopted through NHDOT policy in March of 2000, NH DOT has a well-defined driveway permitting process for state-owned roads. According to the policy, landowners much first apply for a permit for the construction or alteration (including change of use) of a driveway, entrance, exit, or approach that will access any state-maintained highway. In the study area, NH DOT owns and maintains NH 10, Sawyers Crossing Road, and the southern portion of Westport Crossing Road.

Driveway applications that are proposed on any of the three state-owned roads within the study area are reviewed by the NH DOT District 4 office. All landowners wishing to construct a driveway accessing a state-maintained highway are required to complete a driveway permit application and submit it to the district engineer, which includes information about the proposed driveway, the landowner, and parcel history. For driveways that serve a higher number of trips per day, defined by NH DOT as major entrances, there is a much more involved application process which may require site plans, traffic studies, traffic control studies, or information depending on the complexity of existing conditions and the anticipated traffic to be generated. The table below summarizes some of the main design requirements established by NH DOT's driveway policy.

*Table 1: NH DOT Driveway Permit Design Standards**

	NH DOT Jurisdiction Design Standards	**Citation**	**Exceptions granted**
1	No more than one access point if less than 400 feet all season sight distance both directions	Policy 8 (a)	No
2	If frontage on highway is 500 feet or less, no more than 2 access points	Policy 8 (b)	No
3	No more than 3 access points for frontage exceeding 500 feet	Policy 8 (c)	Yes, Policy 8 (d)
4	No parking, loading, vending or servicing vehicles on highway or ROW	Policy 9 (a)	No
5	Miscellaneous items not permitted on, over or under state highway or ROW	Policy 9 (b)	No
6	Access to highway from parcel other than permitted driveway is prohibited	Policy 9(c)	No
7	Except Major entrance exceptions, maximum width of driveway 50 feet wide	Policy 10 (a)	Yes, Policy 10 (b)
8	In rural areas, 200 feet corner clearance. In urban areas, 100 feet corner clearance.	Policy 10 (c)	Yes, Policy 10 (c)
9	Intersection of driveway to highway no less than 60 degrees unless "right turn only"	Policy 10 (d)	No
10	Radius may not extend beyond applicant's frontage without permission of abutter	Policy 10 (e)	No
11	5% slope for car length and vehicle storage incline or decline (20'-25' in length)	Policy 10 (f)	No
12	Maximum grade for major driveway is 8%, Maximum for driveway 15%, algaebraic difference between any 2 grades shall not exceed 10%	Policy 10 (g)	Yes, Policy 10 (g)
13	Gradual slopes on side of driveway	Policy 10 (h)	No

*This Table is meant to summarize design standard components of the NH DOT Driveway permit. Please consult NH DOT policy for more detail.

The Town of Swanzey also has their own well-established driveway permitting process[2] for landowners wishing to construct, relocate or alter (including change of use) any driveway with access to Town managed roads. The Swanzey Public Works Director approves and issues all driveway permits, and driveway permits are required for the building permits of new structures. There are two sets of driveway regulations which govern the driveway permitting and design regulations in Swanzey. Driveway regulations apply to 1- and 2-family dwellings as well as non-commercial properties. Access management regulations apply to multi-family dwellings and commercial uses. As with the NH DOT policy, each set of driveway and access management regulations for Town-owned highways in Swanzey has its own design requirements.

Frontage & Access Points

For the purpose of this analysis, staff looked at the frontage of properties along NH 10 and the number of access points to each property. The total number of access points attributed to a parcel did not include suspected nonpermitted access points. Properties of concern identified in this analysis include parcels with under 500 feet of NH 10 frontage and more than 2 access points as well as parcels with over 500 feet of NH 10 frontage and 3 or more access points. These metrics are derived from NHDOT's driveway policies, particularly Policy 8 (b) and (c). As of this analysis, there are two properties with more than 2 access points and under 500 feet of frontage along NH 10, and no properties with 4 or more access points and over 500 feet of NH 10 frontage.

Table 2: Properties with potential frontage violations

Parcel Address	Parcel Map Number	Type of Violation	Parcel Land Use
765 West Swanzey Road	72-98-1	Under 500 ft., 3 or more access points	Commercial/Industrial
919 West Swanzey Road	71-11	Under 500 ft., 3 or more access points	Commercial/Industrial

Corner Clearance

An important focus of this analysis was documenting driveways that do not conform with either NHDOT or the Town of Swanzey's corner clearance policies. Corner clearance is defined as the distance between a driveway or access to a right-of-way and the nearest corner of an intersecting street. Inadequate corner clearances can result in problems with traffic operations, safety, and capacity. In the study area, the most likely consequence of corner clearance violations are conflicting and confusing turns at intersections.[3] It is important to note that the second highest category of locatable crashes in the study area are "at intersection" or "along road at driveway access".

For driveways along NH 10 and other state-owned roads in the study area, the rural standard of 200 feet between the driveway and intersecting road set forth in Policy 10 (c) was utilized to define corner clearance violations. Corner clearance violations for driveways located within the study area with access to Town-owned roads are defined by the commercial and residential driveway guidelines adopted by the Swanzey

[2] Swanzey's driveway guidelines are administered by their Planning Board, and derives its authority from RSA 674:35 and RSA 236:13

[3] Transportation Research Board, *Access Management Manual*, 2003

Planning Board. For residential driveways, the guidelines dictate a minimum spacing of 100 feet from an intersecting road which was adopted for this analysis. For commercial driveways, generally the guidelines dictated a minimum required distance of 150 feet from intersecting roads. Only corner clearance violations that involved the intersecting road of NH 10 or other state-owned roads are recorded.

Overall, corner clearance violations represented the most common form of nonconformity in driveways within the study area. From our analysis, there are 19 properties within the study area that directly border either NH 10 or another state-owned road that have an access point which does not conform with either state or local regulations. Primarily, the properties that have corner clearance nonconformities are commercial or industrial land uses near intersections. However, for access points subject to NHDOT policies it is important to note that exceptions can be made for driveways which do not meet the standard corner clearance requirements.

Table 3: Parcels with suspected corner clearance nonconformities

Parcel Address	Parcel Map Number	Intersection Requiring Clearance	Parcel Land Use	Governing Design Guidelines
189 West Swanzey Road	52-1	West Swanzey Road/Base Hill Road & West Swanzey Road/Whittmore Farm Road	Commercial/Industrial	NHDOT
599 Sawyers Crossing Road	55-2	West Swanzey Road/Sawyers Crossing Road	Commercial/Industrial	NHDOT
3 Forest Avenue	56-8	West Swanzey Road/Forest Avenue	Single Family/Duplex	Town of Swanzey
90 North Winchester Street	57-39	West Swanzey Road/North Winchester Street	Commercial/Industrial	Town of Swanzey
647 West Swanzey Road	73-26	West Swanzey Road/California Street	Commercial/Industrial	NHDOT
665 West Swanzey Road	73-13-1	West Swanzey Road/California Road	Commercial/Industrial	NHDOT
704 West Swanzey Road	72-85	West Swanzey Road/West Street	Commercial/Industrial	NHDOT
705 West Swanzey Road	72-99	West Swanzey Road/West Street	Single Family/Duplex	NHDOT
735 West Swanzey Road	72-98-2	West Swanzey Road/Perry Lane	Commercial/Industrial	Town of Swanzey
27 Cobble Hill Road	72-55	West Swanzey Road/Cobble Hill Road	Single Family/Duplex	NHDOT & Town of Swanzey (Two Access Points)
787 West Swanzey Road	72-93	West Swanzey Road/Cobble Hill Road	Commercial/Industrial	NHDOT
147 South Winchester Street	72-50	West Swanzey Road/South Winchester Street	Commercial/Industrial	Town of Swanzey
150 South Winchester Street	72-49	West Swanzey Road/South Winchester Street	Other Multifamily	Town of Swanzey
832 West Swanzey Road	71-4	West Swanzey Road/South Winchester Street	Single Family/Duplex	NHDOT
836 West Swanzey Road	71-4-1	West Swanzey Road/South Winchester Street	Other Multifamily	NHDOT
919 West Swanzey Road	71-11	West Swanzey Road/Anthony Lane	Commercial/Industrial	NHDOT
968 West Swanzey Road	70-34	West Swanzey Road/Westport Village Road	Commercial/Industrial	NHDOT
23 Kempton Road	70-29-2	West Swanzey Road/Kempton Road	Commercial/Industrial	Town of Swanzey
1026 West Swanzey Road	70-23	West Swanzey Road/Kempton Road	Single Family/Duplex	NHDOT & Town of Swanzey (Two Access Points)

Driveway Width

NH DOT Driveway policies lists that apart from exceptions made with major entrances, the maximum width of driveways is 50 feet. Because of this, our analysis flagged any driveway greater than 50 feet as an area of concern. Excessive driveway width is the second most common form of nonconformity for properties along NH 10 in the study area, with a total of 9 properties identified. The majority of these properties are commercial or industrial in nature, and many of the driveways in violation of the 50 foot standard are unpaved.

Table 4: Parcels with suspected driveway width infractions

Parcel Address	Parcel Map Number	Paved/Unpaved Access	Parcel Land Use
133 West Swanzey Road	52-26	Paved	Commercial/Industrial
608 West Swanzey Road	57-2	Unpaved	Commercial Industrial
617 West Swanzey Road	73-29	Unpaved	Single Family/Duplex
627 West Swanzey Road	73-28	Unpaved	Commercial/Industrial
765 West Swanzey Road	72-98-1	Paved	Commercial Industrial
898 West Swanzey Road	71-9	Unpaved	Single Family/Duplex
919 West Swanzey Road	71-11	Paved	Commercial/Industrial
968 West Swanzey Road	70-34	Paved	Commercial/Industrial
972 West Swanzey Road	70-33	Paved	Commercial/Industrial

Non-Permitted Access

For the purpose of this study, non-permitted access points are defined by NHDOT driveway design policy 9(c), "Access to the state highway from the parcel other than by a permitted driveway(s) shall be prohibited". Although SWRPC is not aware of a complete dataset of permitted driveways, efforts are made during the review of aerial imagery in the study area to identify potential non-permitted access points. Properties with access points that appear to be nonpermitted are labeled as "suspect". In total, seven properties along the corridor are identified as having potentially non-permitted access. Generally, driveways are identified as potentially non-permitted if they are not the primary access to the parcel, are unpaved, appeared to have intermittent or infrequent use, or appeared to violate other design standards such as slope, grade, corner clearance, or degree of intersection with the highway. Of properties identified as suspect for non-permitted access, 6 of the 7 are residential in nature and one is commercial or industrial in

nature. Non permitted access points compromise the system of access management along NH 10, and can cause safety issues as well as disruptions in service, greater delays, and lowered capacity.

Table 5: Parcels with suspected non-permitted access

Parcel Address	Parcel Map Number	Parcel Land Use
529 West Swanzey Road	56-10	Single Family/Duplex
888 West Swanzey Road	71-8	Single Family/Duplex
920 West Swanzey Road	71-10	Commercial/Industrial
1026 West Swanzey Road	70-23	Single Family/Duplex
1035 West Swanzey Road	70-24	Single Family/Duplex
59 Westport Village Road	88-14-2	Single Family/Duplex
102 Westport Village Road	88-30	Single Family/Duplex

Miscellaneous Objects & Loading Infractions

Two other categories of nonconformity include miscellaneous objects in the right of way and nonpermitted loading in the right of way. Miscellaneous objects violations are defined by design guideline 5 of NH DOT's driveway policy, and loading infractions are defined in design guideline 4 of the policy. Both are difficult to discern without a site visit, but using aerial imagery, eight properties are identified as being suspect for miscellaneous objects nonconformities and three are found to be suspect for loading nonconformities. The majority of properties with suspected miscellaneous objects are commercial or industrial in nature.

Table 6: Parcels with suspected miscellaneous objects in the NH 10 right-of-way

Parcel Address	Parcel Map Number	Parcel Land Use
10 West Swanzey Road	38-2	Other Multifamily
189 West Swanzey Road	52-1	Commercial/Industrial
487 West Swanzey Road	55-5	Single Family/Duplex
608 West Swanzey Road	57-2	Commercial/Industrial
627 West Swanzey Road	73-28	Commercial/Industrial
639 West Swanzey Road	73-26-1	Commercial/Industrial
- West Swanzey Road	72-98	Commercial/Industrial
876 West Swanzey Road	71-7	Commercial/Industrial

Table 7: Parcels with suspected vehicles parking, loading, vending or servicing in the NH 10 right-of-way

Parcel Address	Parcel Map Number	Parcel Land Use
529 West Swanzey Road	56-10	Single Family/Duplex
617 West Swanzey Road	73-29	Single Family/Duplex
59 Westport Village Road	88-14-2	Single Family/Duplex

On-Road Access Management Features

Critical to understanding potential access management issues along the Corridor is gauging the current conditions of on-road access management features along NH 10. In this analysis, on-road access management features include left-hand turn lanes, right-hand turn lanes, flush or painted medians, stop signs, and two-way left turn lanes. Out of any of the features above, two-way left turn lanes comprise the predominate form of on-road access management in the Corridor. There is approximately one half-mile of two-way left turn lanes on NH 10 in the study area. This represents approximately 9% of the total length of NH 10 through Swanzey. Two-way left turning lanes provide safety benefits through a reduction in crashes, increased capacity, and reduced delays. However, they also create the potential for overlapping left turn movements, can encourage strip commercial development, and provide minimal safety benefits to pedestrians and bicycles with the exception of reducing left-turn conflicts. Left- and right-hand turn lanes are present at the intersections of Base Hill Road, Ash Hill Road, North Winchester Street, and California Street. Two-way left turn lanes provide storage for turning vehicles in the stretch of NH 10 in the vicinity of Gomarlo's Shop and Save Supermarket, Perry Lane and West Street. Multiple turn lanes provide access to Market Basket at 11 West Swanzey Road, and a left-hand turn lane provides storage for vehicles turning into the Tire Warehouse at 1050 West Swanzey Road. The turn lanes serving the Ash Hill Road and Base Hill Road intersections are by far the longest along the corridor, at 300 and 400 feet respectively, while the turn lanes at the intersections of North Winchester Street and California Street are relatively short at approximately 100 feet each. A comprehensive map series of the on-road access management features can be found in Appendix A.

Appendix A: On-Road Access Management Features & Nonconformities Map Series

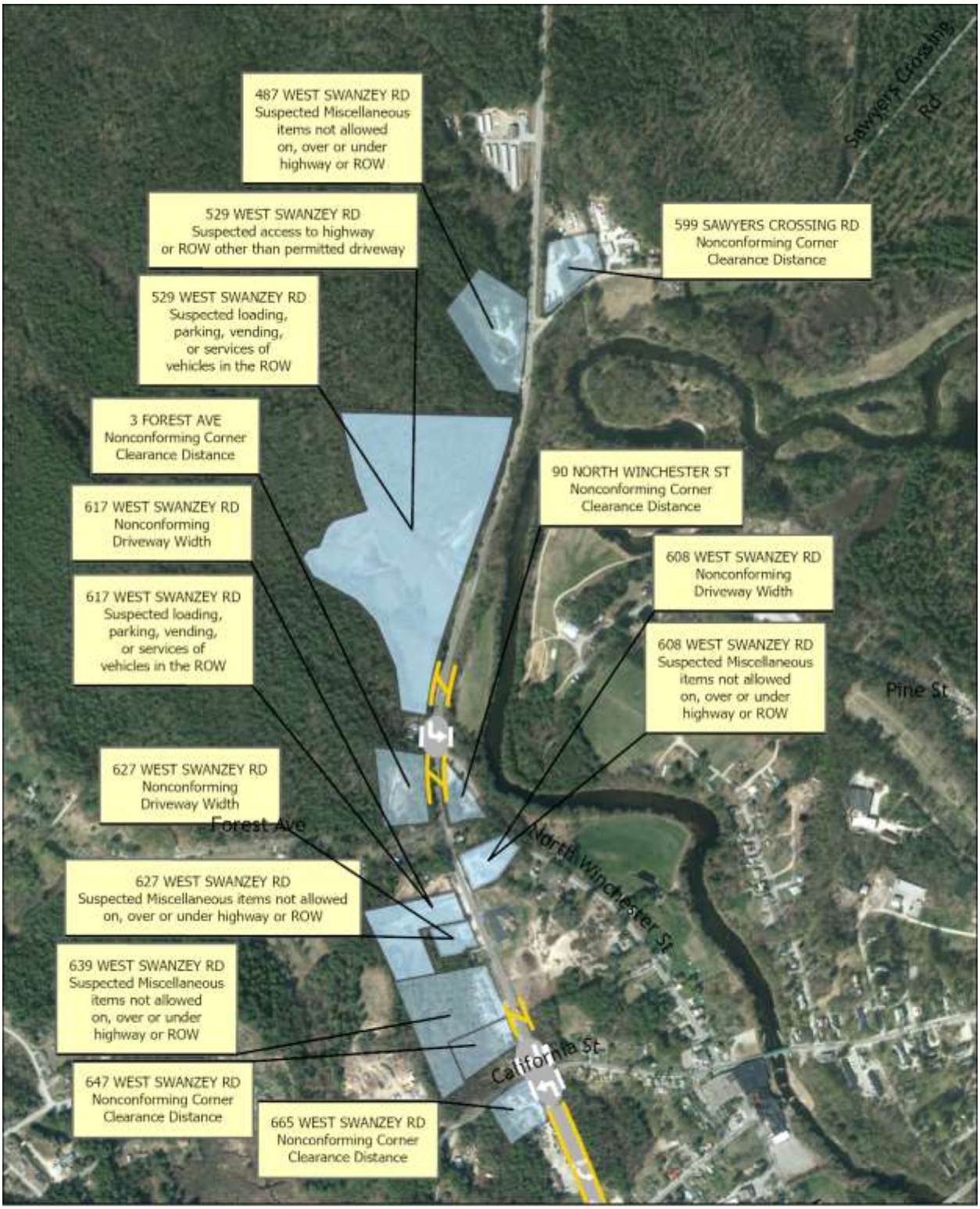
Note: Map series begins at the Keene town line and ends at the Winchester town line.



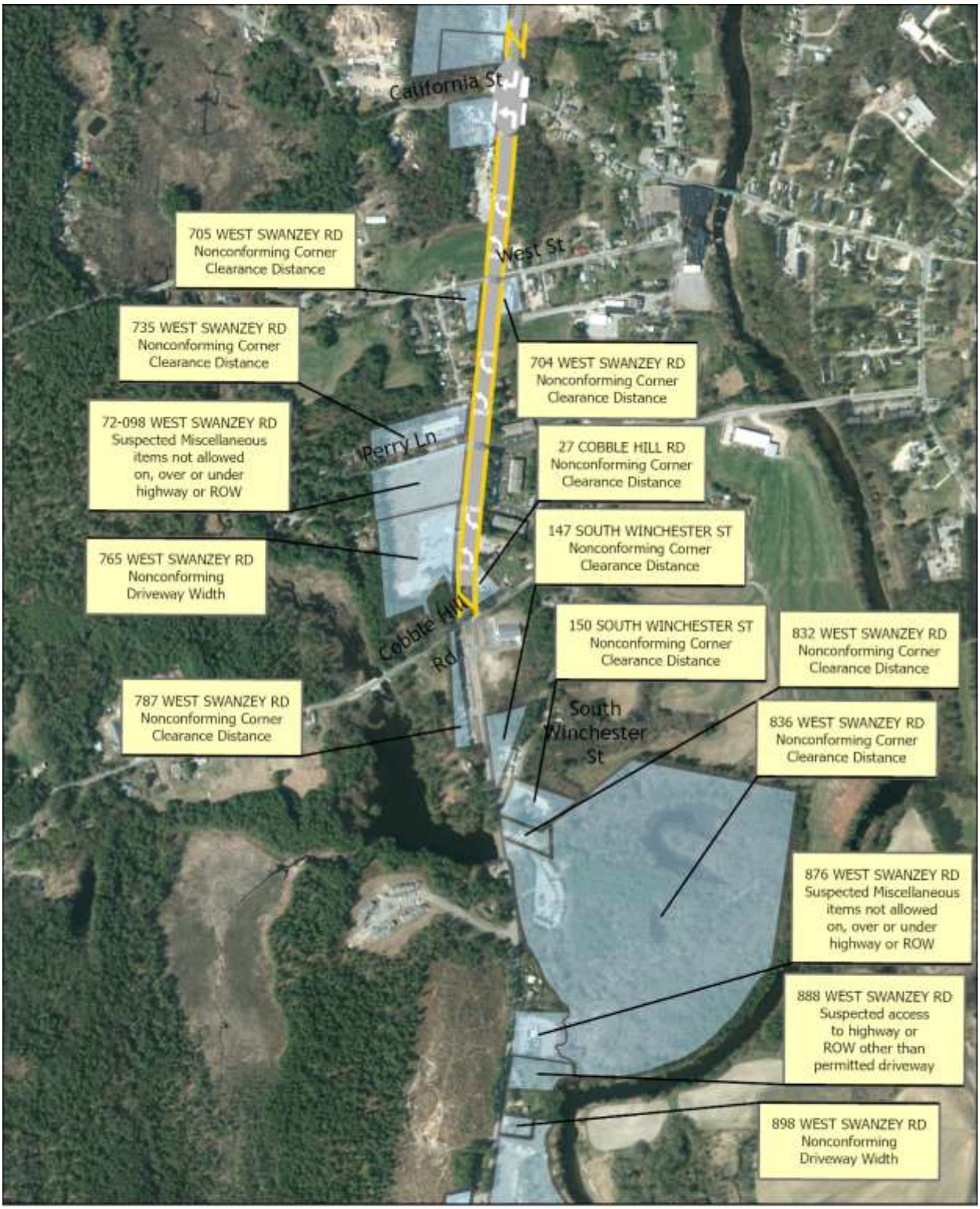
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Appendix A: On-Road Access Management Features & Nonconformities Map Series



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Appendix A: On-Road Access Management Features & Nonconformities Map Series

Swanzey NH 10 Demographic, Economic Activity & Housing Analysis

Demographic Profile

Demographic factors such as population growth trends, density, age, and income can impact transportation patterns and needs within the corridor. This section provides an overview of demographic trends in the Town of Swanzey, with a particular focus on the NH 10 Study Area where demographic data at that geography is available.

Population Change

Predicting population change specifically for the Study Area is difficult to determine, due to shifting Census block geographies and the absence of population projections at that level of resolution. As of 2010 - the last veritable population count for the area - the total population of Census blocks that intersect with the Study Area was approximately 2,000 people, which represented about 28% of the total population of the Town of Swanzey at that time.[1] Based on a survey of driveway permitting in the area and town issued housing permits across Swanzey during the last decade, it does not appear that there was a large number of development activity on the Corridor, so the population has probably not changed significantly in the last 10 years.[2]

Swanzey has seen extensive growth in the past, however. Between 1970 and 2010 the Town of Swanzey's population increased 70% from 4,254 to 7,230, which is slightly slower than the State of New Hampshire's population, which grew 78%. During that same period Swanzey grew at a much faster rate than Cheshire County as a whole, which only grew 47%.

According to the most recent population projections from the NH Office of Strategic Initiatives (NH OSI) (2016), population growth trends for the Town of Swanzey are predicted to follow historical patterns in which Swanzey grows faster than Cheshire County, but slower than the State as a whole. The NH OSI estimates that the Town of Swanzey's population, which was 7,230 in 2010 is predicted to increase to 7,662 by 2040. This represents a total growth from 2010 to 2040 of 5%, as opposed to a predicted growth of 2% for Cheshire County and 9% for the State. During that same time period, Swanzey is projected to grow at a much slower rate than the United States as a whole, which has a growth of 16.5% projected by 2040. In the following chart, the projections for Swanzey's population growth is compared to the other geographies mentioned above, as well as neighboring communities. Only the Town of Marlborough is expected to grow as fast as Swanzey among this group of municipalities.

[1] The official 2010 Census Block count for the study area was 2,038 people. Please note that Census Blocks differ greatly in size and shape, and some larger rural blocks included in this Study Area population calculation include people living outside of the quarter mile radius from NH 10.

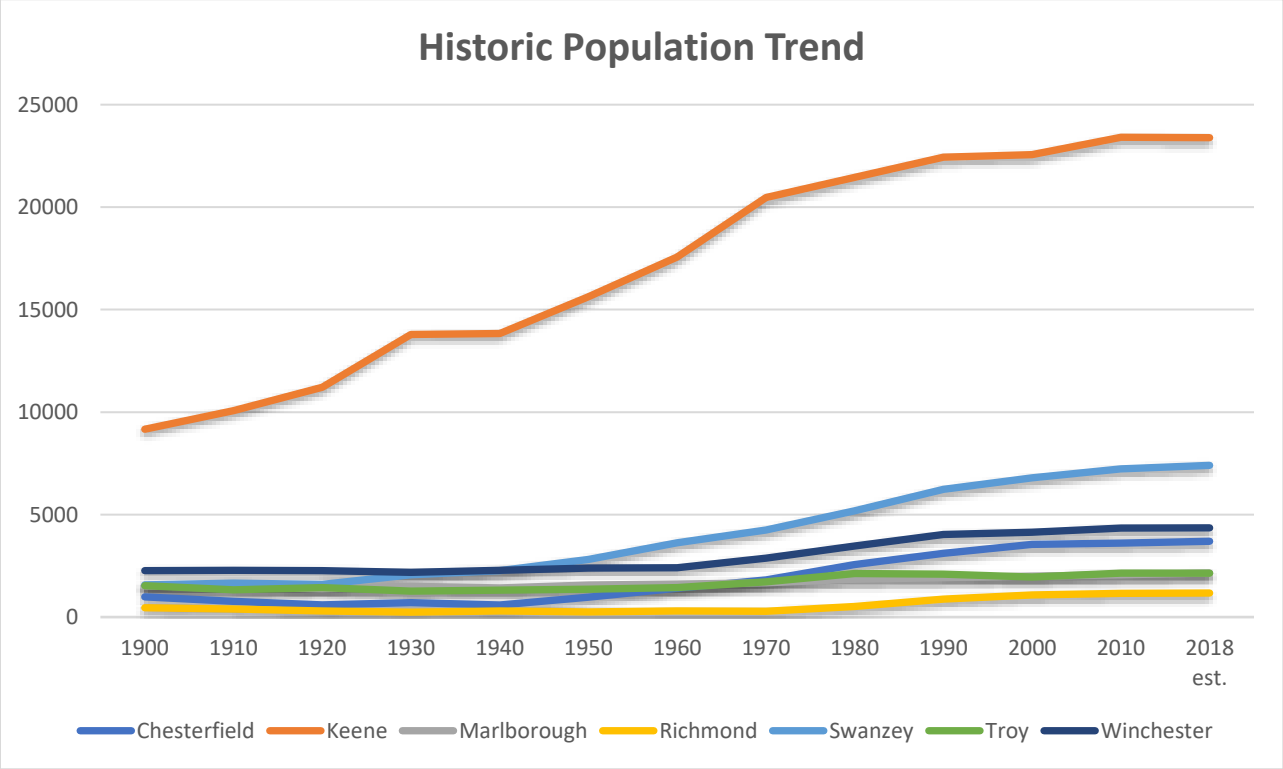
[2] There were 136 housing units permitted between 2010 and 2019 in Swanzey and only 4 new driveway permits issued for housing by NHDOT on NH 10 during the same period.

TABLE 1: Population Change over Time for Swanzey and Surrounding Towns

	Census	NH Office of Strategic Initiatives September 2016 Projections						Change
	2010	2015	2020	2025	2030	2035	2040	2010-2040
New Hampshire	1,316,470	1,330,501	1,349,908	1,374,702	1,402,878	1,422,503	1,432,730	9%
Cheshire County	77,117	77,342	77,653	78,002	78,315	78,543	78,695	2%
Southwest Region	43,947	44,237	44,490	44,763	44,944	45,075	45,162	3%
Chesterfield	3,604	3,610	3,598	3,588	3,602	3,613	3,620	0%
Keene	23,409	23,550	23,641	23,743	23,839	23,908	23,954	2%
Marlborough	2,063	2,110	2,130	2,151	2,160	2,166	2,170	5%
Richmond	1,155	1,159	1,172	1,185	1,189	1,193	1,195	3%
Swanzey	7,230	7,339	7,445	7,554	7,585	7,607	7,622	5%
Troy	2,145	2,135	2,159	2,185	2,194	2,200	2,205	3%
Winchester	4,341	4,334	4,345	4,357	4,375	4,388	4,396	1%

NH Office of Strategic Initiatives

Figure 1: Historical Population for Swanzey and Surrounding Towns

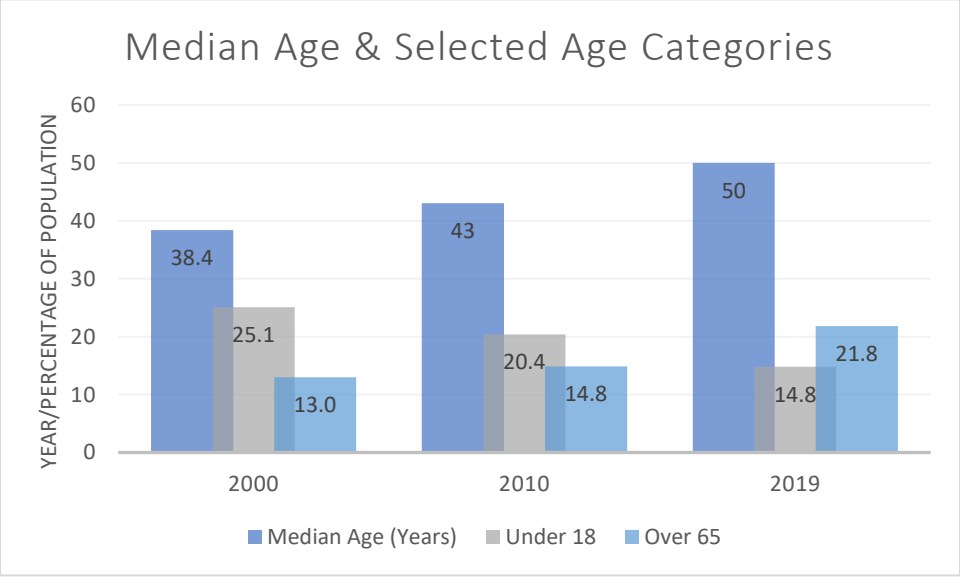


U.S. Census

Age Distribution

Different age groups tend to have different transportation needs. Both young and older persons may have a need for transportation alternatives to single-occupancy vehicles, and a higher overall portion of working-age adults may signal the presence of more single-occupancy vehicles and subsequently potential commuting traffic. The mix of different age groups and the propensity of certain age groups over others may also have an impact on future land use, which in turn shapes transportation needs and patterns. In Swanzey, the median age has increased from 38.4 years in the 2000 Census to 43 years in 2010, with an estimated 50.0 years as of 2019.[3] At the same time, the proportion of the population under 18 years has decreased over time from 25.1% in 2000 to 20.4% in 2010, with an estimated decrease to 14.8% in 2019.[6] At the same time as the population under 18 is decreasing, Swanzey experienced a significant increase in the portion of the population that is over 65, increasing from just 13% of the population in 2000 to 21.8% of the population in 2019. While it is difficult to estimate the age distribution within the Study Area due to changing census geography, the Town of Swanzey demonstrates a clear trend of an increase in median age and those over 65 coupled with a decrease in those under 18. This trend of an aging population could have a substantial impact on the transportation needs for the Demographic Study Area in the future.

Figure 2: Median Age and Selected Age Categories



U.S. Census and American Community Survey 5-year estimates, Table S0101

[3] US Census, Table S0101, 2019: ACS 5-Year Estimate Tables.

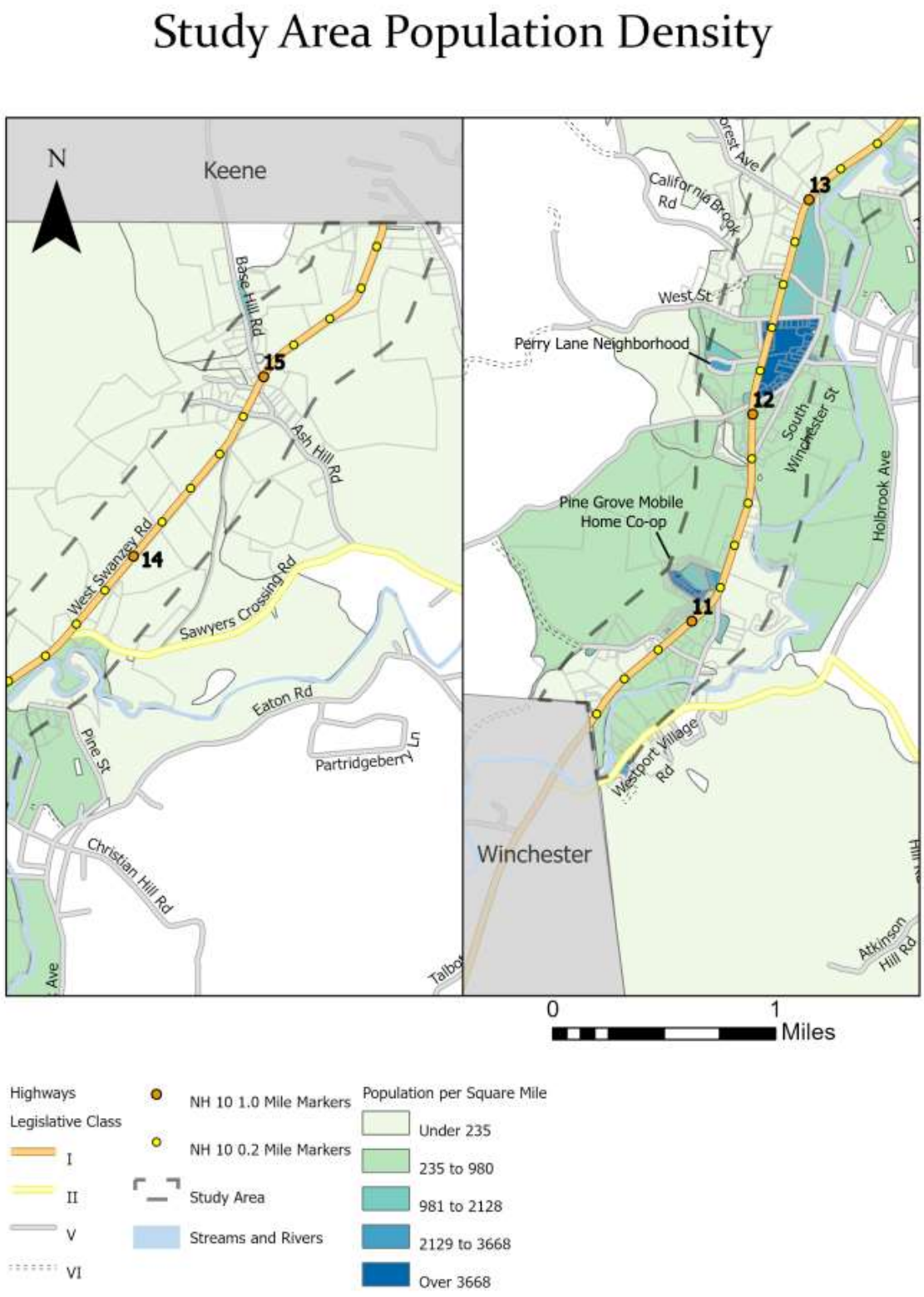
Population Density

Population density can have a major effect on the forms of transportation options that are viable, as well as the overall patterns of transportation within the larger corridor. Population density within the Study Area was determined at the Census block level, which is the smallest geography available for the Study Area. Population counts used to determine density were derived from the 2010 U.S. Census, and density was calculated as the number of people per square mile. Due to the irregular sizes of Census blocks some blocks may have artificially high density per square mile while other blocks may encompass a wider area of both residential and non-residential or rural areas.

With these limitations taken into account, the population density of the Study Area can provide some insight to the distribution of population within the Study Area. By far the blocks with the highest density were in West Swanzey Village in an area roughly bounded by North Winchester Street, South Winchester Street, Cobble Hill Road and NH 10. Both the Perry Lane neighborhood and the Pine Grove Mobile Home Park Cooperative also demonstrate higher densities. Apart from these pockets of density, many of the blocks south of Forest Avenue and Sawyers Crossing Road have moderate population density and distributed population which aligns with the residential zoning along major streets extending from the Study Area. As can be expected, the Census blocks north of Sawyers Crossing Road or Forest Avenue are lower in density than Census blocks in the southern half of the Study Area.

Calculation of population density via U.S. Census data can be combined with parcel-level housing and land-use data to gain a more complete understanding of population distribution within the Study Area. Higher densities along the corridor generally coincide with specific housing developments, such as the Perry Lane neighborhood or the Pine Grove Mobile Home Park Co-operative with the exception of West Swanzey Village.

MAP 1: Population Density in the study area by block group



Median Household Income and Poverty

Socio-economic factors can influence transportation needs and trends. Income can determine the transportation modes households utilize and may also indicate the relative burden of transportation costs on households. The table below provides the median household income for the Town of Swanzey as well as the West Swanzey Census Designated Place, or the Census geography for West Swanzey Village. While median household incomes for both geographies increased from 2010 to 2019, West Swanzey Village is shown to have consistently lower median incomes than the Town of Swanzey as a whole. Outside of West Swanzey Village, the Study Area has a number of clusters of low- and moderate-income populations because of the presence of two housing developments owned by Keene Housing which are subject to income restrictions, as well as the Pine Grove Mobile Home Park.

Table 2: Median Income Over Time

	2010	2019
Swanzey, Cheshire County, New Hampshire	$52,053	$65,019
West Swanzey CDP, New Hampshire	$40,259	$58,494

American Community Survey 2018 5-year estimates, Table S1901

Table 3: Population Under Poverty

Poverty Status, 2019			
Geography	**Total Population**	**Population 150% or more under the Federal Poverty Level**	**Percent of total population 150% or more under the Federal Poverty Level**
New Hampshire	1305013	169,285	13%
Cheshire County	71402	11,438	16%
Swanzey	7185	862	12%
West Swanzey CDP	896	76	8%

American Community Survey 2019 5-year estimates, Table S1701

Key Demographic Findings

- West Swanzey Village, and likely the Study Area as a whole, has lower incomes than the Town of Swanzey as a whole
- The Town of Swanzey is anticipated to have a very slow population growth rate in the future, slower than the State of New Hampshire as a whole and much slower than the national average.
- The Study Area is home to approximately 28% of the Town of Swanzey's population as of the 2010 Census, although this is likely an inflated statistic due to the irregularities of the Census block geography.
- The Town of Swanzey is aging, with the median age and share of the population over 65 increasing and the share of the Town's population under 18 decreasing over time.
- The majority of the population in the Study Area lives in the southern half of the corridor, and the highest population densities outside of specific multifamily or manufactured housing developments can be found in West Swanzey Village.

Jobs and Commuting Patterns

Using Census Longitudinal Employer-Household Dynamics, this section will provide an overview of employment and commuting patterns for workers and residents of the Corridor area. Analysis includes an overview of employment within the Study Area itself, a profile of workers within the Study Area, an overview of the inflow and outflow of workers from the Study Area, and finally an overview of the commuting distance and destinations for those who live and work in the Study Area. This section will provide data for 2010 and 2018 to provide insights into the recent economic changes and trends along the corridor. As NH 10 is a major commercial and industrial hub for the Town of Swanzey, understanding commuting patterns and trends can provide significant insights into existing transportation patterns along the corridor, particularly in the peak weekday commuting hours. For this section, the Study Area is defined as the 0.25-mile buffer from the NH 10 centerline within the Town of Swanzey.

Study Area Employment

The Study Area saw a dramatic increase in jobs from 2010 to 2018, increasing by 267 jobs or 114%. The vast majority of these new jobs, 213, were in the retail sector. This likely reflects the development of Market Basket within the northern section of the Study Area and to a lesser degree the Dollar General in the southern section of the Study Area since 2010. Workers within the Study Area also were younger and lower income in 2018 when compared to 2010. Those aged 29 or younger made up the majority of workers within the Study Area in 2018 (40.9%), while in 2010 the majority of workers were 30 to 54. There were also many more low-earning jobs within the Study Area in 2018 compared to 2010, with 48.1% of jobs earning $1,250 or less in 2018 as compared to 32.9% in 2010. These trends are consistent with the growth in retail trade as the dominant industry within the Study Area. The Study Area also saw increases in the industries of Manufacturing, Wholesale Trade and Other Services.

While employment within the Study Area grew substantially between 2010 and 2018, there were a number of industries that saw losses in employment. The most dramatic decrease was in the Educational Services sector which decreased from 45 positions, about 20% of all jobs in 2010, to no jobs in 2018. The sectors of Accommodation, Food Services and Public Administration also saw a decrease in their total number of jobs in the Study Area.

Table 4: Study Area Labor Market Overview

Total All Jobs				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
Total All Jobs	501	100.0%	234	100.0%
Jobs by Worker Age				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
Age 29 or younger	205	40.9%	56	23.9%
Age 30 to 54	193	38.5%	117	50.0%
Age 55 or older	103	20.6%	61	26.1%
Jobs by Earnings				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
$1,250 per month or less	241	48.1%	77	32.9%
$1,251 to $3,333 per month	156	31.1%	93	39.7%
More than $3,333 per month	104	20.8%	64	27.4%
Jobs by NAICS Industry Sector				
	2018		**2010**	
	Count	**Share**	**Count**	**Share**
Agriculture, Forestry, Fishing and Hunting	0	0.0%	0	0.0%
Mining, Quarrying, and Oil and Gas Extraction	0	0.0%	0	0.0%
Utilities	0	0.0%	0	0.0%
Construction	31	6.2%	34	14.5%
Manufacturing	25	5.0%	2	0.9%
Wholesale Trade	43	8.6%	30	12.8%
Retail Trade	264	52.7%	51	21.8%
Transportation and Warehousing	16	3.2%	0	0.0%
Information	2	0.4%	1	0.4%
Finance and Insurance	0	0.0%	0	0.0%
Real Estate and Rental and Leasing	3	0.6%	7	3.0%
Professional, Scientific, and Technical Services	1	0.2%	1	0.4%
Management of Companies and Enterprises	0	0.0%	0	0.0%
Administration & Support, Waste Management and Remediation	13	2.6%	0	0.0%
Educational Services	0	0.0%	45	19.2%
Health Care and Social Assistance	12	2.4%	10	4.3%
Arts, Entertainment, and Recreation	0	0.0%	0	0.0%
Accommodation and Food Services	22	4.4%	33	14.1%
Other Services (excluding Public Administration)	68	13.6%	12	5.1%
Public Administration	1	0.2%	8	3.4%

U.S. Census Longitudinal Employer-Household Dynamics

Worker Inflow-Outflow

While the number of workers both living and working in the Study Area grew from 2010 to 2018, very few workers both lived or worked in the Study Area in either year. In 2018, despite a 114% increase in employment, only 10 people both lived and worked in the Study Area, up from 7 in 2010. This may indicate a mismatch between the skill set and education of those who live in the Study Area and the employment opportunities available along the NH 10 corridor.

Both the number of jobs based in the Study Area and workers living in the Study Area increased significantly from 2010 to 2018. However, the number of jobs grew far faster than the number of workers living in the area, with a 114% increase of the former and a 24.6% increase in the latter. In 2018, the number of jobs in the Study Area was more than the number of workers living in the Study Area, which is a reversal from 2010 where the number of workers far outstripped the number of jobs along NH 10 in Swanzey.

Table 5: In-Area Labor Force Efficiency (All Jobs)

	2018	2010	Change 2010-2018
Living and Employed in the Selection Area	10	7	42.9%
Living in the Selection Area but Employed Outside	421	338	24.6%
Employed in the Selection Area but Living Outside	491	227	116.3%

U.S. Census Longitudinal Employer-Household Dynamics

Educational Attainment

Educational attainment plays a significant role in the skillset of the workforce in a community, and the types of positions that are filled by the residents of that community. In 2019, the population of Swanzey that is 25 and over had comparable levels of educational attainment to Cheshire County and the State of New Hampshire. Notable trends in education include a higher percentage (9%) of those that only reached a high school level of education compared with the State, and a 7% lower percentage of those that had obtained a Bachelor's degree. In West Swanzey Village, which represents the major concentration of population in the Study Area, the percentage of those who had only obtained a high school diploma was much higher, 15% above the State and 12% higher than the Cheshire County. The high percentage of population with a high school level of education would lend itself to a greater percentage of residents in Swanzey who work in the retail and service sectors. However, this is not reflected in the efficiency of the workforce, as most of the workforce is commuting outside of the Study Area even as retail jobs make up the majority of positions in the Study Area. This may indicate that educational attainment is not the primary driver of whether residents of the Study Area fill positions created locally as opposed to commuting outside of the Study Area.

Table 6: Educational Attainment for Persons 25 and Over

	Less than Highschool	Highschool	Some College	Associates	Bachelors	Masters or Above
New Hampshire	7%	28%	19%	10%	22%	14%
Cheshire County	7%	31%	19%	10%	20%	13%
Swanzey	7%	37%	21%	13%	15%	11%
West Swanzey CDP	9%	43%	15%	2%	21%	16%

American Community Survey 2019 5-Year Estimates, Table B15003

Distance of Travel

Between 2010 and 2018, the population of individuals who work in the Study Area commuting long distances increased dramatically. The portion of those who work in the Study Area and travel greater than 50 miles to get to work increased 355% over this time period from 20 to 91 workers, while the number of individuals travelling between 25 and 50 miles between work and home increased 263% from 19 to 69 workers. In addition, the share of all workers employed in the Study Area who travelled less than 10 miles to work decreased from 59.8% in 2010 to 48.1% in 2018.

Table 7: Distance to Home for Study Area Workers

	2018		2010	
	Count	**Share**	**Count**	**Share**
Total All Jobs	501	100.0%	234	100.0%
Less than 10 miles	241	48.1%	140	59.8%
10 to 24 miles	100	20.0%	55	23.5%
25 to 50 miles	69	13.8%	19	8.1%
Greater than 50 miles	91	18.2%	20	8.5%

U.S. Census Longitudinal Employer-Household Dynamics

Overall, for those who live in the Study Area commute distances increased slightly but remained primarily stable. There was an increase in the number of workers who lived in the Study Area, from 345 in 2010 to 431 in 2018, but a slight decrease in the share of workers travelling less than 10 miles to work. Those who live in the Study Area increasingly were travelling from at least 10 miles to work, although the share of workers travelling greater than 50 miles to work daily decreased slightly from 2010 to 2018.

Table 8: Distance to Work for Study Area Residents

	2018		2010	
	Count	Share	Count	Share
Total All Jobs	431	100.0%	345	100.0%
Less than 10 miles	239	55.5%	203	58.8%
10 to 24 miles	55	12.8%	34	9.9%
25 to 50 miles	68	15.8%	45	13.0%
Greater than 50 miles	69	16.0%	63	18.3%

U.S. Census Longitudinal Employer-Household Dynamics

Home/Work Destinations

In both 2010 and 2018, those who live in the Study Area overwhelmingly work in the City of Keene, while those who work in the Study Area live in a diverse range of locations. Despite an increase in the number of workers who live in the Study Area, the portion of all workers who worked in the City of Keene increased from 2010 to 2018. While the number of workers who live in the City of Keene and work in the Study Area also increased, their relative share of the overall population employed in the Study Area decreased. There was also an increase in those who worked in larger communities farther away, such as Concord, Nashua, Manchester, and Derry.

Table 9: Residence of People Working in Study Area

	2018		2010	
	Count	Share	Count	Share
Keene city, NH	98	19.6%	50	21.4%
West Swanzey CDP, NH	18	3.6%	12	5.1%
Winchester CDP, NH	12	2.4%	7	3.0%
Nashua city, NH	7	1.4%	2	0.9%
Manchester city, NH	6	1.2%	2	0.9%
Troy CDP, NH	6	1.2%	3	1.3%
Derry CDP, NH	5	1.0%	-	-
Hinsdale CDP, NH	5	1.0%	5	2.1%
Concord city, NH	4	0.8%	-	-
Jaffrey CDP, NH	4	0.8%	1	0.4%
All Other Locations	336	67.1%	152	65.0%

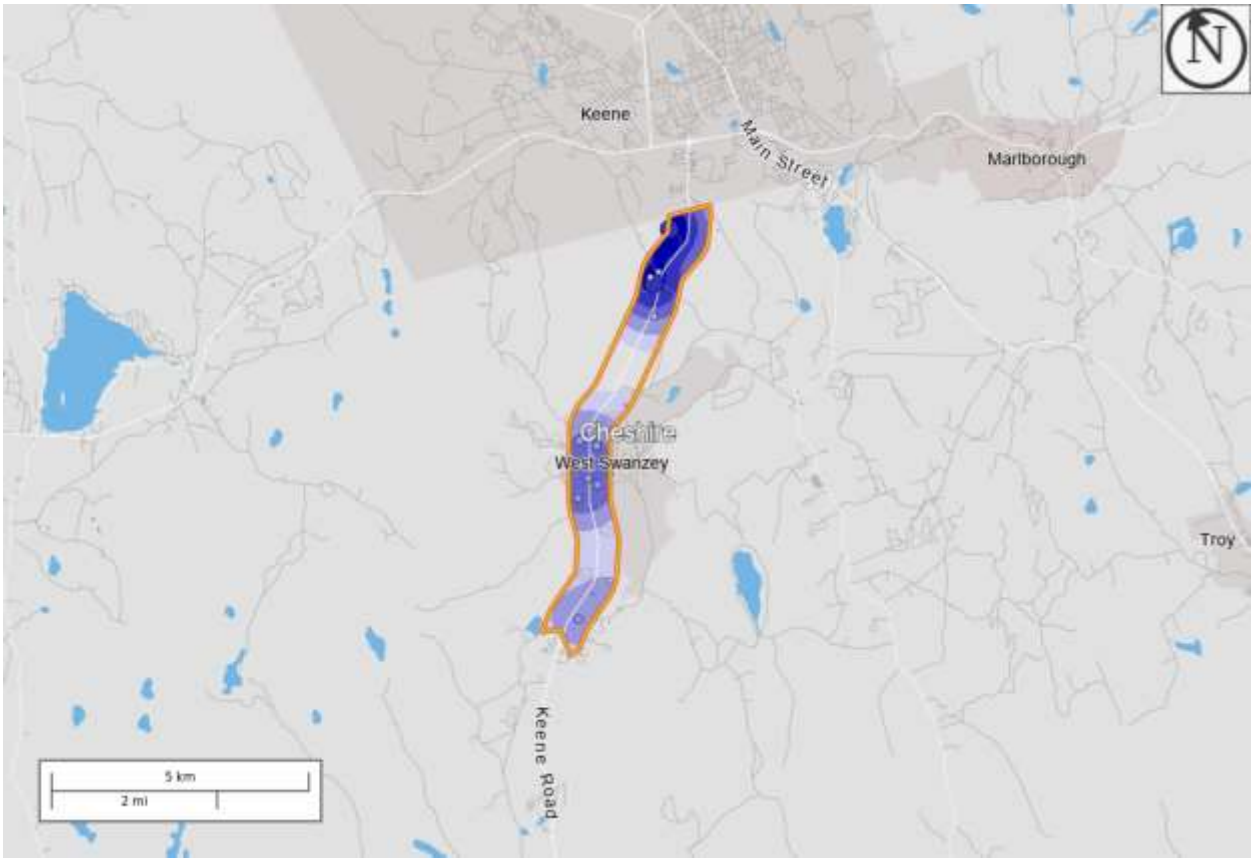
U.S. Census Longitudinal Employer-Household Dynamics

Table 10: Work Destinations for Study Area Residents

	2018		2010	
	Count	Share	Count	Share
Keene city, NH	171	39.7%	133	38.6%
Brattleboro CDP, VT	13	3.0%	12	3.5%
Concord city, NH	12	2.8%	9	2.6%
Manchester city, NH	7	1.6%	8	2.3%
Lebanon city, NH	6	1.4%	10	2.9%
Hanover CDP, NH	5	1.2%	7	2.0%
Nashua city, NH	4	0.9%	4	1.2%
Portsmouth city, NH	4	0.9%	3	0.9%
Hinsdale CDP, NH	3	0.7%	1	0.3%
Rochester city, NH	3	0.7%	-	-
All Other Locations	203	47.1%	158	45.8%

U.S. Census Longitudinal Employer-Household Dynamics

Figure 3: Job Density within the Study Area, 2018



U.S. Census Longitudinal Employer-Household Dynamics

Key Jobs & Commuting Findings

- The Study Area experienced a significant increase in jobs over the last decade and a shift in dominant industries from Construction, Education, Food and Accommodation, and Retail Trade to an employment base overwhelmingly comprised of jobs in the Retail Trade sector.
- The highest density of employment in the corridor is in the far northern section of the Study Area, adjacent to the border with the City of Keene. This likely represents the Market Basket commercial plaza as well as businesses off of Whittemore Farm Road.
- Those who work in the Study Area are younger, have lower incomes and commute farther on average in 2018 when compared to 2010. This is likely a result of the growth in Retail Trade in the Study Area during this period.
- There is almost no overlap between those who live within the Study Area and those who work in the Study Area. However, the number of jobs in the Study Area and the number of workers in the Study Area are almost equal. This may reflect a mismatch in the industries and opportunities present in the Study Area and the skills and needs of those who live in the Study Area.
- While the majority of those who work in the Study Area in 2018 still commute less than 10 miles between work and home, the number of workers who travelled 25 to 50 or over 50 miles increased substantially between 2010 and 2018. Over the same time period, commute times for those who live in the Study Area remained relatively stable and the majority of Study Area workers travelled less than 10 miles to work daily.
- The majority of those who live in the Study Area work in Keene, and Keene is also the largest source of employees commuting into the Study Area for work.
- The Educational Services sector completely disappeared from the Study Area between 2010 and 2018, and is the loss of a significant industry that provided 19.2% of all jobs in the Study Area in 2010.

Housing

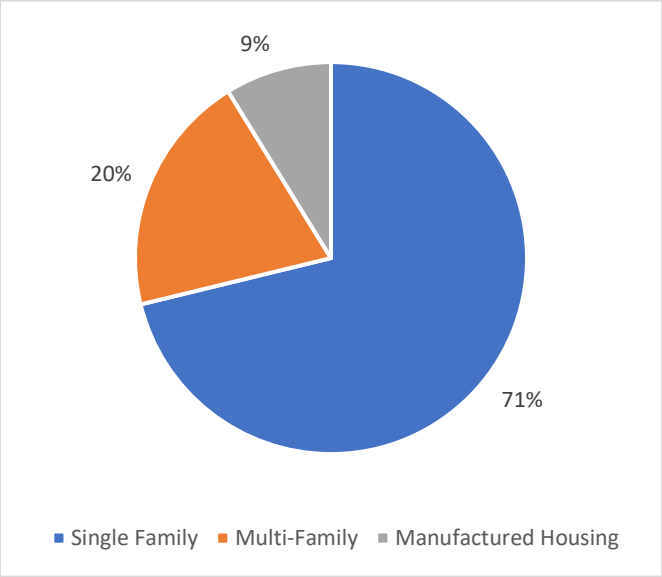
Housing is a critical piece of understanding current and future transportation needs and influences almost all other facets of land use and economic activity that also determine the transportation patterns and needs within the Study Area. This section will provide an overview of the current housing stock along the corridor, including housing types, housing affordability and availability, and how demographic factors can be used to predict future housing need. Data for this section is derived from parcel-level assessing data from the Town of Swanzey, the American Community Survey, the U.S. Census, and the NH OSI.

Housing Stock along the Corridor

In 2010, the Census blocks that intersected with a 0.25-mile buffer of NH 10 contained a total of 921 housing units. This is approximately 29% of the 3,205 housing units in the Town of Swanzey as of the 2010 Census. However, as mentioned before, Census blocks have irregular shapes and sizes, and this represents a far larger area of land than the quarter-mile radius around NH 10. While housing type is not

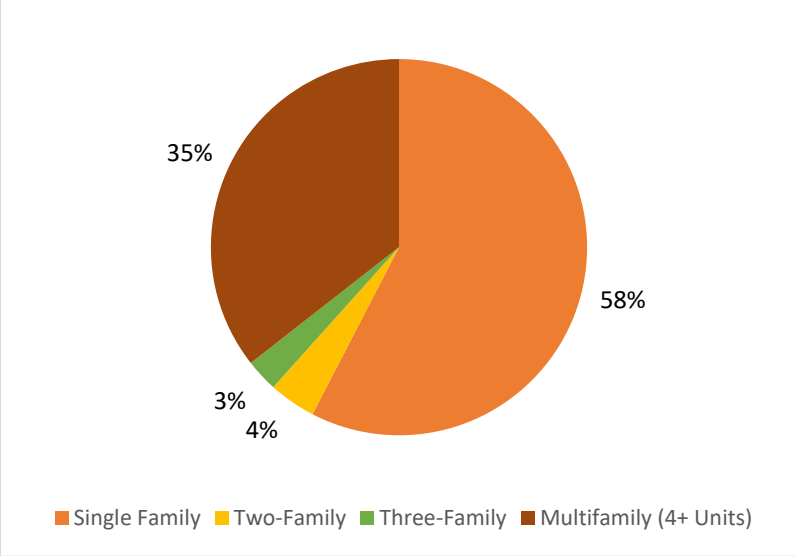
available at the block level, in 2010 the Town of Swanzey had approximately 71% of their housing stock as single-family units, 20% as multi-family units and 9% as manufactured housing units

Figure 4, Swanzey Housing Types in 2010



New Hampshire Office of Strategic Initiatives

Figure 5, Parcel-level Study Area Housing Types



Town of Swanzey Assessing Data

To gain a more granular understanding of the housing stock along the Corridor, land use information from parcel-level assessing data can be used. Assessing data in the Town of Swanzey identifies four land use

codes for residential uses. The land use code "L-R1" represents a single-family home, "L-R2" represents a duplex, "L-R3" represents a triplex and "L-R4" is used for all parcels with four or more units. According to assessing data, there are 644 units of housing within the Study Area across 402 total parcels. Of those, the majority (57.6%) of units are single-family homes, followed by multi-family units on parcels with four or more units which make up 42.4% of all units. Duplex and triplex properties comprise 4% and 2.8% of the housing stock in the Study Area, respectively. Of those units in multifamily buildings with 4 or more units, 92 units are subject to some form of income limitation while 137 units are unrestricted units on the private market.

An important detail for parcels identified with the "L-R1" land use code is that manufactured housing units are included and are classified as single-family homes. Within the Study Area, Pine Grove Mobile Home Cooperative represents the only concentration of manufactured housing. Cross-referencing address and land use data, 116 or 31.2% of "L-R1" properties appear to be in the Pine Grove Cooperative and are manufactured housing. This also represents 18% of all housing units in the Study Area.

According to assessing data for the Town of Swanzey, the median lot size for a parcel with housing indicated as its land use is 0.5 acres. This indicates that at least half of all residential properties are less than an acre, which is the minimum lot size for all zones in the Study Area with the exception of the Village Business District I and II.

Table 11: Parcel-level housing information for the Study Area

Housing Type	Land Use Code	Number of Parcels	Number of Units	Housing Type as Percentage of Stock
Single Family*	L-R1	355	371	57.6%
Duplex	L-R2	12	26	4%
Triplex	L-R3	6	18	2.8%
Four or more units	L-R4	12	229	35.6%
	Total:	385	644	
**Includes 116 units of Manufactured Housing in the Pine Grove Cooperative*				

Town of Swanzey Assessing Data

Housing Affordability & Availability

According to the 2019 American Community Survey 5-year estimates, the Town of Swanzey had an estimated 3,089 occupied housing units, 71% of which were owner occupied and 29% renter occupied. Of those owner-occupied units, 63% had a mortgage and 37% had no mortgage. This ratio of owner and renter occupied units is in line with the State and Cheshire County, with a 71% portion of units being owner occupied statewide and 69% of units being owner occupied in Cheshire County. In 2019, Swanzey had an estimated 6.5% vacancy rate for all housing units, however, Swanzey also had an estimated 0%

vacancy rate for rental units in the Town. While this number is an estimate, it indicates that there is a severely low vacancy rate in the Town for rental housing. The estimated rental vacancy rate in the State of New Hampshire is 3.9%, and 3.4% in Cheshire County. For owner occupied units in Swanzey, there is a 1.8% vacancy rate, which is on par with Cheshire County and the State of New Hampshire. Similar to rental units, a 1.8% vacancy rate is below the level typically considered healthy for a housing market.

An important metric in understanding the housing market for the Town of Swanzey is the level of housing cost burden for households, which is defined as the number of households paying over 30% of their monthly household income on housing. According to the 2019 American Community Survey 5-year estimates, in Swanzey an estimated 28.3% of homeowners with a mortgage and 17.3% of homeowners without a mortgage pay over 30% of their monthly household income on housing costs. The percentage of homeowners both with and without a mortgage that are cost burdened is similar to both the State and Cheshire County. For renters in Swanzey, 48.5% of those who rent their home pay over 30% of their monthly income on housing costs. The percentage of cost burdened renters in Swanzey is on par with the State of New Hampshire (46.2%) and Cheshire County (45.4%). The estimated median monthly housing costs for renters in the Town of Swanzey is $1,028, which is slightly lower than the State of New Hampshire median ($1,111) and slightly higher than the Cheshire County median ($949).

While housing represents a significant cost to households, housing does not exist in a vacuum. The location of housing and its relationship to transportation networks and employment hubs can have a major impact on the transportation costs faced by households. Within the Town of Swanzey, the combined costs of housing and transportation, on average, represent 54% of a household's income[4]. On average, transportation costs represent a quarter of a household's income in Swanzey. This may be impacted by both the location of housing, but also the nature of employment in the Study Area. As mentioned previously, almost no workers who live in the Study Area work within the Study area, and almost all of those employees work in a community outside of Swanzey. In the most extreme examples, at least 16% of Study Area workers commute over 50 miles to work daily. When examining housing availability and affordability, it is important to factor in transportation costs as an important factor in the overall affordability of the housing market.

Housing Need

To calculate the need for housing, population projections published by the NH OSI can be paired with household size information from the U.S. Census to estimate the number of units needed to accommodate future population growth while maintaining the same average household sizes. However, this form of analysis leads to an oversimplification and underestimation of housing need and does not incorporate changing demographics and employment trends of both Swanzey and the Region.

The high number of renters burdened by the cost of housing in Swanzey may indicate that the current housing stock does not adequately meet the needs of the current population in Swanzey. In addition, if the average household size decreases, as is common with an aging population, more housing units will be

[4] Center for Neighborhood Technology (2021). New Hampshire H+T Index by Census Tract [Data file]. Retrieved from https://htaindex.cnt.org/download/data.php.

needed to accommodate a greater number of smaller households. The critically low vacancy rates Swanzey experiences, especially for rental housing, also indicate that there is an immediate need for more housing even without factoring in any population growth or changing demographics.

Key Housing Findings

- Availability of both homeowner and rental housing units is scarce within the Town of Swanzey. For renters, this may translate to higher housing prices and more households burdened by the cost of housing.
- One third of all multi-family housing units within the Study Area are subject to some form of income restriction for occupancy. While a valuable resource to low-income families, many income-restricted housing developments have long wait lists for units and may not provide relief to renters searching for housing in housing markets with low vacancy rates such as Swanzey.
- The Study Area has a more diverse housing stock than the Town of Swanzey as a whole, with 116 (18%) units of manufactured housing, 255 (39.6%) units of single-family homes, and 229 (35.6%) units of multi-family units in properties with four or more units. This is likely reflective of the presence of water and municipal sewer infrastructure compared to other areas of Swanzey.
- At least half of all parcels with housing as its land use is less than half an acre, which is less than the required minimum lot size in the Residence District. This indicates that zoning requirements are not in line with the current pattern of housing development in the Study Area.
- Renters in Swanzey are disproportionally burdened by the cost of housing, with 48.5% of households who rent their home paying more than 30% of their monthly income on housing, which is the generally accepted definition of affordable.
- While an analysis purely based on projected population growth only calls for the development of 4.6 units of new housing per year to accommodate growth, many factors such as low vacancy rates and high rates of housing cost burden indicate that more housing may be needed to accommodate current and future populations.

Appendix 7:
Access Management Analysis

Access Management Analysis

Introduction

"Access management" describes the systematic control of the location, spacing, design and operations of all access points to a roadway including driveways, medians, and intersections[1]. Well-coordinated access management is essential to extending the life of public infrastructure, increasing highway safety, reducing congestion, and preserving and improving the built environment. All users of a roadway, from pedestrians and cyclists to motorists and the freight industry, benefit from effective access management. In addition, the issues caused by a lack of well-coordinated access management can be expensive and difficult to solve and can adversely impact local homes and businesses.

As part of this study, SWRPC staff conducted an analysis of access management along the NH 10 corridor in Swanzey by identifying suspected nonconformities with current state and local access management regulations and inventorying access management features on the roadway itself. This analysis aims to provide insight into where attention and effort should be directed by local officials in coordination with the NH Department of Transportation (NHDOT) to improve access management when opportunities arise, such as in the case of properties changing their use. Effective access management will require local and state coordination and should include the careful management of both the transportation system as well as abutting land uses to the highway. Where NHDOT has authority over extensive portions of the transportation system, local government has regulatory authority over land use and the ability to implement a community vision for future land use. Strong partnership between the two is key to maximizing the efficiency and effectiveness of an access management program.

Methodology

SWRPC staff utilized data from the NH Department of Transportation (NHDOT), the Town of Swanzey, and NH GRANIT to conduct an analysis of access management features and potential nonconformities along the NH 10 corridor in Swanzey. Analysis of aerial imagery and digitization via the use of ArcGIS Online was the primary method used to analyze current conditions along the Corridor. Suspected corner clearance and driveway width violations are identified through the use of the measuring tool in ArcGIS Online in combination with 2015 areal imagery. Other nonconformities, such as miscellaneous objects in the right of way and nonpermitted access points, are identified through visual review of aerial imagery. On-road access management features are digitized also using 2015 imagery, and cross referenced with the most recent Google Maps imagery for the NH 10 corridor.

[1] Transportation Research Board, *Access Management Manual,* 2003

Driveway Permitting Process

As established by NH RSA 236:13 and adopted through NHDOT policy in March of 2000, NH DOT has a well-defined driveway permitting process for state-owned roads. According to the policy, landowners much first apply for a permit for the construction or alteration (including change of use) of a driveway, entrance, exit, or approach that will access any state-maintained highway. In the study area, NH DOT owns and maintains NH 10, Sawyers Crossing Road, and the southern portion of Westport Crossing Road.

Driveway applications that are proposed on any of the three state-owned roads within the study area are reviewed by the NH DOT District 4 office. All landowners wishing to construct a driveway accessing a state-maintained highway are required to complete a driveway permit application and submit it to the district engineer, which includes information about the proposed driveway, the landowner, and parcel history. For driveways that serve a higher number of trips per day, defined by NH DOT as major entrances, there is a much more involved application process which may require site plans, traffic studies, traffic control studies, or information depending on the complexity of existing conditions and the anticipated traffic to be generated. The table below summarizes some of the main design requirements established by NH DOT's driveway policy.

*Table 1: NH DOT Driveway Permit Design Standards**

	NH DOT Jurisdiction Design Standards	**Citation**	**Exceptions granted**
1	No more than one access point if less than 400 feet all season sight distance both directions	Policy 8 (a)	No
2	If frontage on highway is 500 feet or less, no more than 2 access points	Policy 8 (b)	No
3	No more than 3 access points for frontage exceeding 500 feet	Policy 8 (c)	Yes, Policy 8 (d)
4	No parking, loading, vending or servicing vehicles on highway or ROW	Policy 9 (a)	No
5	Miscellaneous items not permitted on, over or under state highway or ROW	Policy 9 (b)	No
6	Access to highway from parcel other than permitted driveway is prohibited	Policy 9(c)	No
7	Except Major entrance exceptions, maximum width of driveway 50 feet wide	Policy 10 (a)	Yes, Policy 10 (b)
8	In rural areas, 200 feet corner clearance. In urban areas, 100 feet corner clearance.	Policy 10 (c)	Yes, Policy 10 (c)
9	Intersection of driveway to highway no less than 60 degrees unless "right turn only"	Policy 10 (d)	No
10	Radius may not extend beyond applicant's frontage without permission of abutter	Policy 10 (e)	No
11	5% slope for car length and vehicle storage incline or decline (20'-25' in length)	Policy 10 (f)	No
12	Maximum grade for major driveway is 8%, Maximum for driveway 15%, algaebraic difference between any 2 grades shall not exceed 10%	Policy 10 (g)	Yes, Policy 10 (g)
13	Gradual slopes on side of driveway	Policy 10 (h)	No

*This Table is meant to summarize design standard components of the NH DOT Driveway permit. Please consult NH DOT policy for more detail.

The Town of Swanzey also has their own well-established driveway permitting process[2] for landowners wishing to construct, relocate or alter (including change of use) any driveway with access to Town managed roads. The Swanzey Public Works Director approves and issues all driveway permits, and driveway permits are required for the building permits of new structures. There are two sets of driveway regulations which govern the driveway permitting and design regulations in Swanzey. Driveway regulations apply to 1- and 2-family dwellings as well as non-commercial properties. Access management regulations apply to multi-family dwellings and commercial uses. As with the NH DOT policy, each set of driveway and access management regulations for Town-owned highways in Swanzey has its own design requirements.

Frontage & Access Points

For the purpose of this analysis, staff looked at the frontage of properties along NH 10 and the number of access points to each property. The total number of access points attributed to a parcel did not include suspected nonpermitted access points. Properties of concern identified in this analysis include parcels with under 500 feet of NH 10 frontage and more than 2 access points as well as parcels with over 500 feet of NH 10 frontage and 3 or more access points. These metrics are derived from NHDOT's driveway policies, particularly Policy 8 (b) and (c). As of this analysis, there are two properties with more than 2 access points and under 500 feet of frontage along NH 10, and no properties with 4 or more access points and over 500 feet of NH 10 frontage.

Table 2: Properties with potential frontage violations

Parcel Address	Parcel Map Number	Type of Violation	Parcel Land Use
765 West Swanzey Road	72-98-1	Under 500 ft., 3 or more access points	Commercial/Industrial
919 West Swanzey Road	71-11	Under 500 ft., 3 or more access points	Commercial/Industrial

Corner Clearance

An important focus of this analysis was documenting driveways that do not conform with either NHDOT or the Town of Swanzey's corner clearance policies. Corner clearance is defined as the distance between a driveway or access to a right-of-way and the nearest corner of an intersecting street. Inadequate corner clearances can result in problems with traffic operations, safety, and capacity. In the study area, the most likely consequence of corner clearance violations are conflicting and confusing turns at intersections.[3] It is important to note that the second highest category of locatable crashes in the study area are "at intersection" or "along road at driveway access".

For driveways along NH 10 and other state-owned roads in the study area, the rural standard of 200 feet between the driveway and intersecting road set forth in Policy 10 (c) was utilized to define corner clearance violations. Corner clearance violations for driveways located within the study area with access to Town-owned roads are defined by the commercial and residential driveway guidelines adopted by the Swanzey

[2] Swanzey's driveway guidelines are administered by their Planning Board, and derives its authority from RSA 674:35 and RSA 236:13

[3] Transportation Research Board, *Access Management Manual*, 2003

Planning Board. For residential driveways, the guidelines dictate a minimum spacing of 100 feet from an intersecting road which was adopted for this analysis. For commercial driveways, generally the guidelines dictated a minimum required distance of 150 feet from intersecting roads. Only corner clearance violations that involved the intersecting road of NH 10 or other state-owned roads are recorded.

Overall, corner clearance violations represented the most common form of nonconformity in driveways within the study area. From our analysis, there are 19 properties within the study area that directly border either NH 10 or another state-owned road that have an access point which does not conform with either state or local regulations. Primarily, the properties that have corner clearance nonconformities are commercial or industrial land uses near intersections. However, for access points subject to NHDOT policies it is important to note that exceptions can be made for driveways which do not meet the standard corner clearance requirements.

Table 3: Parcels with suspected corner clearance nonconformities

Parcel Address	Parcel Map Number	Intersection Requiring Clearance	Parcel Land Use	Governing Design Guidelines
189 West Swanzey Road	52-1	West Swanzey Road/Base Hill Road & West Swanzey Road/Whittmore Farm Road	Commercial/Industrial	NHDOT
599 Sawyers Crossing Road	55-2	West Swanzey Road/Sawyers Crossing Road	Commercial/Industrial	NHDOT
3 Forest Avenue	56-8	West Swanzey Road/Forest Avenue	Single Family/Duplex	Town of Swanzey
90 North Winchester Street	57-39	West Swanzey Road/North Winchester Street	Commercial/Industrial	Town of Swanzey
647 West Swanzey Road	73-26	West Swanzey Road/California Street	Commercial/Industrial	NHDOT
665 West Swanzey Road	73-13-1	West Swanzey Road/California Road	Commercial/Industrial	NHDOT
704 West Swanzey Road	72-85	West Swanzey Road/West Street	Commercial/Industrial	NHDOT
705 West Swanzey Road	72-99	West Swanzey Road/West Street	Single Family/Duplex	NHDOT
735 West Swanzey Road	72-98-2	West Swanzey Road/Perry Lane	Commercial/Industrial	Town of Swanzey
27 Cobble Hill Road	72-55	West Swanzey Road/Cobble Hill Road	Single Family/Duplex	NHDOT & Town of Swanzey (Two Access Points)
787 West Swanzey Road	72-93	West Swanzey Road/Cobble Hill Road	Commercial/Industrial	NHDOT
147 South Winchester Street	72-50	West Swanzey Road/South Winchester Street	Commercial/Industrial	Town of Swanzey
150 South Winchester Street	72-49	West Swanzey Road/South Winchester Street	Other Multifamily	Town of Swanzey
832 West Swanzey Road	71-4	West Swanzey Road/South Winchester Street	Single Family/Duplex	NHDOT
836 West Swanzey Road	71-4-1	West Swanzey Road/South Winchester Street	Other Multifamily	NHDOT
919 West Swanzey Road	71-11	West Swanzey Road/Anthony Lane	Commercial/Industrial	NHDOT
968 West Swanzey Road	70-34	West Swanzey Road/Westport Village Road	Commercial/Industrial	NHDOT
23 Kempton Road	70-29-2	West Swanzey Road/Kempton Road	Commercial/Industrial	Town of Swanzey
1026 West Swanzey Road	70-23	West Swanzey Road/Kempton Road	Single Family/Duplex	NHDOT & Town of Swanzey (Two Access Points)

Driveway Width

NH DOT Driveway policies lists that apart from exceptions made with major entrances, the maximum width of driveways is 50 feet. Because of this, our analysis flagged any driveway greater than 50 feet as an area of concern. Excessive driveway width is the second most common form of nonconformity for properties along NH 10 in the study area, with a total of 9 properties identified. The majority of these properties are commercial or industrial in nature, and many of the driveways in violation of the 50 foot standard are unpaved.

Table 4: Parcels with suspected driveway width infractions

Parcel Address	Parcel Map Number	Paved/Unpaved Access	Parcel Land Use
133 West Swanzey Road	52-26	Paved	Commercial/Industrial
608 West Swanzey Road	57-2	Unpaved	Commercial Industrial
617 West Swanzey Road	73-29	Unpaved	Single Family/Duplex
627 West Swanzey Road	73-28	Unpaved	Commercial/Industrial
765 West Swanzey Road	72-98-1	Paved	Commercial Industrial
898 West Swanzey Road	71-9	Unpaved	Single Family/Duplex
919 West Swanzey Road	71-11	Paved	Commercial/Industrial
968 West Swanzey Road	70-34	Paved	Commercial/Industrial
972 West Swanzey Road	70-33	Paved	Commercial/Industrial

Non-Permitted Access

For the purpose of this study, non-permitted access points are defined by NHDOT driveway design policy 9(c), "Access to the state highway from the parcel other than by a permitted driveway(s) shall be prohibited". Although SWRPC is not aware of a complete dataset of permitted driveways, efforts are made during the review of aerial imagery in the study area to identify potential non-permitted access points. Properties with access points that appear to be nonpermitted are labeled as "suspect". In total, seven properties along the corridor are identified as having potentially non-permitted access. Generally, driveways are identified as potentially non-permitted if they are not the primary access to the parcel, are unpaved, appeared to have intermittent or infrequent use, or appeared to violate other design standards such as slope, grade, corner clearance, or degree of intersection with the highway. Of properties identified as suspect for non-permitted access, 6 of the 7 are residential in nature and one is commercial or industrial in

nature. Non permitted access points compromise the system of access management along NH 10, and can cause safety issues as well as disruptions in service, greater delays, and lowered capacity.

Table 5: Parcels with suspected non-permitted access

Parcel Address	Parcel Map Number	Parcel Land Use
529 West Swanzey Road	56-10	Single Family/Duplex
888 West Swanzey Road	71-8	Single Family/Duplex
920 West Swanzey Road	71-10	Commercial/Industrial
1026 West Swanzey Road	70-23	Single Family/Duplex
1035 West Swanzey Road	70-24	Single Family/Duplex
59 Westport Village Road	88-14-2	Single Family/Duplex
102 Westport Village Road	88-30	Single Family/Duplex

Miscellaneous Objects & Loading Infractions

Two other categories of nonconformity include miscellaneous objects in the right of way and nonpermitted loading in the right of way. Miscellaneous objects violations are defined by design guideline 5 of NH DOT's driveway policy, and loading infractions are defined in design guideline 4 of the policy. Both are difficult to discern without a site visit, but using aerial imagery, eight properties are identified as being suspect for miscellaneous objects nonconformities and three are found to be suspect for loading nonconformities. The majority of properties with suspected miscellaneous objects are commercial or industrial in nature.

Table 6: Parcels with suspected miscellaneous objects in the NH 10 right-of-way

Parcel Address	Parcel Map Number	Parcel Land Use
10 West Swanzey Road	38-2	Other Multifamily
189 West Swanzey Road	52-1	Commercial/Industrial
487 West Swanzey Road	55-5	Single Family/Duplex
608 West Swanzey Road	57-2	Commercial/Industrial
627 West Swanzey Road	73-28	Commercial/Industrial
639 West Swanzey Road	73-26-1	Commercial/Industrial
- West Swanzey Road	72-98	Commercial/Industrial
876 West Swanzey Road	71-7	Commercial/Industrial

Table 7: Parcels with suspected vehicles parking, loading, vending or servicing in the NH 10 right-of-way

Parcel Address	Parcel Map Number	Parcel Land Use
529 West Swanzey Road	56-10	Single Family/Duplex
617 West Swanzey Road	73-29	Single Family/Duplex
59 Westport Village Road	88-14-2	Single Family/Duplex

On-Road Access Management Features

Critical to understanding potential access management issues along the Corridor is gauging the current conditions of on-road access management features along NH 10. In this analysis, on-road access management features include left-hand turn lanes, right-hand turn lanes, flush or painted medians, stop signs, and two-way left turn lanes. Out of any of the features above, two-way left turn lanes comprise the predominate form of on-road access management in the Corridor. There is approximately one half-mile of two-way left turn lanes on NH 10 in the study area. This represents approximately 9% of the total length of NH 10 through Swanzey. Two-way left turning lanes provide safety benefits through a reduction in crashes, increased capacity, and reduced delays. However, they also create the potential for overlapping left turn movements, can encourage strip commercial development, and provide minimal safety benefits to pedestrians and bicycles with the exception of reducing left-turn conflicts. Left- and right-hand turn lanes are present at the intersections of Base Hill Road, Ash Hill Road, North Winchester Street, and California Street. Two-way left turn lanes provide storage for turning vehicles in the stretch of NH 10 in the vicinity of Gomarlo's Shop and Save Supermarket, Perry Lane and West Street. Multiple turn lanes provide access to Market Basket at 11 West Swanzey Road, and a left-hand turn lane provides storage for vehicles turning into the Tire Warehouse at 1050 West Swanzey Road. The turn lanes serving the Ash Hill Road and Base Hill Road intersections are by far the longest along the corridor, at 300 and 400 feet respectively, while the turn lanes at the intersections of North Winchester Street and California Street are relatively short at approximately 100 feet each. A comprehensive map series of the on-road access management features can be found in Appendix A.

Appendix A: On-Road Access Management Features & Nonconformities Map Series

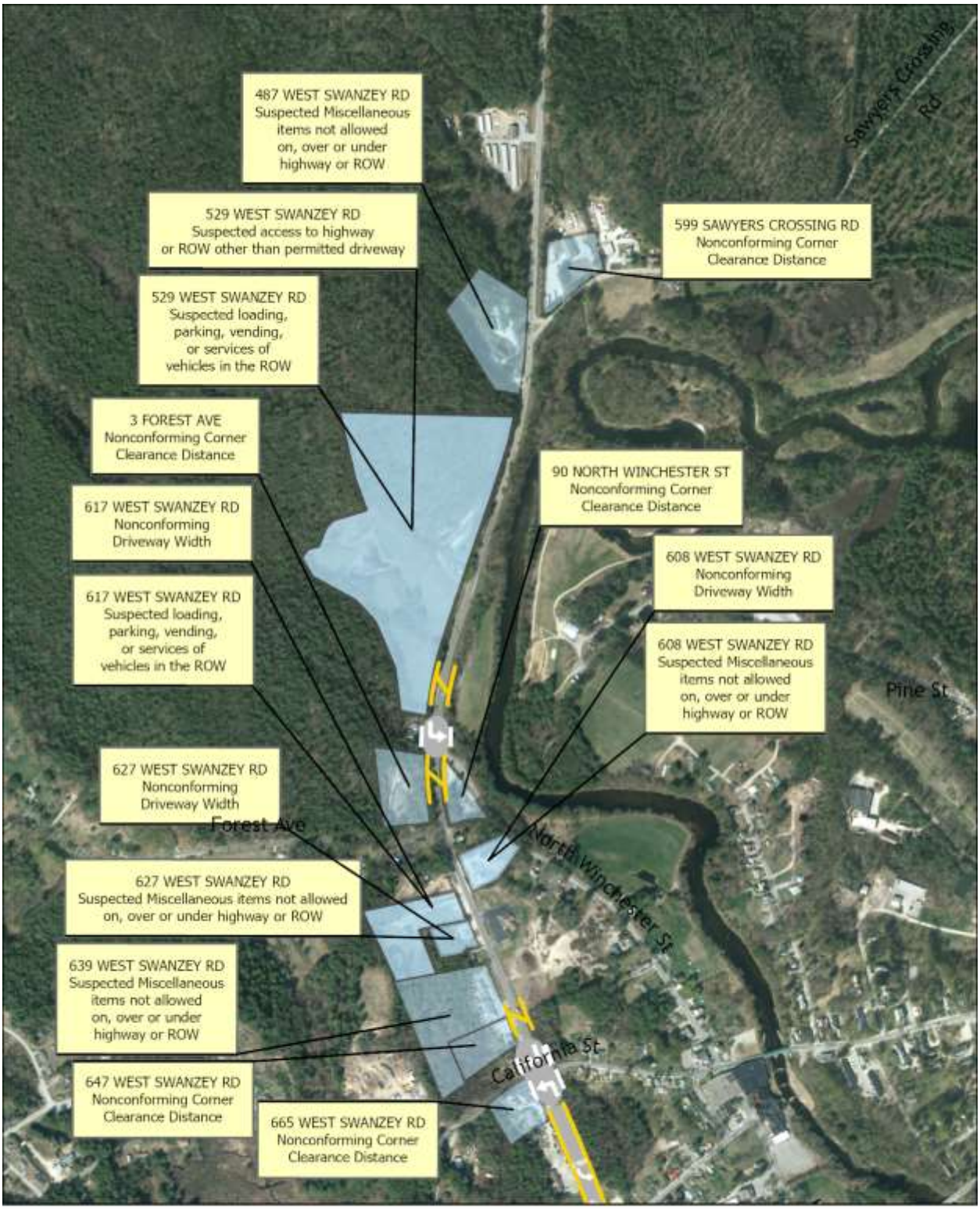
Note: Map series begins at the Keene town line and ends at the Winchester town line.



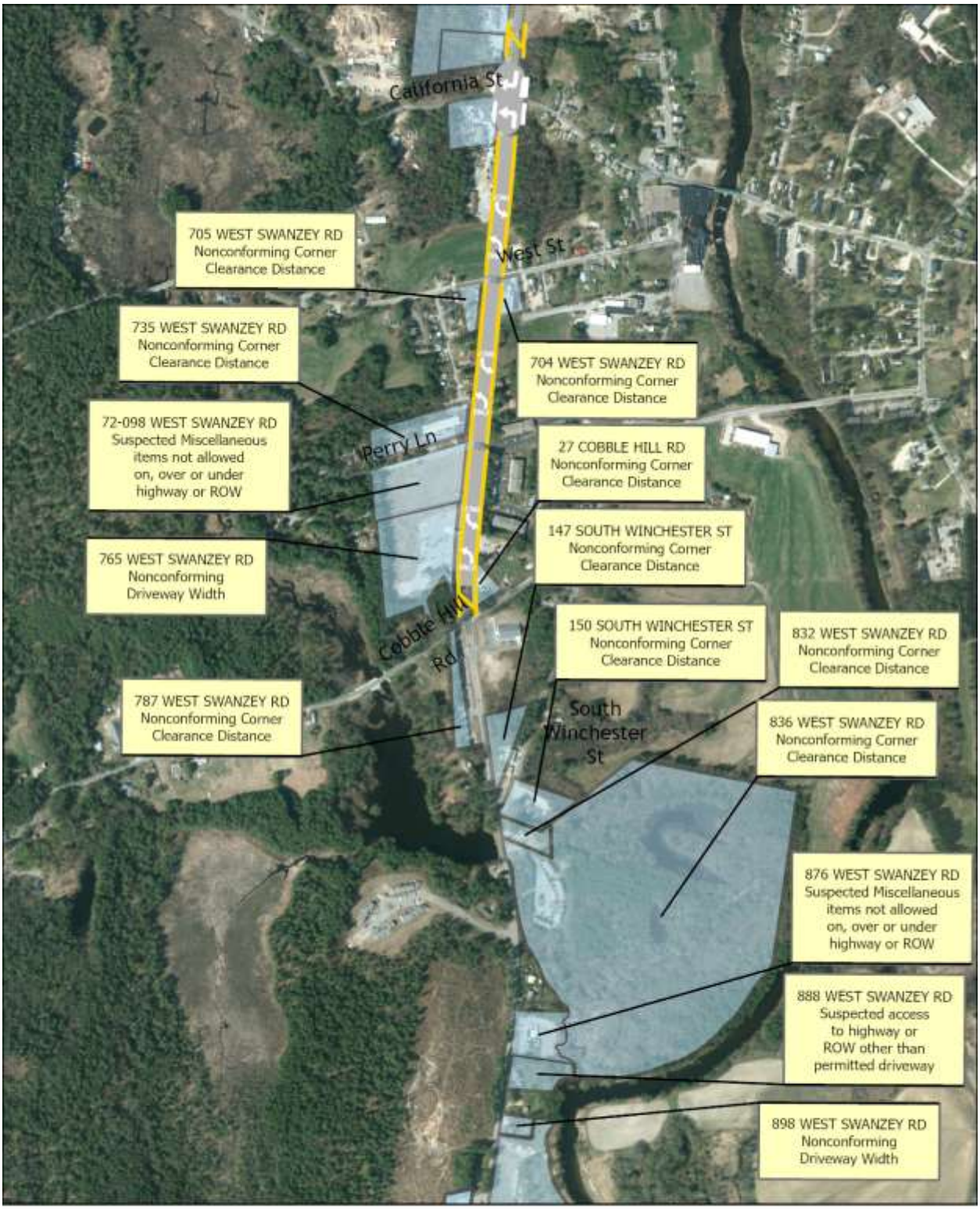
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Appendix A: On-Road Access Management Features & Nonconformities Map Series



Appendix A: On-Road Access Management Features & Nonconformities Map Series



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Appendix A: On-Road Access Management Features & Nonconformities Map Series

Appendix 8:

West Swanzey Visual Preference Survey and Results

West Swanzey Visual Preference Survey and Results

In order to better understand public opinion relative to potential transportation and land use interventions, SWRPC staff launched an online visual preference survey, which was advertised through the SWRPC webpage, newsletters and social media. The survey was opened on April 28, 2021 and closed on June 2, 2021. The survey utilized images of existing conditions along the NH 10 Corridor through Swanzey and presented a proposed alternative intervention focused on a specific topic area such as bicycle and pedestrian improvements, land use changes and signage using images selected by SWRPC staff from other locations in New Hampshire and Vermont. This memo summarizes key results including who responded and the general opinions presented on proposed interventions. The geographic focus of the survey was between North and South Winchester Streets, also known as the West Swanzey portion of the highway corridor. In total, 93 individuals responded to the survey. The number of respondents to each question is indicated by the letter *n*.

Respondent Overview

Respondents were asked to provide their household size, household income and their relationship with NH 10 and West Swanzey. An overview of responses to these demographic questions can be found below:

Question 11: What is your household size? (n = 68)

Household Size	Percent of Respondents	Number of Respondents
1	8.82%	6
2	50.00%	34
3	14.71%	10
4	11.76%	8
5	4.41%	3
6	7.35%	5
7	0.00%	0
8 or more	0.00%	0
Prefer not to say	2.94%	2

The overwhelming majority of respondents indicated a household size of two people, followed by three and four person households.

Question 12: What best describes your household income? (n=78)

Respondents indicated a fairly equal distribution of household income, with the majority of respondents that provided their income indicating an income above $50,000. The most common income bracket reported was between $75,000 and $99,9999. However, just over a quarter of respondents declined to provide their household income, which may hinder the representativeness of the data collected.

Household Income	Percent of Respondents	Number of Respondents
Under $15,000	1.28%	1
Between $15,000 and $29,999	7.69%	6
Between $30,000 and $49,999	11.54%	9
Between $50,000 and $74,999	15.38%	12
Between $75,000 and $99,999	21.79%	17
Between $100,000 and $150,000	15.38%	12
Over $150,000	1.28%	1
Prefer not to say	25.64%	20

Question 9: What best describes your relationship with NH 10 and West Swanzey? (Please select all that apply) (n=78)

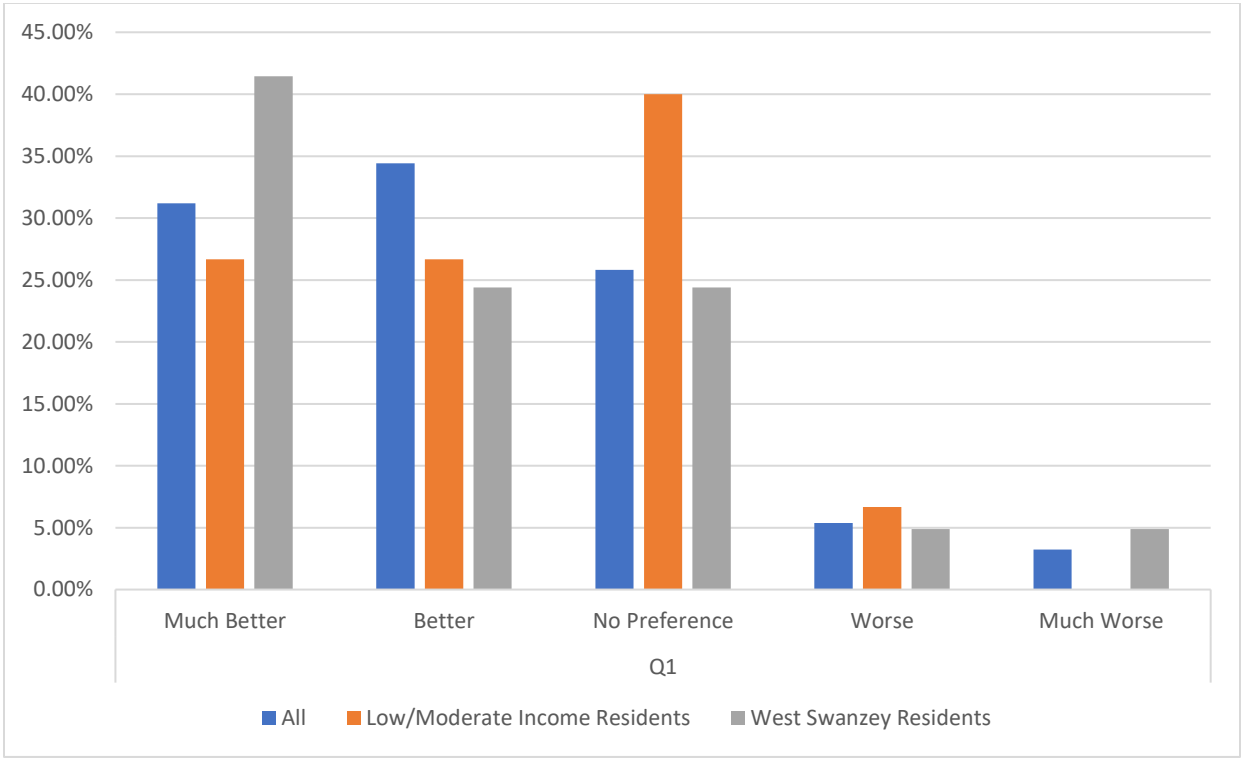
Relationship with NH 10 and West Swanzey	Percent of Respondents	Number of Respondents
None of the above	0.00%	0
I live in West Swanzey	52.56%	41
I work in West Swanzey	6.41%	5
I live in Swanzey	39.74%	31
I work in Swanzey	10.26%	8
I travel along NH 10 for my daily commute	35.90%	28
Other (please specify)	12.82%	10

Just over half of survey respondents indicated that they were West Swanzey residents and another 27 respondents, or 34%, indicated that they lived in Swanzey but did not live in West Swanzey. Just over 6%, or five respondents, indicated that they worked in West Swanzey and another six respondents or 7% indicated that they worked in the Town of Swanzey outside of West Swanzey. Just under 36% of all respondents indicated that they travelled along NH 10 for their daily commute. Other responses include those that walk or bike in West Swanzey (4 responses), travel through West Swanzey (4 responses) or those that shop or dine in West Swanzey (1 response).

Intervention Preferences

Question 1: How would you rate the sidewalk alternative in comparison to existing conditions? (N = 93)

The first intervention proposed was for the construction of a 5-foot sidewalk on the western side of NH 10 as well as a fully compliant Americans with Disabilities Act compliant 5-foot sidewalk on the eastern side of the road between Cobble Hill Road and West Street. A reference image was used from Northfield, MA on Route 63. The majority of respondents (66%) believed that the intervention of constructing a sidewalk on both sides of NH 10 was either "Better" or "Much Better" than existing conditions. Respondents from West Swanzey were much more likely (41%) than respondents as a whole (31%) to indicate that the proposed sidewalk intervention was "Much Better" than current conditions. Just over a quarter of respondents had no preference in relation to the sidewalk alternative, and very few (9%) were opposed to the sidewalk intervention.

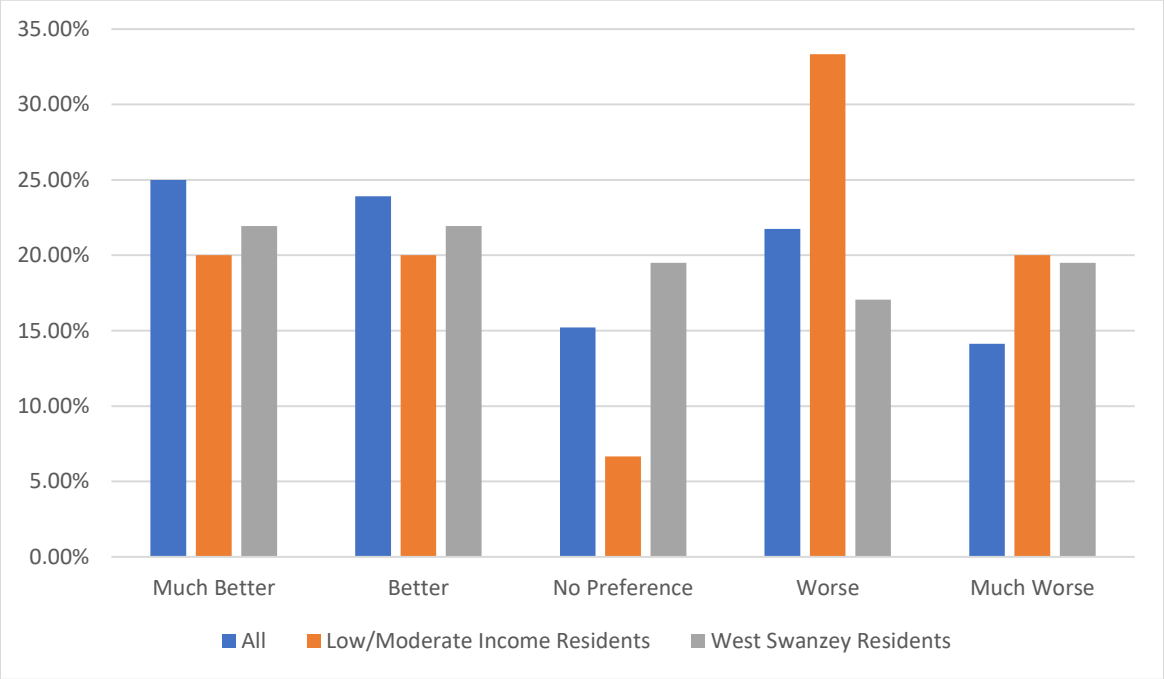






Question 2: How would you rate the bike lane alternative in comparison with existing conditions? (N = 92)

The bike lane alternative proposed the addition of bike lanes to both sides of NH 10 between North and South Winchester Street, and utilized a reference bike lane image from Vermont. Overall, respondents provided a more mixed response to the proposed bike lane intervention, with 49% indicating a favorable opinion of bike lanes and 36% indicating an opposition to the bike lane intervention. West Swanzey residents were slightly less likely than the average respondent to indicate that the bike lane intervention was "Much Better" or "Better" than existing conditions, and were more likely to indicate "No Preference" or "Much Worse".

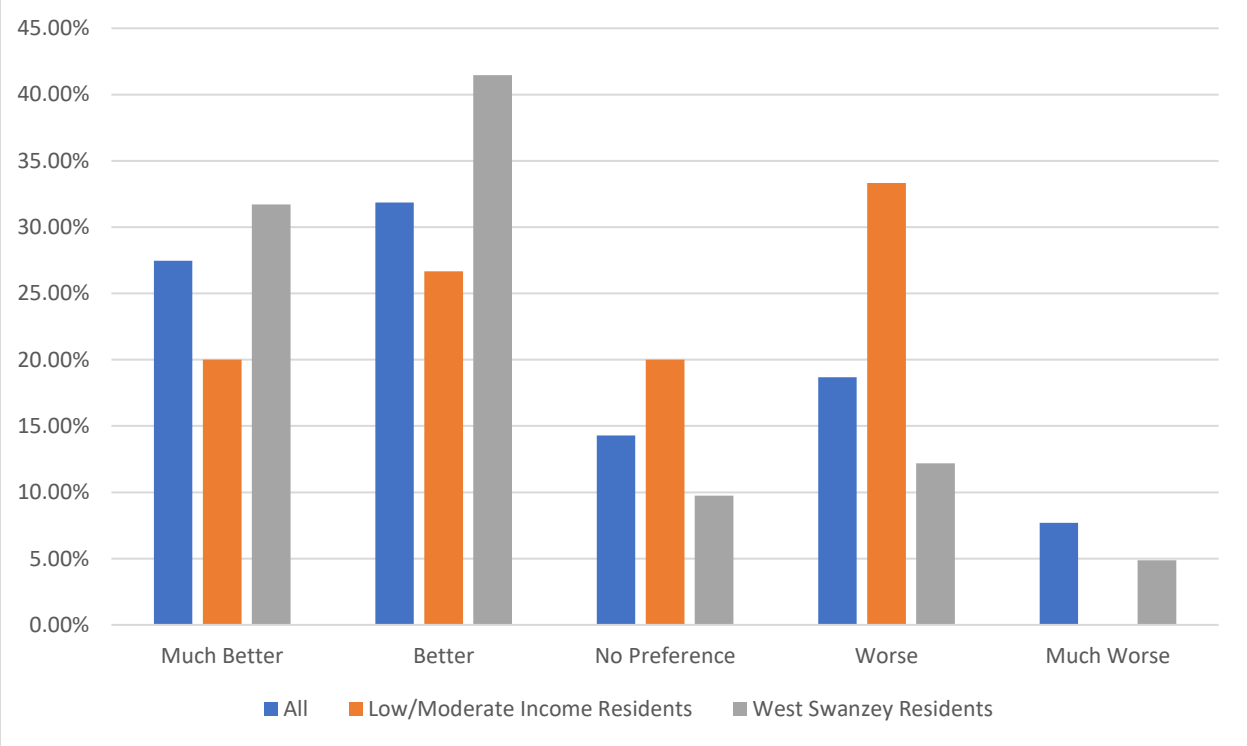






Question 3: How would you rate the pedestrian refuge alternative in comparison with existing conditions? (N = 91)

The potential alternative proposed for a pedestrian refuge was the construction of a refuge including signage, short raised median and crosswalk and utilized a reference image from Route 10 in Lebanon, NH. The pedestrian refuge intervention had strong support from respondents, with 59% reporting that the intervention was either "Better" or "Much Better". West Swanzey residents were much more likely than the average respondent to indicate that the intervention was "Better" and slightly more likely to indicate that the intervention was "Much Better".

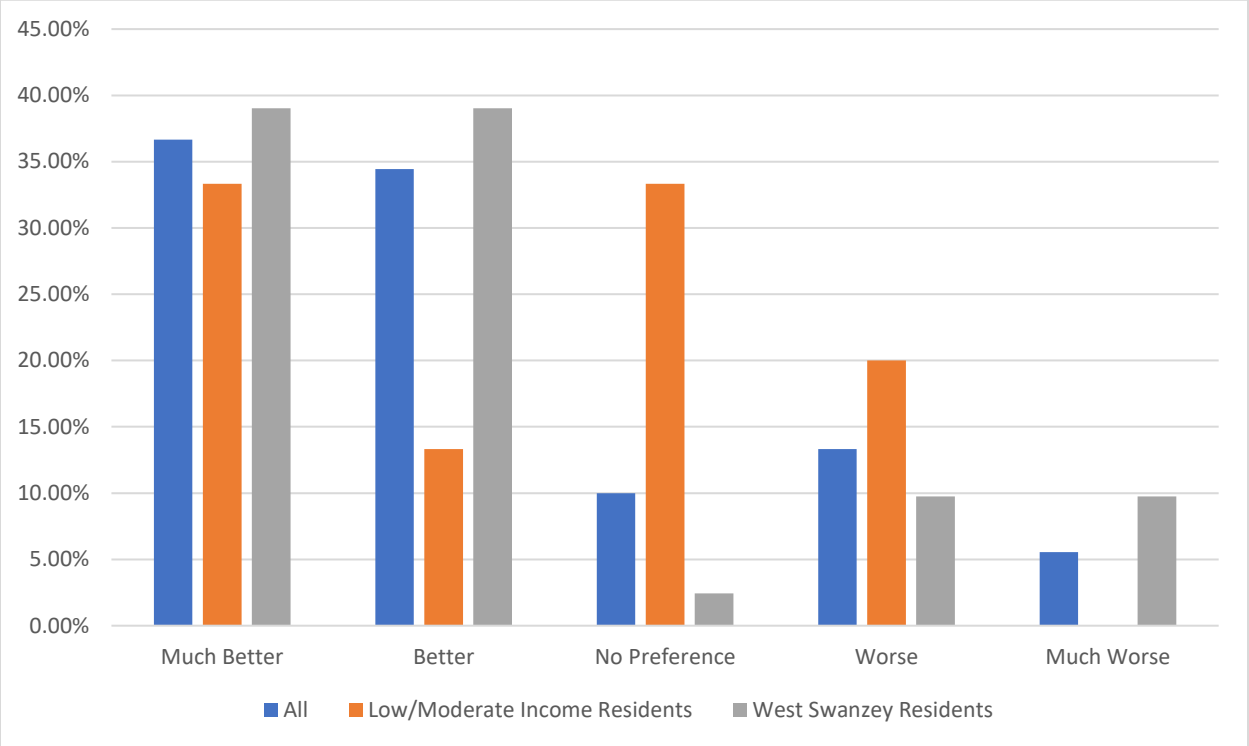






Question 4: How would you rate the crosswalk alternative in comparison with existing conditions? (N = 90)

The crosswalk alternative proposed the construction of a crosswalk and Rectangular Rapid-Flashing Beacon (RRFB) at key intersections, and utilized a reference image from Hanover, NH. Respondents overwhelmingly indicated that the crosswalk intervention was either "Much Better" (36%) or "Better" (34%). West Swanzey residents were also slightly more likely than the average respondent to indicate that the intervention was "Much Better" or "Better". This is in line with other pedestrian interventions which also received positive reactions from respondents.

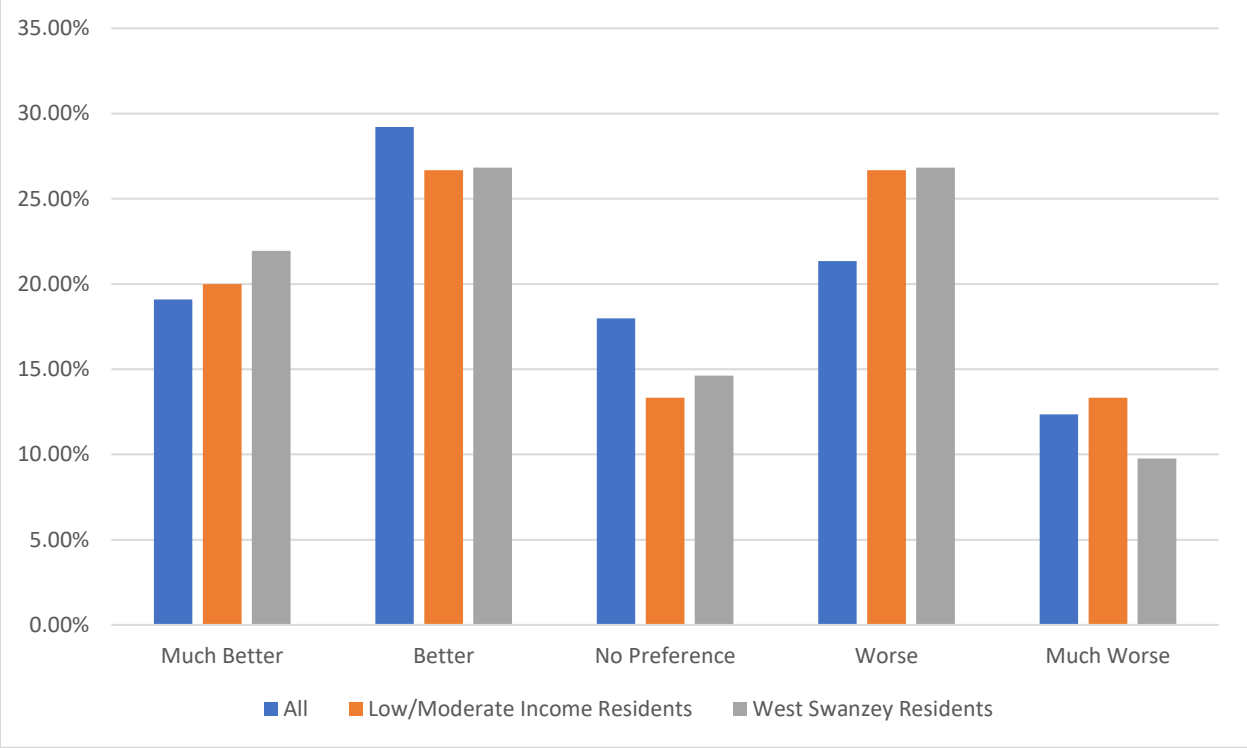






Question 5: How would you rate the commercial density alternative in comparison with existing conditions? (N = 89)

The commercial density intervention proposed the use of shared driveways, multistory buildings and increased connectivity as an alternative to current strip development. The reference image used was the Mad River Taste Place and surrounding neighborhood in Waitsfield, VT. Overall, respondents had mixed reactions to the commercial density intervention with 48% of respondents viewing the intervention favorably while 34% were opposed to the intervention. West Swanzey residents responded similarly, with slightly higher support than opposition.

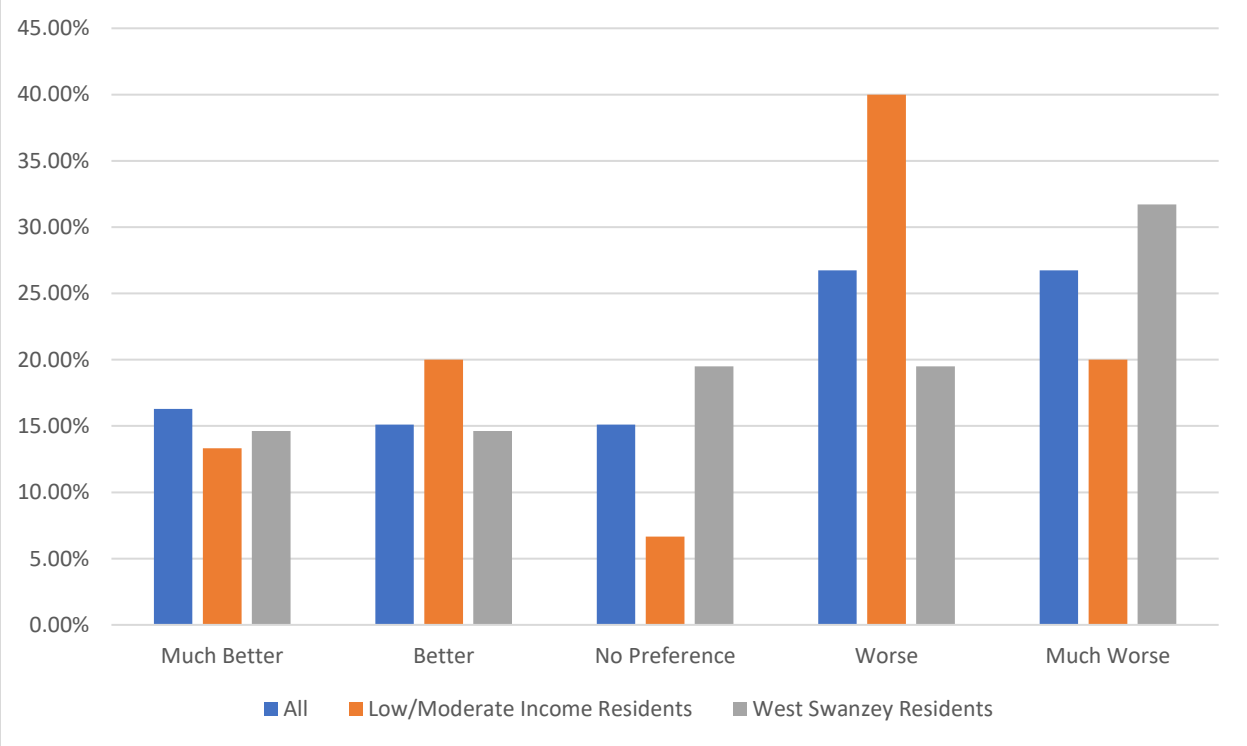






Question 6: How would you rate the setback alternative in comparison with existing conditions? (N = 86)

The setback intervention proposed the reduction in setback requirements to allow buildings to be constructed closer to the road, and included an example image from Woodstock, VT. The setback intervention is one of the two interventions where more respondents were in opposition than in support. Overall, 53% of respondents indicated that the proposed intervention was either "Worse" or "Much Worse". Respondents who indicated they were West Swanzey residents responded to the intervention similarly to all respondents as a whole.

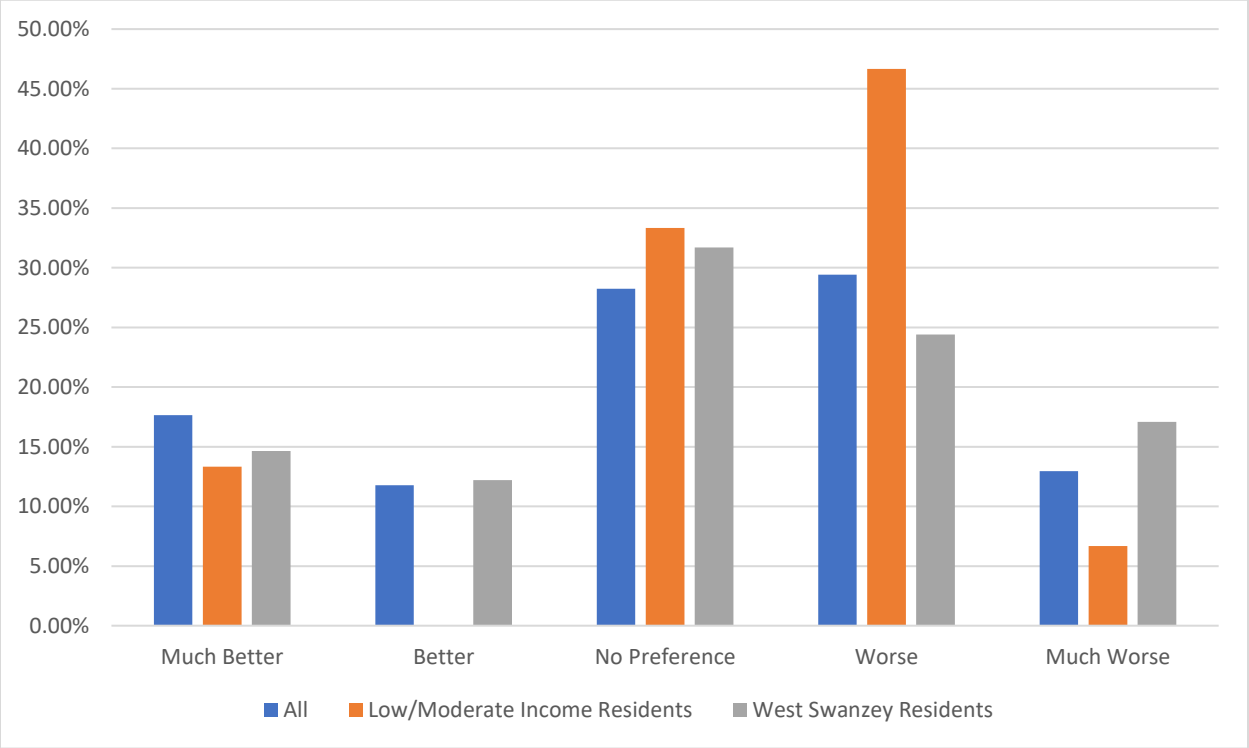






Question 7: How would you rate the parking alternative in comparison with existing conditions? (N = 85)

The rear or side parking requirement intervention proposed the requirement for new development to situate parking facilities in places other than the front of the building, and included a reference image from a new urbanist development in Ames, Iowa. The parking intervention is the second proposed intervention that received greater opposition than support, with 42% of respondents indicating that the alternative was "Worse" or "Much Worse". About equal numbers of respondents indicated that they had either "No Preference" (28%) or if they thought the intervention was "Better" or "Much Better" (29%).

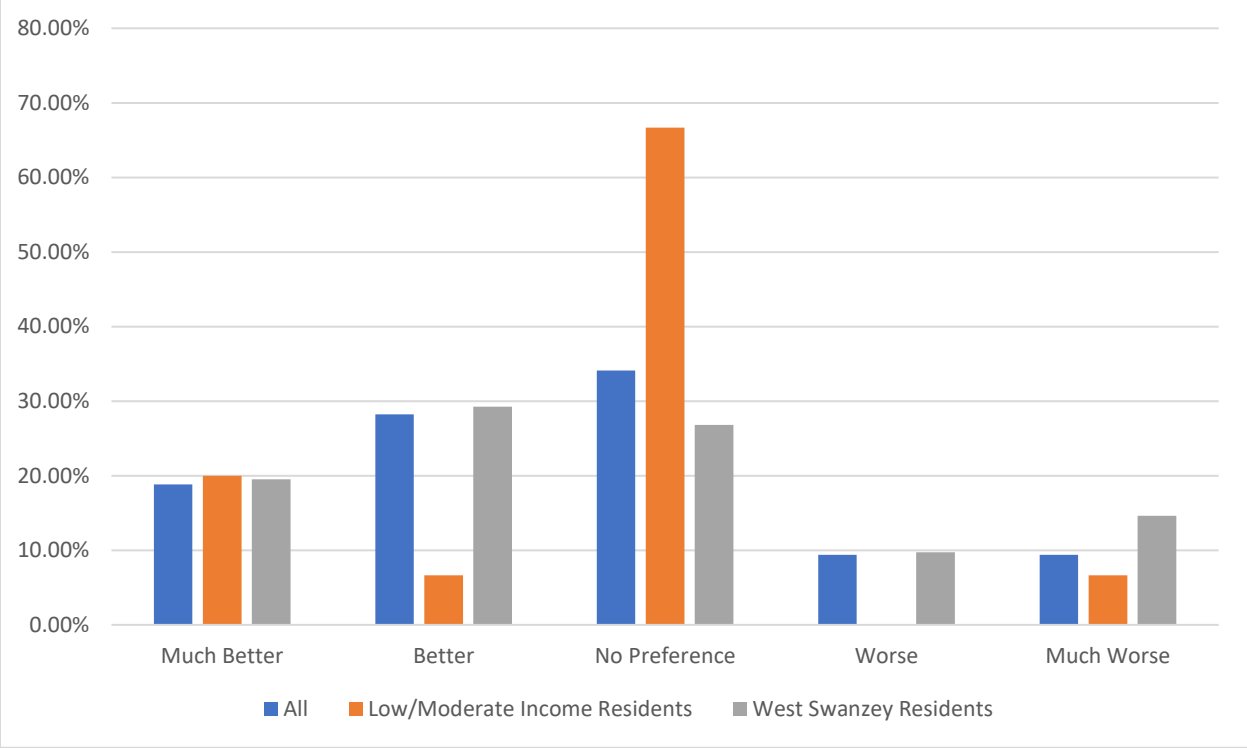






Question 8: How would you rate the signage alternative in comparison with existing conditions? (N = 85)

The signage alternative proposed the construction of gateway signage on NH 10 indicating traffic is entering West Swanzey to signal to motorists that they are entering a "place" while also promoting cultural, business and recreational amenities. SWRPC utilized a reference image from Northampton, MA. Overall, respondents were either in favor (47%) or neutral (34%) to the proposed signage alternative. West Swanzey residents responded similarly to survey respondents as a whole.







Findings

- The strongest support amount respondents were for interventions that promoted a safer environment for pedestrians, including crosswalks, sidewalks and pedestrian refuges.
- West Swanzey Village residents indicated stronger support than respondents as a whole for pedestrian improvements.
- Bicycle improvements also garnered some support among respondents but was a polarizing intervention.
- Generally, land use interventions such as increased commercial density, rear/side parking requirements and reduced setbacks either received mixed or negative reactions in comparison to pedestrian safety interventions.
- The majority of respondents had household incomes of $75,000 or above, represented a two-person household and lived in West Swanzey or Swanzey.