VERMONT TRANSPORTATION THEME

Statewide, Vermont

Prepared for:

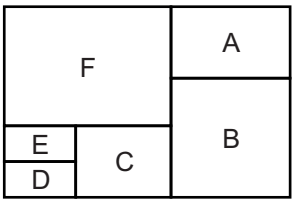
Vermont Agency of Transportation
1 National Life Drive
Montpelier, Vermont 05633-5001

Prepared by:

Louis Berger
20 Corporate Woods Blvd.
Albany, New York 12211

June 21, 2018

Cover Image Source



A) Landscape Change 1938
B) Landscape Change 1990
C) Landscape Change [1890]
D) Landscape Change 1940
E) Stoddard 1898
F) Landdscape Change [1906]

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I. VERMONT TRANSPORTATION THEME

A. INTRODUCTION

> The history of transportation in Vermont is the history of change. From the steamboat era and the days of "canal fever" to the building of Vermont's first airport, each new development in transportation has had far-reaching effects on the state's economy, social and cultural life, and landscape. Indeed, it is the landscape that provides us with the most visible evidence of the ways in which speed has shaped the Vermont we know today [Vermont Division for Historic Preservation (VDHP) 1989:1].

Early settlement of in the inland regions of New England was often difficult because of the mountainous terrain and the thick forests. Once a homestead site was chosen, settlers needed to work quickly to establish shelter and plant their food source. This same "quick and dirty" approach was used to create the earliest roadways in Vermont, in which routes were created from preexisting Native American paths or paths-of-least-resistance to the nearest water sources and other settlements. The need to defend the new European settlements prompted the first long-distance roads constructed throughout the region that would later become Vermont, the first of which was built by English soldiers during the French and Indian War to provide a route connecting their forts on the Connecticut River and Lake Champlain. To allow the passage of military personnel and carriages of military supplies, the roads were engineered with far superior methods over those created by the early settlers, and quickly began to attract settlement and commerce along their routes (VDHP 1989:1).

As the population of the state grew, and more settlers migrated from other states to Vermont, the need for communication routes prompted the building of local roads and bridges. In 1789 the Vermont General Assembly directed the establishment of several postal routes to be used to transport mail. Mail service was made much easier in the early 1800s with the creation of private turnpikes that were funded by tolls collected at gates located along the routes. These turnpikes and other new roadways being created at the same time opened up a wider market to local farmers, who could then transport their goods more easily to urban centers (VDHP 1989:2).

Laws governing the roadways were passed as the network of roadways continued to grow, ensuring the proper maintenance and usage of the roads. In 1834 the Vermont legislature authorized the indictment of towns that failed to construct or repair bridges. Road conditions gradually improved, aided by the 1866 authorization of highway surveyors to take materials within the right-of-way to help improve the highways and an 1870 legislative act requiring surveyors to remove loose stones in the roadbed to ensure the safety of the roadways. In the 1880s road improvements continued with the

passage of an 1884 law governing the width of highways and an 1886 law allowing selectmen to create drainage along the roadway. Highway taxes collected by towns, used in the maintenance and construction of new roads, was overseen by the elected office of the road commissioner, a position created in 1892. Another office created that same year, the state highway commission, lasted only a few years before disbanding, but it established a policy of the direct involvement of the state in highway operations. The policy of state involvement in the highway system was revived in 1898 with the creation of a state highway commissioner who ensured that highways were constructed and repaired according to state standards (Gillies 2012:10, 13-14). It was through these laws, and many others passed by the state, that allowed the continued advancement of the highway systems in Vermont eventually preparing the state for the age of the automobile.

Rivers and lakes provided another resource by which settlers traveled their goods. The Connecticut River and Lake Champlain became significant resources for commerce early in the 1800s, especially after the installation of the Connecticut River Canal in 1802 and the construction of the Lake Champlain Canal in the 1820s. Watercraft innovation surged in the nineteenth century, and steamboats, barges, ferries, and other watercraft carried people and goods north and south.

The boom in water transport was soon disrupted, however, by the introduction of the railway in Vermont in 1848 (VDHP 1989:3-4). Overland transportation soon overtook waterways in Vermont as the dominant form of commercial transportation, as the "Iron Horse" was capable of moving goods and people faster and cheaper than its water-bound competitors. Advancement of rail lines was quick, and by 1855 over 500 miles of track had been laid. By the end of the century, railroads in Vermont serviced approximately 200 locations. Communities located at railroad stops grew exponentially, catering to the commerce the trains brought in by establishing taverns, hotels, shops, warehouses, and more. In Vermont's larger cities, electric rail cars soon replaced horse-drawn trolleys as the primary means of traveling from the rural outskirts to the downtown centers. The railroad enjoyed over a half century of prominence in transporting goods and people, but another advancement in transportation would in turn dethrone the Iron Horse. By the close of the 1920s, the automobile had begun to establish itself as the future of transportation, thanks in part to the improvement of the roads ensured by early legislation (VDHP 1989:4-6).

Alternative forms of transportation, including bicycles, snowmobiles, and all-terrain vehicles, have also left their mark on Vermont's landscape. The short-lived bicycle craze of the late nineteenth century spurred the Good Roads movement, an effort to improve road conditions throughout the United States. Bicycles returned to popularity, along with the appearance and rise of snowmobiles and all-terrain vehicles in the mid-twentieth century. Coinciding with the further development of the state

highway system and the federal interstate highway system, and thus the increase in automobile traffic, the rise in popularity of alternative transportation once again prompted discussions of the rights and resources available for these vehicles, beginning the development of recreational pathways and trails.

Vermont's history can be studied by reading the landscape, the rise and fall of transportation systems having left their mark across the countryside.

B. WATERWAYS

The following section is a revised excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan (VDHP 1989).

Vermont's water routes were first used by Native American people as early as 10,500 B.C., when Lake Champlain was still a saltwater sea. With the rapid settlement of the Champlain Valley at the close of the American Revolution the lake became a dominant corridor for transportation and market shipments north to Canada. The Connecticut River was also a major corridor early on to points south, carrying lumber rafts and flatboats weighted with cargo to New Hampshire and Massachusetts. After the construction of the Bellows Falls (1802) and Champlain (1823) Canals, and the advent of steam-powered boats during the first decade of the 19th century, both water routes bustled with passenger and freight carriers. A number of ports along the Vermont shores of Lake Champlain developed into busy centers of commerce and shipbuilding, and storage depots, shipyards, mills, taverns and hotels were built to accommodate the various kinds of traffic. After 1850 the railroad eclipsed these water corridors as the major transportation routes. By the late nineteenth century lake commerce had largely given way to pleasure boating and commuter traffic.

Early Water Transportation (1750-1790)

The following section is an excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan I (VDHP 1989).

Overland travel was not the only means of transport in Vermont during the early 19th century. After the American Revolution, Lake Champlain, long used as a passageway for Native American populations, and later as a path for explorers and a strategic military route became a dominant corridor for transportation and commercial shipments between Vermont and Canada (Figure 1). Most of the cargo consisted of logs and potash which were floated north by raft to Canada, and on to the English market.

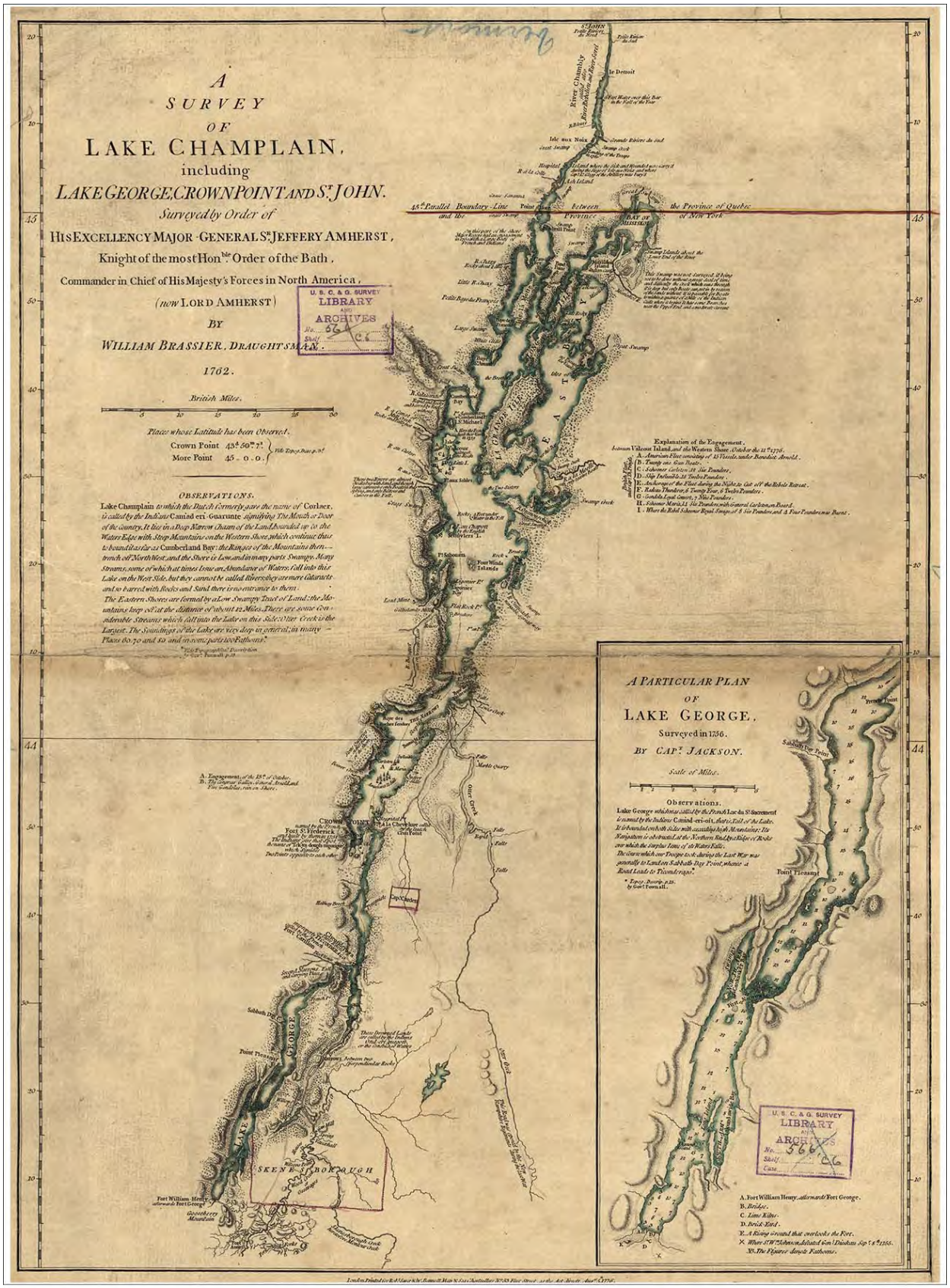

FIGURE 1: A Survey of Lake Champlain, Lake George, Crown Point, and St. John, 1776 (Brasier 1776)

The Connecticut River was also a major corridor early on, first as a passageway for many of Vermont's early settlers, and later as a commercial artery where lumber rafts and flatboats weighted with cargo were driven south to New Hampshire, Massachusetts and Connecticut. One impediment to water transport was the occasional falls, where cargo had to be unloaded, pulled by ox-cart around the falls, then re-loaded at the other side. Small villages were likely to grow up where the loading and unloading took place, and warehouses, boatyards and taverns were built to accommodate river traffic.

Associated Resource Types

- Villages
- Boat/shipyards
- Taverns
- Dams

Golden Age of Water Navigation (1790-1870)

The following section is a revised excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan (VDHP 1989).

Beginning in the 1790s, two major developments took place on the Connecticut River which significantly improved transportation and commerce on Vermont's waterways. In 1791 one of the first canal in the United States was chartered in Bellows Falls as a means of by-passing the falls by boat. Completed in 1802, it had a profound effect on river commerce, and the Connecticut swarmed with boat traffic until well into the 1840s.

The second development occurred in 1793, when Samuel Morey of Fairlee, Vermont, operated what may have been the first steam-powered paddle-wheel boat in history on the Connecticut River. The experiment failed, however, and it was not until a decade later that the first successful steamboat was launched by Robert Fulton on the Hudson River. The second successful steamboat in the world, the *Vermont*, was built in Burlington in 1808 and launched on Lake Champlain the following year. By the 1820s steam boating had become an established means of transportation on the lake for both freight and passenger service.

It was also during the 1820s that the Champlain Canal was built between Whitehall and Troy, New York, providing shippers for the first time with an uninterrupted waterway from Lake Champlain to the Hudson River. The opening of the new canal in 1823 permitted products from northern New York and Vermont to move swiftly and inexpensively to New York City, and from there to the far corners of the world. Maritime commerce further increased in 1843

when the Chambly Canal opened on the Richelieu River to provide access between Lake Champlain and the St. Lawrence River in Canada.

The third quarter of the nineteenth century marked the heyday of water transportation and commerce as steamboats, ferries, canal boats, barges, sloops, and other vessels plied the waters of Lake Champlain, carrying people and freight back and forth from Vermont to points north and south (Figure 2). Ports along the shores developed into busy centers of commerce and shipbuilding, and taverns, inns, mills and storage depots were built to serve the various kinds of traffic. Vergennes, Charlotte, Burlington and St. Albans Bay boasted some of the busiest boatyards along the lake.

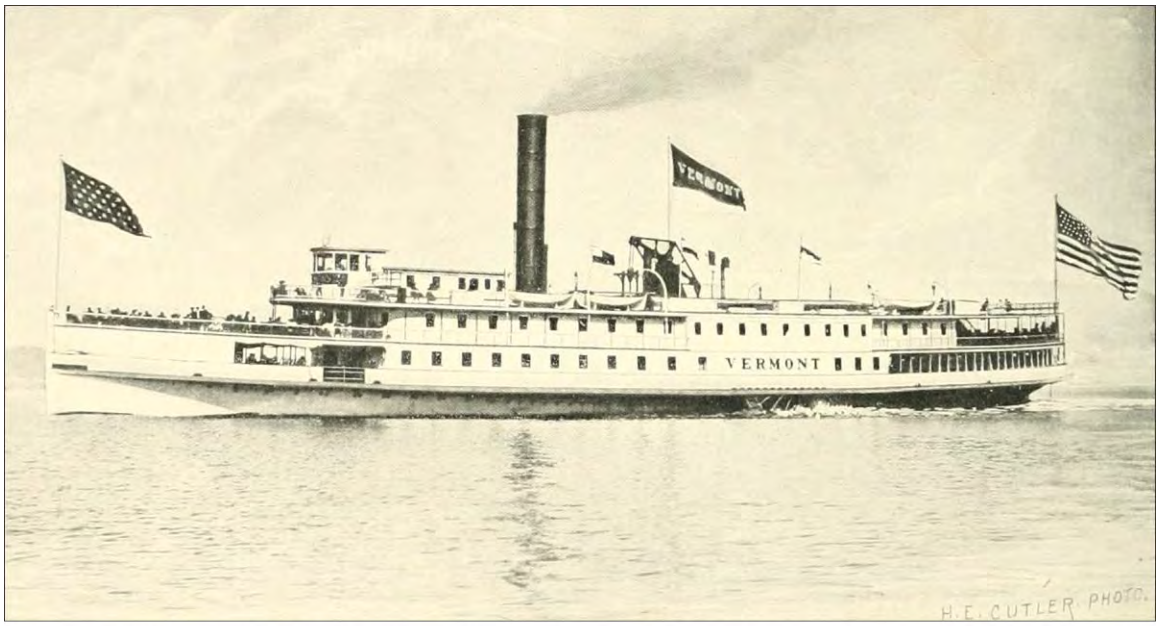

FIGURE 2: Steamer Vermont on Lake Champlain, 1898 (Stoddard 1898)

The opening of the Champlain Canal also produced a new type of vessel: the sailing canal boat. These boats were almost exclusively Lake Champlain vessels, and were particularly popular with shippers working out of the small ports at the northern end of the lake. Several wreck sites of these boats have been discovered, and there are believed to be many more such sites in various parts of the lake.

Ferrying people across both the lake and the Connecticut River was a lucrative business, beginning before statehood. The most unusual type of this craft on the lake was the horse ferry, which was powered by horses walking on a turntable rather than a steam engine. The wreck of one such ferry is located in Burlington Bay and is now operated as a State-Owned Historic Site.

With increased traffic on the lake, lighthouses were needed to aid navigation. The first lighthouse on the lake was a brick structure built in 1826 on Juniper Island, a few miles off the Burlington shore. Replaced in 1846 by a cast-iron tower, the Juniper Island Lighthouse is the oldest standing cast-iron lighthouse in the United States (Figure 3). At least eight other lighthouses were built at various points along the Vermont shoreline.

Associated Resource Types

- Canals
- Locks and dams
- Taverns and inns
- Mills and storehouses
- Villages
- Lighthouses
- Docks, ferry landings, and wharves
- Dams

FIGURE 3: Juniper Island Lighthouse, ca. 1916 (Lighthouse Friends 2018)

Decline of Water Commerce (1870-1940)

Completion of railroad lines along the Connecticut River valley around 1850 abruptly diverted commercial traffic from the river boats in the region, and use of the Bellows Falls canal for navigation ceased ca. 1858. A few years after the canal was abandoned, the locks were removed. In the 1870s the

Bellows Falls canal became a convenient source of water power for the expanding wood pulp paper mills located at the southern end of the canal. The canal was enlarged in 1874 and granite head gates were installed to increase flow. The canal was further improved with construction of a concrete diversion dam at the head of the canal in 1908. The advent of hydroelectric power prompted the canal to be enlarged to a width of 100 feet and lined with concrete in 1927 (Henry 1982:Sec. 7, p. 18).

The Champlain Transportation Company, chartered in 1826 and based in Burlington, continued to build steam-powered ferries in the late nineteenth and early twentieth centuries, such as the *Chateaugay* (1888), the *Vermont* (1903), and the *Ticonderoga* (1906), to provide transport on the lake (Crockett 1909:312). The number of ferries decreased in the off season when serving only local traffic. The *Vermont* was retired in 1937, and the *Chateaugay* was disassembled, rebuilt, and relocated to Lake Winnipesaukee in 1940. The *Ticonderoga* remained in service until 1953, shuttling automobiles, passengers, and freight between Vermont and New York. In 1955 the *Ticonderoga* was relocated to the Shelburne Museum, where it remains on public display today. The Lake Champlain Transportation Company continues to operate three ferry routes: between Grand Isle, Vermont, and Plattsburgh, New York; Burlington, Vermont, and Port Kent, New York; and Charlotte, Vermont, and Essex, New York.

Commercial boating on Lake Champlain decreased because of the reduced cost of shipping by rail and the increased popularity of the automobile. Construction of a new rail line on the western shore of the lake reduced the need for ferries and cargo boats on the lake. The construction of the Champlain Bridge at the south end of the lake in 1929 and the Rouses Point and Missisquoi Bridges at the north end of the lake in 1938 provided direct automotive connections to New York and the Lake Champlain islands, lessening the need for small boats and ferries (Figure 4) (Lake Champlain Maritime Museum 2018).

Associated Resource Types

- Hotels
- Summer camps
- Recreational boating clubs
- Boat docks, landings and wharves
- Boat liveries

FIGURE 4: Aerial View of Champlain Bridge, 1938 (Landscape Change Program 2011a)

Resurgence of River Commerce and Recreational Boating (1940-1978)

Beginning in the early twentieth century, cargo traffic on the Connecticut River saw a steady increase with petroleum, coal, sand, gravel, rock, and other materials being shipped into the upper river valley. This increase continued well into the 1960s with over 3 million tons of material shipped in 1963, compared with just over 430,000 tons in 1920 (NPS 1970:O-23).

While commercial boating on Lake Champlain declined after World War II, recreational boating on the lake increased. Local residents used the lake for boating, and as tourism in the area increased, more public beaches and other facilities were constructed around the lake.

Associated Resource Types

- Ferry/boat landings
- Head gates
- Canals, improved
- Bridges
- Breakwaters
- Lighthouses
  Hotels

C. ROADS

The earliest roads in what was to become Vermont were cleared along the paths of least resistance: river valleys and Native American trails. Even so, the clearing of roads was a difficult task in such a mountainous and forested area, and early roads were little more than crude connections between early settlements and routes of water transportation.

Military Roads (1759-1781)

The following section is a revised excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan (VDHP 1989).

Military roads were the first long distance routes of land travel in what was to become Vermont. They are significant both as military highways and as subsequent routes of settlement. The first was the Crown Point Military Road, built by the British Army during the French and Indian War. Constructed in 1759-60, the road provided the British Army with a means of land transportation over the Green Mountains between their northernmost fort on the Connecticut River in Charlestown, N.H. and the garrison at Crown Point on Lake Champlain. The second was the Mount Independence-Hubbardton Military Road which was constructed during the American Revolution. It was built in 1776 by the American Army and ran from Mount Independence in Orwell to make the connection with the Crown Point Military Road at Rutland Falls. The Bayley-Hazen Military Road was also constructed during the American Revolution. Built between 1776-79, it was conceived as an aid to invade Canada by means of an unoccupied and more direct route than the British-controlled Champlain Valley. The road as completed stretched 54 miles over mostly high ground from Wells River to Hazen's Notch.

In the course of building these early military roads, blockhouses and forts were built with relative frequency. Stone mile markers were also placed along each of the routes, and major camps were set up at regular intervals. Because these roads were the first to be improved to the point of permitting wagon access into the wilderness between the Connecticut River and Champlain valleys, they became some of the earliest routes of settlement and commerce. Around the middle of the nineteenth century, portions of these roads were abandoned as settlers left the uplands for opportunities in the river valleys.

Associated Resource Types

- Earthen roads
- Military forts
- Stone mile markers

Early Overland Transportation: Post Roads, Turnpikes, Stage Roads, Market Roads (1780-1900)

The following section is a revised excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan (VDHP 1989).

As more settlers arrived from Connecticut, Massachusetts, and New York, overland transportation became imperative as a means of maintaining communication with older Lower New England communities, and towns began building local roads and bridges. Often the roads traversed ridges rather than valleys to avoid large rivers and dense tree cover. Although the Vermont General Assembly did not attempt to coordinate local roads, it did (in 1784) direct the establishment of a limited number of post roads over which riders delivered mail. By 1813 Vermont had 100 post offices.

Postal service, and indeed all overland transportation, had become easier by the turn of the nineteenth century with the introduction of private turnpikes. A "turnpike craze" developed during the early 1800s, and by mid-century more than 50 turnpikes had been constructed in Vermont (Figure 5). Road maintenance was paid by fees collected at tollgates along the routes. The tollgate was usually inside a small tollhouse building extending over the road on which a required sign post designated the costs of various types of travel depending upon the vehicle. Ministers, post riders, and farmers engaged in local transport were usually allowed to pass free, and many others attempted to dodge the expense by circuitous routes called "shunpikes." Nearly all of these old toll houses have long since disappeared.

Bridges were a necessary component of turnpike building. The earliest bridges were open, wood-frame structures. By 1820 it had become a standard practice to cover bridges to protect wood members from weathering. This practice continued for nearly a century.

With the building of new roads came increased traffic as farm and forest products were hauled overland to large urban areas outside Vermont. Just as frequent as the freight wagons on these turnpikes were the stage coaches, which, in addition to carrying passengers, took over the carrying and delivery of mail along their routes. Many villages and hamlets developed at

FIGURE 5: Map of Roadways in Vermont, [1800] (Doolittle [1800])

the intersections of major turnpike and stage routes and prospered from the busy freight and stage activity until the corning of the railroad. Along the more rural parts of turnpikes and stage coach routes, farmers sometimes opened their homes as part-time inns and taverns (sometimes referred to as "stands"). In the villages the tavern and inn business became very profitable. Stations for the stage lines were usually at the village taverns, which had barns attached for stabling the horses running the stage relays. Liveries were also commonly located at stagecoach stops to provide additional space for the horses. Blacksmith shops were often next door or across the street, and rooms for overnight accommodation were upstairs or nearby.

Associated Resource Types

- Earthen roads
- Modern paved roads
- Bridges
- Inns/Taverns/Stands
- Toll Houses

Automobile Travel (1890-1978)

Early Automobile Travel and the Good Roads Movement

The following section is an excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan (VDHP 1989).

In 1899 Mr. Charles Warren of Waterbury became the first Vermonter to own an automobile. Six years later there were 380 registered automobiles in Vermont. "Devil Wagons" were initially regarded with suspicion by many Vermonters, and automobile ownership rose slowly at first. The growing acceptance of automobiles during the 1920s was reflected in the jump in the number of registered vehicles in the state from 30,000 in 1920 to 90,000 in 1929. When the automobile first appeared, Vermont roads were poorly suited to motor travel; however, the combined effects of the 1927 flood and increased use of autos during the 1920s and 1930s resulted in the improvement and reconstruction of many of the State's roads and bridges. The automobile not only brought the tourist industry into full swing, but it was also a great boon to the service industry as gas stations, roadside restaurants, camp grounds and motor courts began to dot the major routes around the state.

Associated Resource Types

- Roads
- Curbs
- Bridges
- Gas stations
- Service industry buildings
- Campgrounds

Parking lots

Vermont's Highway System

In the early twentieth century the highway system in Vermont was classified under four different systems that indicate administrative authority and financing: federal, state, state-aid, and town. All public roads in the state were classified as town highways prior to 1906. The state highway commissioner supervised the construction of roads, but towns were responsible for their maintenance and repair. In 1906 some highways were designated as state-aid highways, which were funded by the state but still administered by the towns. In 1922 the state designated the routes that would be part of the federal-aid highway system in response to the Federal Aid Highway Act of 1921, which provided federal 50-50 matching funds for construction of state highways; however, at the time of the designation, the federal-aid highways remained under the jurisdiction of the towns (Vermont State Highway Board 1938-1940:13). Coinciding with the passage of the Federal Aid Highway Act was Vermont Act 123, which established the first State Highway Board, which operated through the Commissioner of Highways. In 1923 Vermont Act 7 created the Department of Highways, administered by the State Highway Board, to carry out administrative and policy-related responsibilities (Vermont Agency of Transportation [VTrans] 2014:10).

Funding mechanisms for construction of highways and bridges in Vermont were first established early in 1904 with a motor vehicle registration fee, the proceeds of which were used for construction of permanent highways (Vermont State Highway Board 1940-1942:9). Although federal money was available on a 50-50 matching basis, the Department of Highways did not have sufficient funds to provide their share of the match. Gasoline taxes were levied to increase state appropriations for road and bridge work and take advantage of the federal funding (*Burlington Free Press* 1949a:3). As road construction began to increase in the 1920s, gasoline taxes were levied in 1923, 1925, 1927, and 1929. The initial gas tax started out at $0.01/gallon with $0.01 increases in 1925, 1927, and 1929 (Vermont State Highway Board 1940-1942:13). By 1940, 81 percent of state highway revenue came from motor vehicle registration fees and gas taxes, amounting to almost $8.4 million (Vermont State Highway Board 1938-1940:14).

Vermont was ravaged by floods and hurricanes numerous times in the first half of the twentieth century. The Flood of 1927 washed away more than 1,200 bridges in Vermont. The governor authorized $8 million in state funds to replace the bridges, an effort that was supplemented by $2.6 million in federal appropriations (Rudge 1989:E:10). The enormity of the task prompted the Department of Highways bridge department to use standardized designs as much as possible.[1] Standard designs were created for concrete and truss bridges with options for standard railings, sidewalks, and abutments. Steel trusses were constructed with built-up members for the top and bottom chords but used rolled I-beams for the vertical and diagonal members between the chords, which shortened construction time. These innovative trusses was designed by an American Bridge Company engineer, who was loaned to the Department of Highways to assist in the design of steel structures (Rudge 1989:E:11). The 1938 New England hurricane damaged 75 bridges in the state and state-aid highway systems. The state requested Progress Works Administration (PWA) funds totaling over $800,000 to complete the repairs (*Burlington Free Pres*s 1938:2). As of June 30, 1942, the total net cost to the state for the 1938 hurricane damage totaled over $3.2 million (Vermont State Highway Board 1940-1942:69).

In 1931 the Vermont General Assembly through Act No. 61 authorized the State Highway System, effectively transferring nearly all the highways that were in the federal-aid system, some 1,012.82 miles, to the state highway system, which transferred these roads from the jurisdiction of towns to the state (Vermont State Highway Board 1938-1940:13). The State Aid System remained intact as a network of "…trunk lines of improved highways from town to town and to the important railroad stations" (Vermont State Highway Board 1930-1932:7). At that time town highways covered 9,952.28 miles (Vermont State Highway Board 1930-1932:7). With this transfer the Department of Highways became responsible for the construction and maintenance of approximately 1,000 bridges (Vermont State Highway Board 1934-1936:20). Total expenditures for bridge work in the 1930-1931 biennium was $427,881 (Vermont State Highway Board 1930-1932:17).

In the 1932-1934 biennium the State Highway Board suggested that the "Through Roads," which included secondary roads that connected major state routes, also be taken over by the state, adding an extra 735 miles to the state system (Vermont State Highway Board 1932-1934:23). These through roads provided convenient short cuts between major routes. In the 1930s increased volumes, weights, and speeds of highway traffic prompted improvements in highway and bridge design and

[1] Bridge design places bridges into two categories: short-span and long-span. Short-span bridges have a length between 6 and 20 feet, and long-span structures have a minimum length of 20 feet.

construction. In general, roads built before 1930 were 18 feet wide with narrow, 3-foot shoulders. In the mid-1930s the standard was increased to 20 feet with a 6-foot shoulder to accommodate larger trucks, automobiles, and buses (Vermont State Highway Board 1936-1938:14). With the widening of the road came widening of the bridges to 24 feet to meet the new bridge standards (Vermont State Highway Board 1936-1938:28). Consequently, the Department of Highways embarked on a road widening program, which was conducted under the purview of the maintenance department. In 1937 less than $20,000 was devoted to highway "Additions and Betterments." The program included hard-surfacing and widening shoulders, which was less expensive to maintain than gravel and increased the "effective width of the pavement…enough to prevent vehicles crowding to the center of a heavily travelled road" (Vermont State Highway Board 1936-1938:37). The next year funding for the Additions and Betterments program jumped to nearly $100,000 for the state highway system (Vermont State Highway Board 1936-1938:37).

Around the same time the Department of Highways also began to modernize the road network by eliminating dangerous curves, increasing sightlines, and flattening steep hills. Highways were either reconstructed or relocated altogether to eliminate curves. In 1939 U.S. Route 7 was completely relocated between Manchester and Rutland to reduce the number of curves from 25 to five (Vermont State Highway Board 1938-1940:21). Bypasses around villages such as Salisbury and Morrisville were also constructed as part of the modernization program (Vermont State Highway Board 1940-1942:17).

Associated Resource Types

- Roads, original alignment and realigned
- Curbs
- Bridges
- Bypasses
- Gas stations
- Service industry buildings
- Bus stop structures
- Campgrounds
- Parking lots and structures

(1) The War Years (1941-1945)

In 1942 the War Production Board ordered a stoppage of all new highway construction projects that cost over $5,000. Only emergency repairs to roads and bridges and regular maintenance were performed during World War II because materials were reserved for the war effort. The Department of Highways completed contracts that were let prior to the outbreak of the war that included

construction of 32 miles of roads and 10 bridges. Emergency work was completed in Orleans and Essex counties, where a storm damaged numerous bridges. Because of the wartime shortage of steel, the Department of Highways used wood to build temporary replacement bridges (*Burlington Free Press* 1942a:2). Later that year, Vermont Governor William H. Wills offered state iron bridges that had been destroyed and removed during the 1927 flood as scrap to support the war effort (*Burlington Free Press* 1942b:10).

Two federally funded road projects, which provided access to the Vermont Copper Company mine at South Strafford and the Gallup Mills in Victory, proceeded during the war. These sites were considered critical to the war effort and funded through the Defense Highway Act of 1941 (Vermont State Highway Board 1942-1944:29).

Associated Resource Types

- Roads, original alignment and realigned
- Curbs
- Temporary bridges
- Bypasses
- Gas stations
- Service industry buildings
- Parking lots and structures

(2) Postwar Period (1946 to 1951)

In December 1944 a new federal program, the Federal Aid Highway Act of 1944, jumpstarted highway and bridge construction efforts across the nation. The new program provided matching funds on a 50-50 basis to aid in the construction of "Federal Aid Roads" (primary), secondary roads, and urban roads that were extensions of primary roads in urban areas with populations of less than 5,000. To collect these funds, however, the state had to designate a network of secondary roads that would be improved with federal funds. Soon after the bill was enacted, Vermont Commissioner of Highways Hubert E. Sargent and local officials held district meetings to consider which roads would be part of the federal aid system (*Burlington Free Press* 1945a:2). The newly designated federal aid secondary highway system comprised a total of 1,908 miles; of these, 1,148 miles were the "more important" state aid highways, and 760 miles were state highways not on the previously established federal aid system (Figure 6) (Vermont State Highway Board 1944-1946:23).

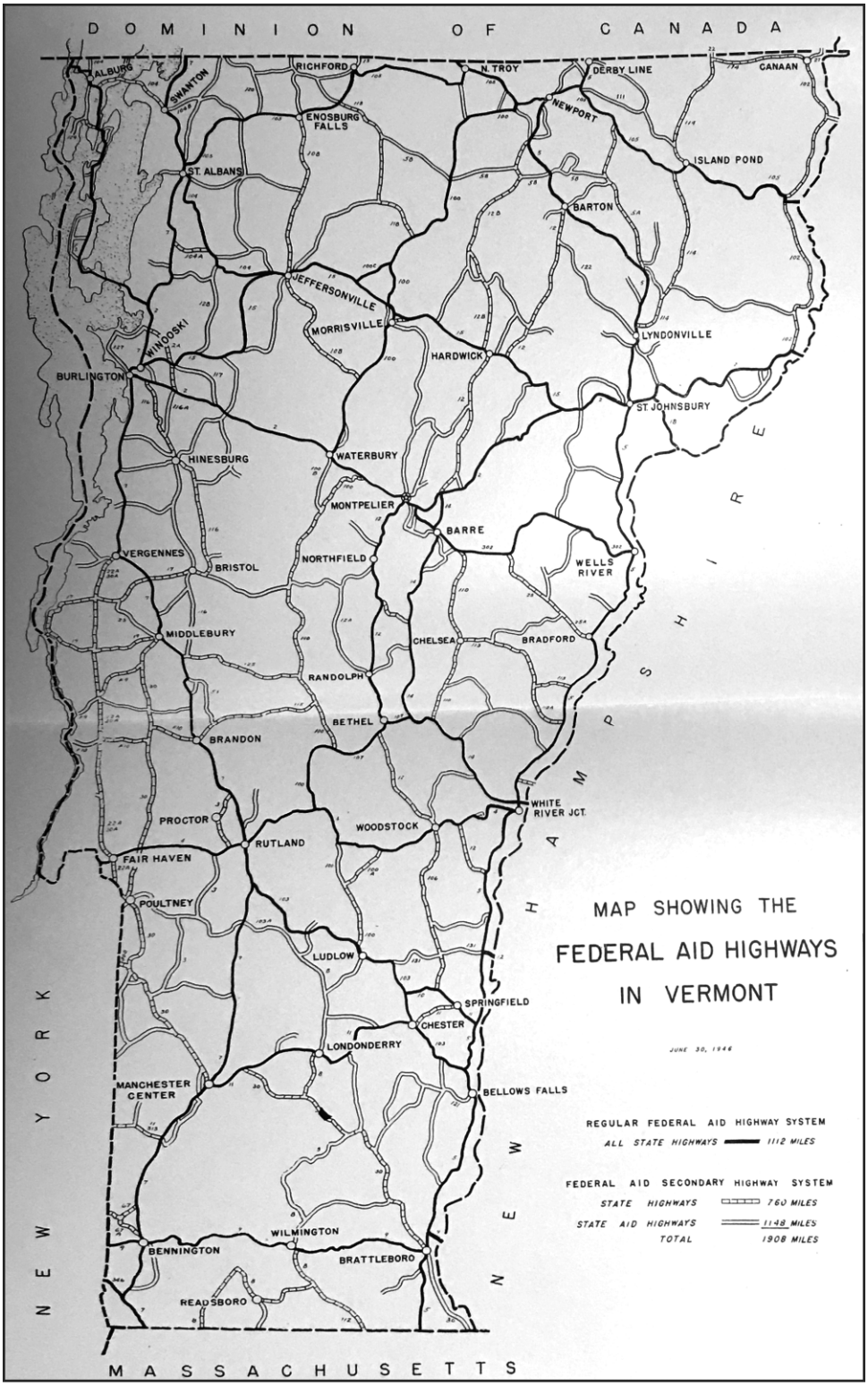

FIGURE 6: Federal Aid Highway System in Vermont, 1946 (Vermont State Highway Board 1944-1946)

The Vermont Department of Highways had 20 highway projects ready for letting once the war officially ended in 1945 and the Federal Aid Highway Act of 1944 was authorized (*Burlington Free Press* 1945b:2). The total allotment to Vermont for each year from 1946 to 1948 was $2.04 million, of which half was designated for regular federal-aid highways, $731,250 went to federal-aid secondary roads, and $211,884 to urban routes (Vermont State Highway Board 1944-1946:22). One key issue for Vermont was the lack of matching funds for the Highway Act. The lack of funds during the war had led to a large amount of deferred maintenance that took up a larger than normal share of the annual budget. In 1947 the State Highway Board estimated that as of June 30, 1949, the state would fall short of the needed $4 million to match federal funds by $2.9 million (*Burlington Free Press* 1947a:17). To make up that shortfall, a bill to increase the gasoline tax from 4 cents to 4½ cents was passed by the legislature in 1947 (*Burlington Free Press* 1947b:1). A second bill raising the tax to 5 cents was passed in 1949 (Vermont State Highway Board 1948-1950:25). Motor vehicle registration fees, which comprised a large percentage of the highway department's annual funding, were increased in 1947 from $18 to $22 for passenger vehicles (Vermont State Highway Board 1946-1948:19).

Ten percent of the total allotment to the state under the Highway Act, which did not require a match, could also be spent to eliminate at-grade railroad crossings (Vermont State Highway Board 1944-1946:22). Elimination of these types of crossings had been a priority of the Department of Highways since 1935, when federal funding first became available (Vermont State Highway Board 1936-1938:32). For the biennial period 1936 to 1938, three underpasses and nine overpasses were planned at a cost of $741,092.75 (Vermont State Highway Board 1936-1938:32). In 1946 the highway department planned to replace eight underpasses on U.S. Route 2, U.S. Route 7, VT Route 30, VT Route 105, and VT Route 14 at a cost of $1.62 million (Vermont State Highway Board 1944-1946:18). The first underpass replacement to be completed was on VT Route 105 at Newport Center in 1954 (Vermont State Highway Board 1952-1954:12). The underpass on U.S. Route 2 at Waterbury Village was constructed by O.W. Miller Co., Inc. of Ludlow, Massachusetts, in 1956 (Vermont State Highway Board 1954-1956:38).

A town road study conducted in 1949 found that much of town highway construction up to that time consisted primarily of graveling with little attention paid to improvements to facilitate easier snowplowing and drainage, widening the roadways, creating ditches, or any necessary road relocation. With direction from the 1949 10-year program of construction on town highways, however, 760 miles of town highways were improved, although not all of them to adequate standards, by the biennium of 1952-1954. Town road-widening and resurfacing projects soon began, and even those towns not able to build first-rate town highways were improving the local roads (Vermont State Highway Board 1952-

1954:23). By the end of the 1954 fiscal year, 74 miles of state-aid highways with annual average traffic of 150 vehicles or more per day and 73 miles of lesser used state-aid highways were hard-surfaced or had been provided funding to complete the projects (Figure 7) (Vermont State Highway Board 1952-1954:21-22).

FIGURE 7: Blacktopped Ticklenaked Pond Road in the Town of Rygate (Vermont State Highway Board 1952-1954)

Despite the overall improvement of town highways within the state, several towns were unduly burdened and unable to fund resurfacing projects, furthering the deterioration of the local roadways. In 1951 towns were allowed to match federal aid for projects on state-aid highway systems (Vermont State Highway Board 1950-1952:11). In 1953 legislative action No. 212 was passed, allowing the burdened towns to assign to the Highway Board its regular allotments of $115 per mile and the ½-cent gas tax. In return the board would immediately make available money from current appropriations. As a result federal-aid projects planned according to good engineering practices raised the average size of the contracts on state aid projects from $45,000 to $66,000, and the General Assembly increased appropriation for state-aid highway construction by $200,000 annually. The towns of Ira and

Middletown Springs were the first to use the newly passed legislation to improve a 3.12-mile gap on VT Route 3 (Vermont State Highway Board 1952-1954:19, 21).

Associated Resource Types

- Roads
- Curbs
- Bridges
- Roadside drainage ditches
- Bypasses
- Gas stations
- Service industry buildings
- Bus stop structures
- Campgrounds
- Parking lots and structures

(3) Highway Modernization (1952-1978)

Safety measures on local roads and highways continued to advance, with road realignments and bypass routes constructed on state-aid highways and other well-traveled roads. Sharp curves in roadways were often created to follow the easiest passage over a stream or other obstacle. As more modern roads were designed with fewer curves and relatively flat geometry irrespective of the topography, bypasses and road relocations required more earthmoving and complex bridge designs to accommodate the terrain. In 1948 the VT Route 105 bypass to Sheldon Springs required a concrete box culvert with 40 feet of fill on top to create a gentle slope (Vermont State Highway Board 1946-1948:26). In 1951, 5.4 miles of VT Route 108 in Bakersfield were relocated to eliminate three sharp curves (*Burlington Free Press* 1951:18). The state-aid highway between Guilford and Guilford Center required the relocation of the Broad Brook stream from the right side of the roadway to the left. The relocation allowed the road to be straightened and eliminated serious washing in the spring (Vermont State Highway Board 1952-1954:18).

Construction on bypass routes began as early as 1940 to relieve urban congestion on busy highways. Between 1937 and 1954, traffic on Vermont highways increased 90 percent, and it was estimated that by 1974 highway traffic would increase an additional 60 percent. To relieve the congestion, especially near urban areas prone to rapid congestion, planners considered widening the roadways or constructing parallel throughways or urban bypasses (Vermont State Highway Board 1952-1954:44-45). The State Highway Board provided assistance to cities and villages to complete

traffic studies for areas of urban congestion on state highways, but any solutions had to be undertaken by the municipality (Vermont State Highway Board 1946-1948:31).

One of the largest bypass projects undertaken by the state in the 1950s was the Brattleboro bypass, an approximately 4-mile-long project that included two interchanges and 11 structures, of which seven passed over highways. Twin three-span continuous plate girder bridges with a long span of 98 feet required extensive earthwork to minimize steep slopes (Figure 8). The bridge is still in use today and crosses Broad Brook (Vermont State Highway Board 1956-1958:28).

As advancements were made to the roadways, vehicular safety became a growing concern. Laws were passed restricting the gross weights on state, state-aid, and town highways to 20,000 pounds, 15,000 pounds, and 10,000 pounds, respectively (Vermont State Highway Board 1952-1954:11). A highway safety rating system was adopted by Vermont, and in 1954 a survey found that 539 miles of highway construction rated to less than 60—the point between a reasonably serviceable highway and a not reasonably serviceable highway. This rating system allowed the Department of Highways to allocate priority funding to those highways most in need of improvement (Vermont State Highway Board 1952-1954:43). Other safety measures included the application of pavement markings, the erection of safe speed signage on the curves of heavily traveled routes, and the spraying of roadside flora that could obstruct sight lines (Figure 9) (Vermont State Highway Board 1952-1954:11, 17, 36).

Roadways in steep terrain posed another issue for the department. Especially unsafe in the winter months, the roads across hills often caused congestion as traffic built up behind slow-moving vehicles. “Creeper lanes” were soon constructed on inclines of 5 percent for the benefit of slower-moving traffic and heavily laden trucks, which allowed faster-moving traffic to safely pass (Vermont State Highway Board 1952-1954:17, 1956-1958:31).

In 1951 President Harry S. Truman included within his budget a special appropriation to states to fund 100 percent of the cost to build or improve access roads to critical material or military assets. Several roads in Vermont were constructed under this program, including a 3.5-mile road from VT Route 100 to an asbestos mine near Eden Mills (Vermont State Highway Board 1950-1952:11).

Discussion continued on toll vs. free roads and bridges. A report published by the Vermont Department of Highways in 1952 reviewed the system of toll roads and bridges nationwide and recounted the operation of two toll bridges in Vermont, the Crown Point and Rouses Point and Missisquoi Bay Bridges. The report recommended the establishment of two toll roads, Montpelier to Burlington and Montpelier-Barre; the toll roads were never established but became part of the interstate system as Interstate 89 (I-89).

FIGURE 8: Construction of Twin Bridges over Broad Brook on the Brattleboro Bypass (Vermont State Highway Board 1956-1958)

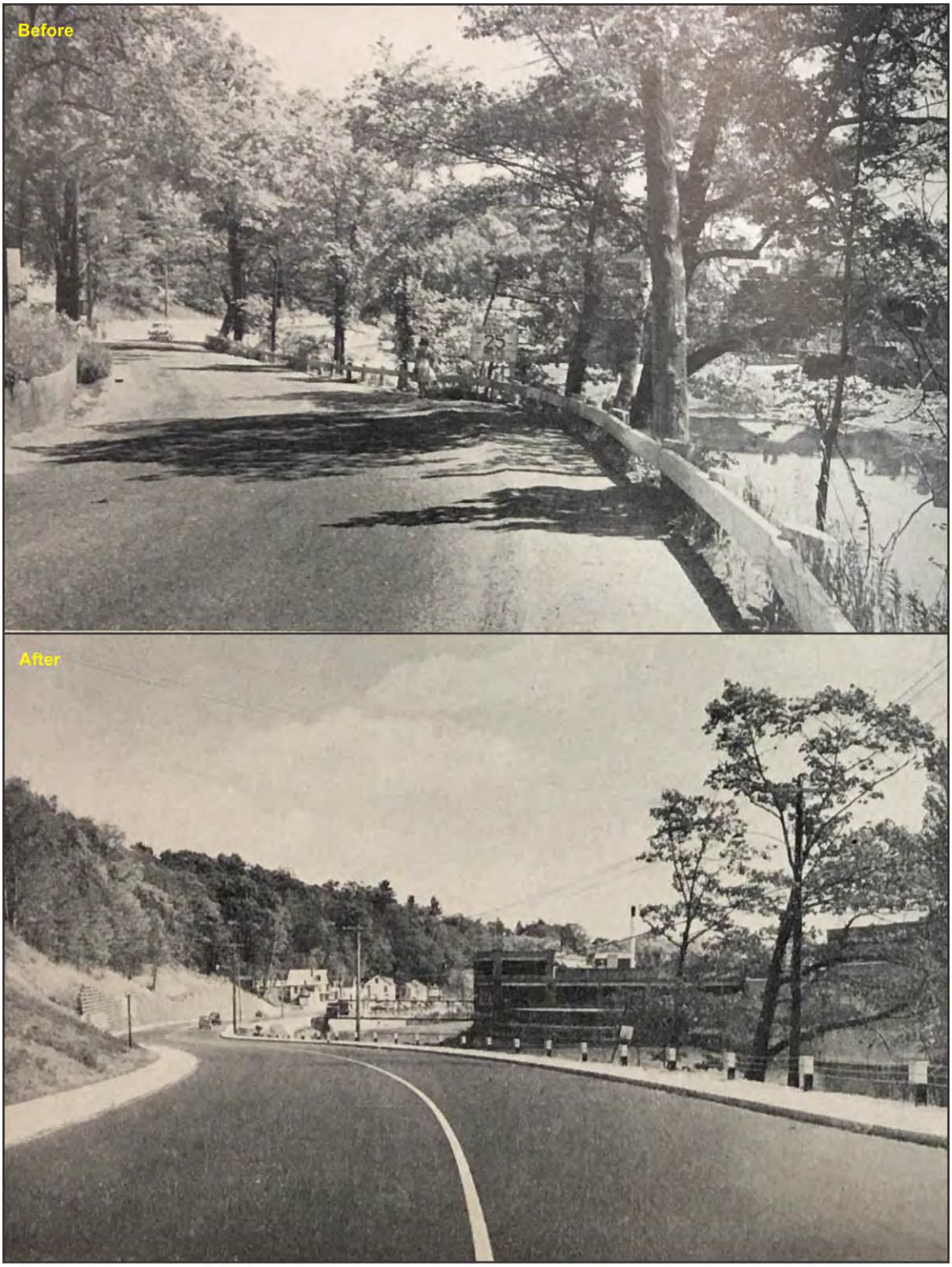

FIGURE 9: Before and After Photographs of Road Improvements on River Street (Route 11) in Springfield (Vermont State Highway Board 1952-1954)

One toll road that did not become part of the interstate system was the McCullough Turnpike. First authorized as a private toll turnpike by legislative act No. 168 of the Acts of 1933, the rights to the McCullough Turnpike were sold to Vermont in 1935. Early construction efforts along the turnpike include the construction of a 1.27-mile standard gravel highway completed by the Civilian Conservation Corps (CCC) and later improvements to access the Mad River ski development. An additional graveled one-way stretch of 1.4 miles with turnouts extended to the divide at the Appalachian Gap state forest lands, where a precipitous slope made a 1.7-mile connection with another section of the turnpike difficult (Figure 10) (Vermont State Highway Board 1952-1954:24). Completion of the connecting road came before the legislature and passed on May 6, 1955, with the requirement that the road be completed by November 1, 1956 (*Burlington Free Press* 1955:2). That same year the existing access road to the Mad River ski development was hard-surfaced with gravel (Vermont State Highway Board 1954-1956:11). The entire route was paved by the summer of 1957. Along with providing access to the ski resort, the completed route provided a passage through the Appalachian Gap (*Burlington Free Press* 1957:10).

FIGURE 10: Excavation for McCullough Turnpike Connector, 1956 (Vermont State Highway Board 1954-1956)

Associated Resource Types

- Roads
- Curbs
- Bridges
- Roadside drainage ditches
- Bypasses
- Gas stations
- Service industry buildings
- Bus stop structures
- Campgrounds
- Parking lots and structures
- Toll road buildings

(4) The Interstate System in Vermont (1944-1978)

By the early 1930s construction of the transcontinental Lincoln Highway and Jefferson Highway had been completed. By the end of the decade, the federal government was considering the creation of a national interstate system of highways, then termed interregional highways (Vermont Department of Highways 1965:4). The first legislative initiative to create the interstate system was the Federal Aid Highway Act of 1944, which designated a system of interstate highways but did not commit any funding to it. In 1944 the National Interregional Highway Committee recommended U.S. Route 5 as the only interregional highway in Vermont. One year later the Vermont Department of Highways designated U.S. Route 7 on the other side of the state as its first choice for an interregional route, but Massachusetts preferred U.S. Route 5 to connect to its interregional highway through Greenfield. A total of 343 miles of interstate highways were designated in Vermont along U.S. Routes 5 and 2 (Vermont Department of Highways 1965:5). Continued expansion of the planned 343 miles of National System of Interstate Highways in Vermont, the highest mileage in New England, was a concern for the Department of Highways as it sought to engineer connections through principal metropolitan areas and industrial centers, all of which were included in the Federal Aid Highway System (Vermont State Highway Board 1952-1954:39, 40-41) (Figure 11).

The Federal Highway Act of 1952 was the first to appropriate funds for construction on a 50-50 match basis, although it allowed only $25 million per year for fiscal years 1954 and 1955. A third act in 1954 increased funding to $175 million annually to be divided among the states according to their population on a 60-40 basis (Federal Highway Administration [FHWA] 1976; Vermont State Highway Board 1952-1954:47, 49;).

By the end of the 1952-1954 biennium, the Department of Highways was planning to construct highways at a rate of $10 million per year (Vermont State Highway Board 1952-1954:9). At the

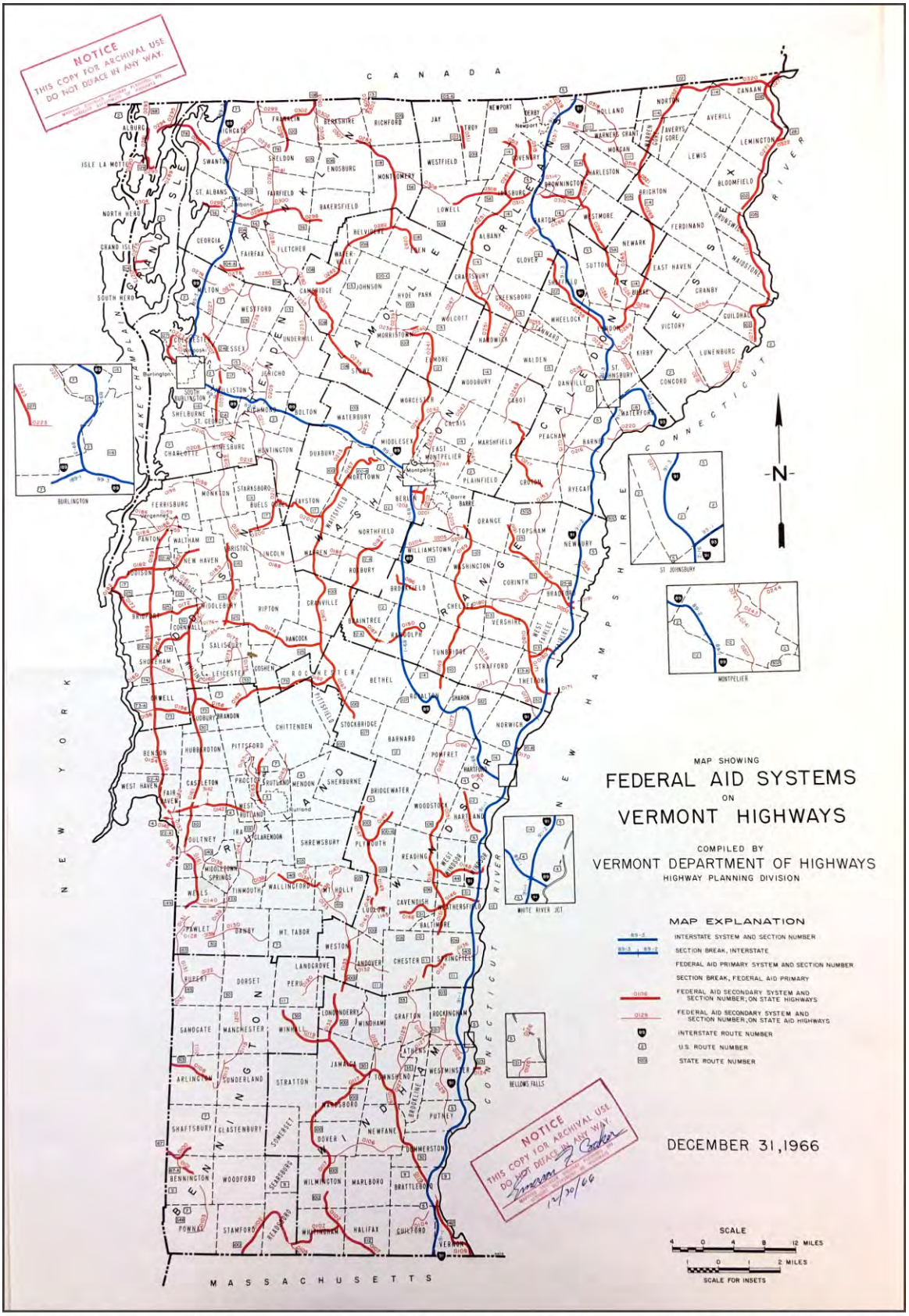

FIGURE 11: Federal Aid Highway System in Vermont, 1966 (Vermont State Archives, Montpelier)

conclusion of the biennium of 1956-1958, the department had completed 62 federal-aid projects with an additional 110 miles across 56 projects under construction. During this two-year period 94 bridges were constructed, 64 of which were completed with state-aid funding.

One requirement with the increased funding afforded by the Federal Aid Highway Act of 1954 came in the form of interstate standards. The interstate in Vermont was to be "designed and constructed to the Interstate standards adopted in 1945.…In general, minimum widths (of right-of-way) of about 200 feet in urban areas and 300 feet in rural areas…are suggested" (Vermont State Highway Board 1952-1954:49). According to the Fifty Billion Dollar Program proposed by President Eisenhower, the interstate system was expected to consist of a minimum of four lanes to allow the free flow of traffic. For Vermont to meet the above requirements, it was determined that over 90 percent of the interstate system would have to be constructed in new locations, sometimes requiring major relocations where the topography restricted the ability to create 300-foot-wide interstates, and would cost an estimated $171,500,000 (Vermont State Highway Board 1952-1954:49, 51).

The National System of Interstate and Defense Highways was approved in 1956 with the Federal Aid Highway Act. This act proposed a 13-year construction program for a 41,000-mile system of major highways across the United States in which the federal government would pay 90 percent of the costs (Vermont State Highway Board 1954-1956:15). The funds appropriated by the Federal-Aid Highway Act of 1956 lagged behind necessary revenues at a time when many parts of the nation were experiencing less-than-favorable economic conditions. In 1958 Congress passed an act immediately making available $400 million for use on 737,000 miles of federal-aid primary and secondary systems, which could now be apportioned to projects in either system based upon the individual needs of the states, and an additional $200 million for construction of the interstate system (Vermont State Highway Board 1956-1958:16, 19). The 1958 Act also included a new ratio for financing federal-aid primary and secondary systems, under which two thirds were federally funded and the remaining third was funded by the state, with a provision that a state lacking in funds "could borrow on future apportionments of federal funds for up to 66 2/3% of state's normal one-third matching share" (Vermont State Highway Board 1956-1958:16).

In 1960 an organizational change brought about by Vermont Act 329 placed the State Highway Board and the Commissioner of Highways under the direction of the Department of Highways (VTrans 2014:10). By the biennium of 1958-1960, the Department of Highways had achieved record construction and modernization after completing or beginning 298 miles of highway, including the opening of the first three sections of the four-lane interstate running from the Massachusetts state line

to Brattleboro. An additional 12 miles of interstate were slated to open between Montpelier and Waterbury by early 1961 (Vermont State Highway Board 1958-1960:6).

Design of the interstate required that it meet traffic volume estimates for 1975 and have a minimum of four lanes with a wide center divider between opposing traffic, unless the estimated 1975 traffic volume equaled less than 700 vehicles for the peak hour, in which case a two-lane highway with sufficient sight for passing was acceptable. It was estimated that one third of Vermont's interstate system would consist of four-lane highways before 1975 (Vermont State Highway Board 1954-1956:17). The Bureau of Public Roads favored limited-access roads because of their inherent ability to control traffic patterns by restricting so-called ribbon development. Ribbon development, defined as commercial and residential areas built along the sides of highways, attracts traffic, intersecting traffic patterns, and congestion, thereby increasing traffic hazards (Vermont State Highway Board 1952-1954:44). To create limited-access or controlled-access highways, Vermont was required to pass legislation authorizing the state to designate roadways as limited access. By 1953 laws had been passed in 37 states providing control of access on highways (Vermont State Highway Board 1952-1954:51, 53). In Vermont allowances for creation of limited-access roadways only applied to interstate highway construction and one section of highway between West Rutland and New York State through the 1950s (Vermont State Highway Board 1956-1958:46).

Aerial imagery quickly became an important tool in determining highway alignments and new construction for the interstate as it drastically cut down the need for long hours of field survey based upon trial and error. Engineers could observe the landscape on a larger, more accurate scale as compared to traditional field surveying. By viewing large swaths of the landscape, highway realignment and new construction of the interstate could easily be assessed. Once a route was chosen, the aerial was overlaid on a photogrammetric contour map, which allowed highway engineers to quickly and accurately determine grades and profiles of the roadway. The aerials could also help determine optimal locations for drainage basins, aid in the layout of interchanges and intersections with a higher level of accuracy, help identify areas in need of tree removal, and allow highway engineers to see whole parcels instead of narrow strips when determining rights-of-way (Vermont State Highway Board 1954-1956:29).

The use of computers also emerged as an important resource early in the construction of the interstate. In 1962 the computer program was stepped up and expanded to the areas of Design and Planning, Construction, Bridge Division, Materials and Soils, and Administration. Computers were touted as a tool to help release "personnel from tedious mathematical computations to engage in more creative engineering fields requiring ingenuity, judgement, and experience." Calculations that once

required 18 man-hours to compute required only one or two hours with the use of computers. The increased efficiency was not only evident in the ability of the engineers to focus on more creative endeavors, but also benefited the contractors and public, who were provided with faster payment and project information (Vermont State Highway Board 1962-1964:6).

Construction of the interstate followed exacting standards. First, the subgrade was properly shaped. A layer of compacted sand followed by a following layer of crushed stone were placed to create the foundation. The stone layer was chinked, rolled, and shaped, and then two more two layers of crushed stone were laid, chinked, rolled, and shaped. Lastly, two layers of bituminous concrete and a double tack of asphalt and peastone finished the roadway (Figure 12) (Vermont State Highway Board 1956-1958:27-28).

FIGURE 12: Constructing the Base on Vermont's First Interstate Highway Link (Vermont State Highway Board 1956-1958)

The entire 130-mile length of I-89 in Vermont, stretching northwest from the New Hampshire border at White River Junction to Highgate Springs (where it crosses the Canadian border and becomes Quebec Route 133), was completed by November 1972 (Interstate Guide 2016a; Vermont State Highway Board 1970-1972:11). I-91 was also completed to Fairlee by that time (Vermont State

Highway Board 1970-1972:11). By October 1978 the last segment of I-91 was completed, spanning a total of 177.38 miles within Vermont between Brattleboro and Derby Line (*Burlington Free Press* 1978a:20; Interstate Guide 2016b). Although a source of some controversy with environmental groups, and affected by tight budgets and passed deadlines, the interstates proved their importance during summer flooding in 1973 as the new highway provided a valuable transportation artery that allowed "uninterrupted service" out of the flood zones (Vermont State Highway Board 1972-1974:9). The positive role the interstate system played during the flooding in 1973 did not help with the controversy levied against I-93, the last portion of Vermont's interstate to be completed. With a $30 million price tag and an overdue completion date of October 1982, the controversy seemed to outshine the news that Vermont was the fourth state to complete its interstate system, with a total of 321 miles (*Burlington Free Press* 1976a:9, 1982:17).

Associated Resource Types

- Roads
- Curbs
- Bridges
- Roadside drainage ditches
- Bypasses
- Interstate highways
- Gas stations
- Service industry buildings
- Bus stop structures
- Parking lots and structures
- Billboards

(5) State Highway Modernization and Beautification (1966-1978)

The modernization of highways was also a challenge. To address the worst issues, the Arterial and Betterment Highway Program was passed in 1966 as part of a larger highway construction bill. The program provided $5 million to conduct "spot improvements" to improve safety, including curve reductions, shoulder widening, and creeper lanes on hills, to be expended over the next three years. The completion of spot improvements was seen as more feasible in the short term rather than waiting for the entire roadway to be brought up to modern standards (*Burlington Free Press* 1966:11). All of the allocated funds were expended by June 1970, but improvements were still needed. The program was reauthorized in 1968 under Act 379 and in 1976 under Act 235, but it was not to be funded unless surplus revenue was available at the end of each fiscal year (Vermont State Highway Board 1968-1970:2, 1974-1976:11).

In response to the financial and policy needs of highway modernization, Vermont authorized the creation of two transportation entities. In 1973 Vermont Act 259 created the Transportation Advisory Board. The responsibilities of the board were to "assess the various organizations and financing alternatives for transportation within Vermont and to submit a ten-year plan to the 1975 general assembly" (VTrans 2014:10). Two years after the passage of Vermont Act 259, the first Agency of Transportation was created by Act 120. The agency included four departments—Motor Vehicles; Aeronautics; Highways; and Bus, Rail, Waterways and Motor Carrier Services—and functioned as a policy-making and regulatory entity (VTrans 2014:10).

In the 1960s tourism to Vermont from urban centers, including New York City and Boston, increased in part because the modernized highway systems had made Vermont more accessible. Increased traffic and interest in Vermont led to quicker development and furthered the need for improved local roads and highways. Early planning and construction of the Vermont section of the interstate envisioned a highway laid out "to take full advantage of panoramic views, and to enhance the picturesque and scenic charm which [had] brought Vermont national and international fame" (Vermont State Highway Board 1956-1958:31). The systematic modernization brought about by the construction of the interstate also helped bring tourists off the highway by ensuring that the local roads were serviced and improved to meet the current standards, offering a modernized drive through the scenic Vermont countryside away from the rush of the interstate (Vermont State Highway Board 1956-1958:24).

It quickly became apparent, however, that the benefits of advancement also brought with it unforeseen issues. Increased litter along the sides of the highways that detracted from the natural landscape, the growing need for self-promotion of the Vermont tourist industry, and the loss of historic roadways and trees prompted the passage of several initiatives and laws working to protect scenic Vermont.

The Green Up Day initiative launched in 1970 by Governor Deane Davis was started as a clean-up and recycling program aimed at collecting litter along the interstate. A program aimed at including young people in the support of Vermont's ecological system, 75 percent of the working crews attending the first Green Up Day were school-aged children, aged five to 18 (*Burlington Free Press* 1971a:18). The second Green Up Day involved about 75,000 people, a state-wide turnout of 16 percent, three quarters of whom consisted of school-aged children. The work crews that walked the closed-to-traffic interstate between 9 a.m. and 12:30 p.m. filled five tractor-trailer trucks with cans sent to Albany, New York, for recycling and some 250,000 30-gallon plastic bags and reinforced paper bags of litter. Visitors to the state were offered pamphlets pertaining to the clean-up as well as collection bags and

encouraged to join the effort (U.S. Senate Congressional Record 1971:S6194-S6195). In 1999 a total of 62.67 tons of litter were collected across the state, showing the continued success of the annual event (Bazilchuk 1999:9). The clean-up initiative continues to this day, now a private venture headed by the non-profit Vermont Green Up, Inc., started in 1979, funded mostly through sponsorships and charitable contributions (Green Up Vermont 2017).

The successes of the interstate system in promoting tourism to Vermont also made it faster and more convenient for tourists to bypass Vermont, as evidenced by decreasing business in traditional resort towns across the United States in the 1960s. For many state tourist promotion officials the concern was that "too many travelers…[were] using the speedy new freeways to get someplace else" (Bedell 1966:6). A 1966 report given by Governor Philip Hoff urged the preservation of Vermont's scenic landscape along highway corridors, which he stated had been subjected to haphazard changes "which [deteriorated] scenery, an important aspect of the state's economic base" (*Bennington Banner* 1966:15). In an effort to maintain and promote Vermont's idyllic scenery and outdoor way of life to out-of-state visitors, those interested in scenic preservation targeted several areas in need of reform.

One such area was the encroaching and excessive billboards along the state highways. Visual pollution along the roadway prompted the passage of Vermont's Outdoor Advertising Law, popularly known as the Anti-Billboard Law, in 1968 (*Bennington Banner* 1975a:4). The law allowed signs erected before March 23, 1968, to be voluntarily removed before January 1, 1970, or five years from the date of licensing, whichever date was later. A 1969 estimate stated that 2,100 signs were to be removed by January 1970 and another 750 signs were to be removed once their five-year licensing timeline was met. Arguments by advertisers stated that the removal of the billboards would hinder their business, and farmers argued against the loss of revenue of leasing their land to the billboard agencies (*Burlington Free Press* 1969:1). Elimination of the billboards, however, was found to have no adverse effect on the businesses of Vermont, and it may have benefited businesses by drawing in more tourists interested in the unobstructed beauty of the state. As of 2011, Vermont, Hawaii, Alaska, and Maine were the only four states to have passed anti-billboard legislation. The successes of the program can be seen as all of those states continue to be praised for their natural and unhindered beauty (PlannersWeb 2011).

To those interested in maintaining the scenic preservation of Vermont, the quick modernization of local roads as a result of accommodating the standards of the interstate highway system presented a challenge. The maintenance of existing town roads and the quick construction of graveled or surfaced roads allowed the overall improvement of road access to outlying areas while also encouraging tourists to travel the modernized scenic winding back roads of Vermont (Vermont State Highway Board 1956-

1958:24). The issue with upgrading the local roadways, however, was the need to construct and maintain roadways to a certain standard, which included set widths that required the elimination of roadside vegetation, realignment of roadways to allow safer and faster travel, and the erection of power lines and "out-of-place" buildings that took away or blocked the pleasant views that Vermont was attempting to promote. The Scenic Road Law, enacted in 1977, provided a way for towns to determine, protect, and properly maintain state- or town-owned roadways they selected as scenic by following engineering specifications that would "preserve scenic quality without reducing the level of services or safety." Headed by the Scenery Preservation Council, created in 1966, and the Transportation Board, the Scenic Road Law allows towns to preserve whole or parts of roadways determined to possess significant scenic value by also allowing the towns to define what they deem scenic (Vermont Scenery Preservation Council 1979:1-2, 6).

Associated Resource Types

- Realigned or widened roads
- Curbs
- Bridges
- Roadside drainage ditches
- Multiple-lane highways
- Billboards
- Scenic Roadways

Alternative Transportation (1868-1978)

Bicycles

Begun around 1868, the American bicycle craze of the late 1800s was marked by jaunts through the countryside, club excursions, and both legislative power and public conflict (McCullough 2015:17). The legislative clout of bicycle groups as a result of the vehicles' widespread popularity began the "Good Roads" movement in the United States and began the fight for cyclists' rights. As quickly as the bicycle had gained popularity, it was surpassed by the automobile in the early twentieth century. It would not be until World War I and later during the energy crisis of the 1970s that the bicycle would experience a resurgence in popularity in the United States. As before, the increased presence of cyclists on the roadways proved to be an issue as safety concerns from both motorists and cyclists were voiced. If bicycles were going to be largely relegated to operating on the roadways, there was a need for wider roads or separate bicycle paths. While in its infancy in the state in the 1970s, the construction of bicycle paths along railroad rights-of-way and the designation of bicycle routes on

roadways established a bicycle culture that would continue to develop in Vermont in the following decades.

(1) Bicycle Clubs and Good Roads Movement (1866-1920)

Tours of the countryside were a prevalent pastime before the advent of the velocipede, the early model of the bicycle. Travel routes were well established by the 1860s and the sudden appearance of the bicycle made these trips all the more popular. Road books detailing travel routes were popular as were the personal journals of bicyclists who liked to discover their own paths (McCullough 2015:23). Often tours were completed by bicycle clubs, the center of the bicycle's popularity in the late nineteenth century. Cyclist clubs afforded their members a chance to enjoy bicycling in a social environment, their members partaking in group rides and bicycle parades (McCullough 2015:3-4). Races also became popular amongst the clubs; members participated in events such as the 1893 race held in Barre that hosted members from several clubs based out of Massachusetts and New Hampshire as well as the Capital Bicycle Club and the Barre Bicycle Club from Vermont (*Burlington Free Press* 1893:2).

Experiencing almost instant popularity, the quickly increasing number of cyclists had an opposite effect with other travelers, as conflicts between the two groups mounted. Faced with navigating rutted gravel and dirt roads and mounting antagonism from horsemen, wagon drivers, and pedestrians, the League of American Wheelmen (LAW) was formed.[2] Established in Newport, Rhode Island, in 1880, LAW was formed to ensure the rights of cyclists across the United States (Sturges [2005]). State chapters of the League formed when the respective states possessed a minimum paid membership of 25 wheelmen and offered their members perks such as reduced rates at hotels, access to parks, and places in parades (Barkman 1887:72). Vermont's chapter of LAW had 68 active members in 1886, with representation from several clubs in the state (*Burlington Free Press* 1886:8).

The early anatomy of the bicycle resulted in a vehicle that was hard to operate and offered no shock absorption, earning it the nickname "boneshaker." The growing popularity of the bicycle coupled with design flaws that were only exacerbated by the poor conditions of the roadways and the requirement that bicycles not use sidewalks led to the Good Roads movement. Complaints from the cyclists were delivered through LAW in an effort to improve roads, several years before the prevalence of the automobile (Wilkie 1929:15). The League educated the public regarding the advantages of goods roods at national rallies, wrote letters and articles for newspapers, published their own *Good Roads* magazine to promote the cause, and connected with local people through their clubs, empowering a

[2] In the 1990s the League of American Wheelmen was renamed the League of American Bicyclists.

grassroots movement in which "the agitation [was] extensive and there [was] hardly a State in the Union but that [was] feeling the effects of an awakened conscience as to public needs and benefits" (*Burlington Weekly Free Press* 1893:12; Quinn 1968:5-6). In 1898, in response to the public outcry, Vermont legislature passed an act that established the Vermont Highway Commission to improve public roadways, a position that had been created in more than half of the states by 1900 (*Essex County Herald* 1900:2).

The Good Roads movement was begun by complaints from bicyclists but there was also a push to create bicycle paths separate from the roadways. Cinder paths along the side of the roads were constructed by bicycle clubs, such as the bicycle path from St. Johnsbury to Lyndonville, which was under construction in 1899 (*St. Johnsbury Caledonian* 1899:8).[3] For use of the paths, individuals were charged 50 cents a year (Tripp 1951:6).

By the end of century, several attempts had been made to pass legislation regarding bicycle paths and roadways. In 1898 a bicycle tax bill that would require 50 cents per wheel annually to be used to improve streets and highways was proposed and struck down (*Burlington Free Press* 1898:1). A bill proposing the legislative establishment of bicycle pathways across the state was reintroduced numerous times and was eventually killed in the Senate in 1900 (*Burlington Free Press* 1900:1; *St. Johnsbury Caledonian* 1900:4).

Associated Resource Types

- Roads
- Curbs
- Bridges

(2) Decline in Bicycle Use (1900-1939)

Although the Good Roads movement continued into the 1920s, the popularity of the bicycle ebbed quickly with the rise in automobile sales around the turn of the century. Just a decade later, the bicycle craze was a thing of the past. More cars on the road and the continuation of laws forbidding bicycles to use the sidewalks meant that the streets became much less safe for the bicycle. As a result of the negative interactions between bicycles and automobiles sharing the roadway, the Vermont legislature passed a bicycle law in 1939 requiring that bicycles be equipped with a bell or horn and that

[3] No early side paths for bicycles are known to remain in Vermont (Vermont Digital Newspaper Project [VTDNP] 2015).

travel at night required lighted lanterns that were visible from at least 50 feet (*Burlington Free Press* 1939:9).

Associated Resource Types

- Roads
- Curbs
- Bridges

(3) Bicycle Paths and Rail Trails (1940-1978)

Complaints from the cyclist community about the state of the roads again resurfaced, this time focusing on the lack of space given to bicyclists that were restricted to the roadways. During the energy crisis of the 1970s, the United States sold more bicycles than automobiles, and while the mortality rate for accidents was down, serious accidents requiring hospitalization increased. Many argued that this was evidence of a need for wider road standards and bicycle paths (*Bennington Banner* 1974a:4). Of those polled in a 1974 survey, only 17 percent of Vermont bicyclists were satisfied with the available road space (*Burlington Free Press* 1974a:15). In that same year the Vermont legislature approved the appropriation of funds for a study of bicycling needs in the state, including an inventory of existing bike routes and a five-year statewide plan for needed improvements (Peck 1974:22-23, 41-42).

In 1970 Vermont had no bicycle pathway mileage to add to the over 15,000 miles of bikeways throughout the United States (Barber 1970:15). The following year, however, volunteers in the City of Burlington began converting the defunct Rutland Railroad right-of-way between Shore Road and the Winooski River into a pedestrian dirt path (*Burlington Free Press* 1971b:8). The Burlington Bikeway continued to develop and improve and later became part of the longer Island Line Rail Trail (Figure 13).[4] Greater awareness of the needs of bicycles in the city also led to the installation of several bicycle racks at some of the area's parks around the same time (*Burlington Free Press* 1974b:31). In the town of Colchester, a project to mark bicycle routes on town roadways—boasted as the first project of its kind in the state by the group that completed the work—was completed in 1973 with the intent of directing cyclists to use the safest routes on town roadways while also alerting automobiles to the presence of cyclists (*Burlington Free Press* 1973a:1). The passage of the federal "bicycle bill" of 1975

[4] Vermont has several rail trails, four of which are inventoried and maintained by VTrans and the Vermont Department of Forests, Parks and Recreation—Beebe Spur Rail Trail (opened 1999), Missisquoi Valley Rail Trail (opened 1995), Lamoille Valley Rail Trail (first section opened 2005), and the Delaware & Hudson Rail Trail (north section of the line acquired in 1983, south section acquired in 1986). More information on Vermont's rail trails can be found at the following links: TrailLink (https://www.traillink.com/state/vt-trails/) and Trails.com (https://www.trails.com/vermont/rail-trails).

FIGURE 13: Map of the Island Line Rail Trail (The Island Line Trail Vermont 2017)

furthered the goal of cyclists to have their needs considered in the planning process. The bill provided the necessary machinery needed by the Highway Department to develop bike paths and lanes along the state's roadways using Federal Bureau of Outdoor Recreation funds matched by state money (Gregg 1975a:17).[5]

[5] The 1973 Federal Aid Highway Act established that bicycle path construction was to be considered a project for highway departments.

- Associated Resource TypesRoads and bicycle lanes
- Recreational trails
- Trail barriers including posts and chains
- Designated bicycle route signs
- Bicycle racks
- Picnic areas
- Parks
- Interpretative panels and displays

Snowmobiles (1922-1978)

The modern Ski-Doo snowmobile, which was launched in 1959, became a quick success with the public. This date, however, marks only the beginning of the popularity of the modern snowmobile. In fact, forerunners to the modern snowmobile existed as early as the 1800s, with versions of the snowmobile existing in the 1910s. The earliest snowmobiles consisted of winterizing automobiles or the construction of clunky machines that were used primarily by workers, and it was not until 1959 that the snowmobile became popular as a recreational vehicle (Kalkomey 2018a). The almost immediate popularity of the Ski-Doo snowmobile and its successors allowed a whole new way to travel, both recreationally and for necessary trips, but also brought with it complaints and tensions with the public. As a result Vermont worked to establish regulations that would allow the snowmobile to continue to grow in popularity while also addressing the concerns of Vermonters. Safety regulations were put in place, snowmobile clubs were created, and snowmobile trails were allocated and constructed, setting the groundwork for the winter sport that many Vermonters enjoy.

(1) Winterizing Automobiles (1922-1958)

Earlier snowmobile models include failed inventions and prototypes that only worked in dry snow. The popularity of the Ford Model T automobile was mounting, but its weather restrictions quickly became apparent to Virgil D. White. In 1917 White patented a kit that provided all the mechanizations required to transform the body of the vehicle into a snowmobile that utilized tracks at the rear and skis at the front, although his invention was not available on the market until 1922 (Ernst 2014). In a 1923 *Burlington Free Press* newspaper ad, the snowmobile was described as "a Ford on Snowshoes! 40 Times the Traction Surface of an Ordinary Auto Is Provided by THE BELTS. 60 Times the Bearing Surface of an Ordinary Auto is Provided by Belts and THE RUNNERS…The Snowmobile will revolutionize the mode of travel in snow countries the world over!" (Figure 14) (*Burlington Free Press* 1923:14). In February 1926 the Morrisville, Vermont, Winter Carnival hosted what they claimed to be the first snowmobile race ever staged, and in March 1926 a Ford Model T snowmobile led the

funerary procession of John Calvin Coolidge Sr., father of the president, over the hills of Vermont (*Burlington Free Press* 1926:13; Model T Ford Snowmobile Club [2000]).

FIGURE 14: Automobile Converted to Snowmobile (Landscape Change Program 2011f)

Although sales were slow at first, the kits soon exceeded over 3,000 units a year. By the end of the decade, however, increased winter maintenance of the roadways greatly reduced the necessity of the kits and sales declined (Model T Ford Snowmobile Club [2000]).

Early iterations of the snowmobile proved to be an important mode of transportation to several professions. Snowmobiles provided access to areas once inaccessible in inclement weather, which was especially important to rural doctors. Advancements in technology such as the snowmobile allowed doctors to cover a wider area in rural Vermont (*Burlington Free Press* 1927:8). Other professions that relied on the snowmobile were other emergency service workers such as firefighters, whose horse-drawn equipment was replaced by snowmobiles, and even mail carriers, who relied on the vehicle to complete their rural routes (*Burlington Free Press* 1925:11, 1933:13).

Associated Resource Types

- Roads
- Bridges

(2) Regulation of Vehicles and Trails (1959-1978)

Smaller engines of the earlier snowmobiles often resulted in the vehicle's overheating during its journey. For this reason snowmobiles were considered more necessary than recreational, and were used by Vermonters to run errands or carry out their jobs. This all changed, however, with the 1959 launch of the Ski-Doo. Improved engine technology provided smaller engines with more power, and the snowmobile quickly became popular among winter sports enthusiasts (Miss Cellania 2015).

By the early 1970s complaints concerning snowmobile use were mounting. The Executive Director of Vermont Tomorrow Inc. stated: "environmentally, the machine is a technological monster…and it conflicts with other forms of recreation and with values traditionally associated with property and privacy. [Nothing short of a ban] will eradicate the environmental damage done in terms of harassed wildlife, polluted air, destroyed vegetation, and increased litter" (*Burlington Free Press* 1972a:3). In 1972 a state bill was introduced that would rewrite Vermont's lenient (and controversial) trespass laws, which proponents of the legislation claimed snowmobilers were taking advantage of (*Bennington Banner* 1972a:28, 42). Others argued that the snowmobiles were ruining the very lands that they explored. The assistant Secretary of the Interior Harrison Loesch stated: "motorized wilderness lovers are loving big chunks of the American wilderness to death" (*Bennington Banner* 1972a:29)—and that the machines were obnoxiously loud.

In an effort to quell some of the emerging issues surrounding snowmobiles, Vermont passed several laws regulating the sport. The "Snowmobile Bill" of 1968 required that the vehicles be registered with the state with exceptions for personal property use, ski resort snow packing, and rescue operations. Registration of the vehicles cost $3, part of which was applied to trail survey and construction (Figure 15) (Boright 1970:9). A law passed in 1972 expanded on the previous bill by increasing registration fees, limiting snowmobile access to designated lands indicated by approved signage from the Secretary of State and private properties with permission, and setting appropriate age limits (*Burlington Free Press* 1972a:3, 1972b:15). Other legislation targeted noise. During the snow season of 1972-1973, the allowable decibels for the machines was capped at 82 decibels at 50 feet, and on or after June 30, 1976, Vermont required that all snowmobiles manufactured be outfitted with a muffler that reduced the allowable noise level to 73 decibels at a range of 50 feet (*Burlington Free Press* 1976b:32; Miller 1973:1, 5). To enforce the newly implemented regulations, the Snowmobile Enforcement Program was begun during the 1972-1973 snowmobile season, policed by specially trained deputy sheriffs and state police, which reduced the number of complaints and accidents (*Burlington Free Press* 1973b:5).

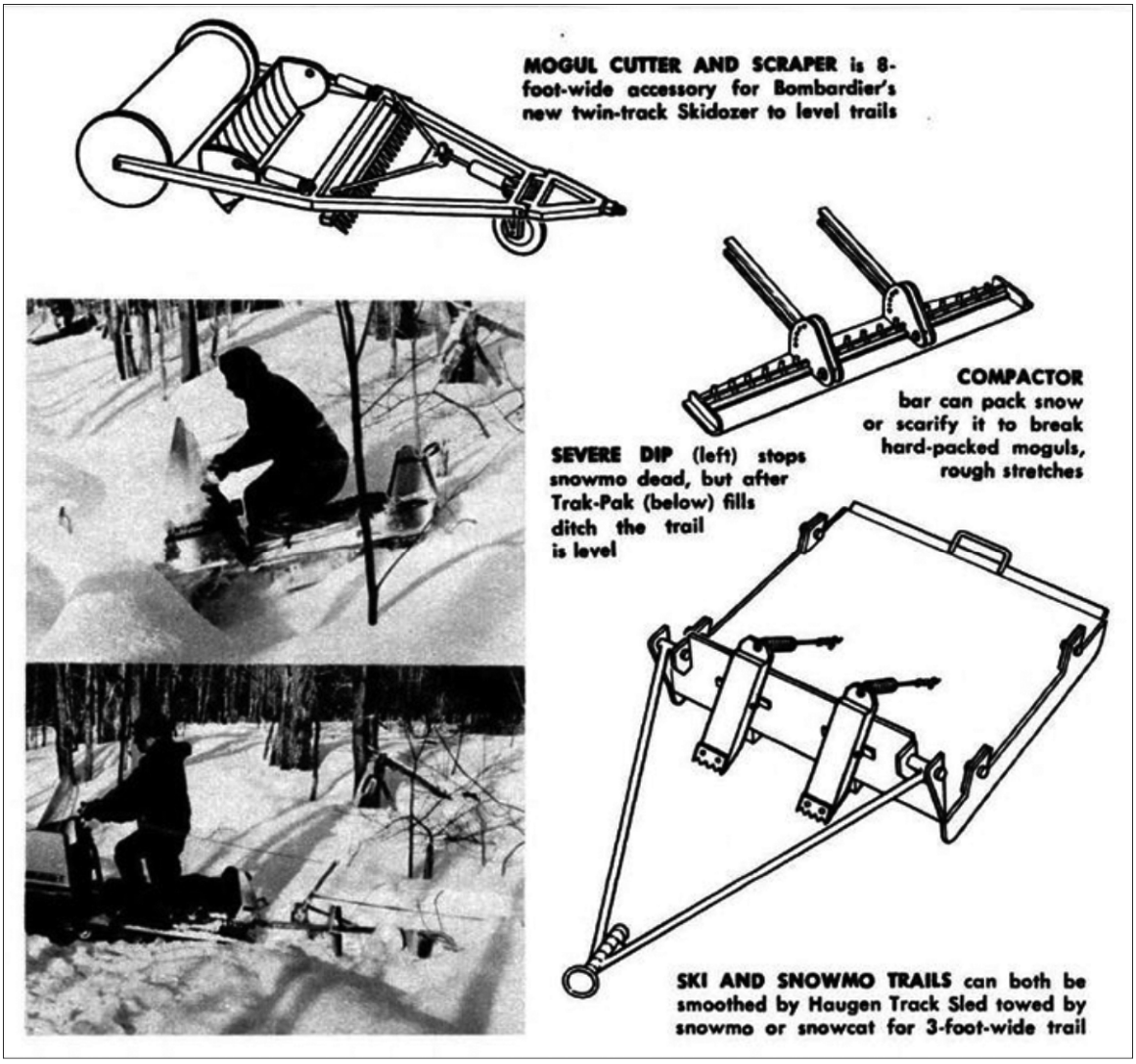

FIGURE 15: Constructing and Maintaining Snowmobile Trails (Popular Mechanics 1973:92)

Complaints from property owners coupled with the growing popularity of the sport made it apparent that to curtail severe restrictions on the sport, Vermont snowmobilers would need to self-regulate. In 1967 more than 80 snowmobilers met and laid out the foundation of a statewide snowmobile organization named the Vermont Association of Snow Travelers (VAST), which would act as an umbrella organization for regional clubs focused on legislation. With the rise of snowmobiles' popularity as well as the increasing requests for information, land-use agencies welcomed the creation of the organization. Around the time of the passage of the 1968 "Snowmobile Bill," Vermont issued a Snowmobile Travel Guide that outlined all state land and trails that could be accessed by the public. By 1970 VAST was working to compile their own listings of private trails that would be accessible to members (*Burlington Free Press* 1970:20).

Both the popularity of the sport and the benefits offered by VAST grew rapidly, and by the end of the 1967-1968 snowmobile season, VAST membership numbered more than 800 people, most of whom belonged to regional clubs. By 1970 the club had grown to include over 4,500 members and 60 member clubs, and by the end of the decade there were 16,500 members and 200 snowmobile clubs, of which most belonged to VAST (*Burlington Free Press* 1970:20; Read 1979:76-77).

On a national scale, in 1972 President Nixon signed into law an executive order requiring all federal agencies to establish regulations for the use of off road-vehicles on federally owned land in an effort to protect certain areas from the damage caused by the vehicles (*Burlington Free Press* 1972c:17). Prior to the executive order Forest Service lands in Vermont were open to unrestricted use by off-road vehicles with exceptions for the Long Trail and the Lye Brook and Bristol Cliffs wilderness areas, which, along with several other wilderness areas throughout the Northeast, were created with the 1975 Federal Eastern Wilderness Areas bill (*Bennington Banner* 1975b:14; Randolph 1975:11). Implementation of the 1972 executive order was thought to have a significant effect on snowmobile usage in Vermont's national forests because the regulations would "impose 'rather stringent restrictions' on the use of vehicles 'off the road' on federal properties" (*Burlington Free Press* 1972c:17). President Carter expanded on this executive order in 1977 with EO 11989, which clarified the definition of an off-road vehicle and also helped provide direction on the closure of previously designated off-road vehicle-use areas (Bureau of Reclamation 2017).

Under the requirements of the 1972 executive order, the Forest Service of the Green Mountain National Forest developed a plan that outlined land-use restrictions. Released in 1976, the off-road vehicle plan continued the land-use designations of the forest in place prior to the issuance of the executive order. As a result about half of the 262,000 acres of forest remained closed to off-road vehicles or restricted them to specific corridors. Mapping of the designated areas within the forest was carried out with the aid of VAST and the Northeastern Ski Touring Operators' Association (*Bennington Banner* 1976:6).

The Vermont legislature, with the help of VAST, established the Statewide Snowmobile Trails System (SSTS) in 1978, a trail system that utilized earmarked state funds for the development and maintenance of the snowmobile trails across Vermont and developed connections to trails in New York, New Hampshire, Massachusetts, and Canada (*Burlington Free Press* 1978b:17; Northwest Regional Planning Commission 2007:2). The SSTS consisted of more than 4,500 miles of corridor trails and more than 1,500 secondary trails primarily used to access services such as food or gas; 80 percent of the trails were located on private lands that allowed snowmobile access (Kalkomey 2018b). Funding for the endeavor came from a half percent of Vermont's 9-cent gasoline tax. (*Burlington Free*

Press 1978c:18). As of 2017, VAST maintains a system of snowmobile trails that totals over 4,700 miles (Figure 16) (Vermont Association of Snow Travelers 2018a,b; Vermont Vacation [2017]).

Associated Resource Types

- Roads
- Bridges
- Trails
- Trail markers
- Trail barriers
- Parking areas
- Tour company buildings

All-Terrain Vehicles (1967-1978)

(1) Legislative Restrictions (1967-1978)

The creation of the all-terrain vehicle (ATV) followed years of research conducted by the Honda Technical Research Institute on the development and production of the earliest motorbikes (McNamee 2011). The earliest models consisted of amphibious vehicles with wide bodies and six wheels described as "bathtubs on wheels [that could] jounce, swim or crawl over just about any obstacle that nature has to offer" (*Bennington Banner* 1969:14). In August 1969 the first major race exclusively for all-terrain vehicles occurred in New Hampshire, giving the riders a chance to show the sturdiness of the ATVs (*Bennington Banner* 1969:14). The following year Mount Snow in West Dover hosted a 50-mile endurance race with obstacles set to test the vehicles and their drivers (*Bennington Banner* 1970:6).

From the onset ATVs suffered complaints and public outcry to ban the vehicles. Introduced at a time when snowmobiles were under scrutiny, this new machine was just as loud and the riders were just as prone to trespass as snowmobilers, but the presence of wheels on the vehicles posed a greater threat to the environment and Vermont's highly erodible soils (Bishop 1975:16). Just a few years after the three-wheeled ATV's release in America, environmental organizations were calling to ban the ATV, arguing that the vehicles "rip up the ground, causing erosion problems, are detrimental to wildlife, and emit sparks which can lead to forest fires" (*Burlington Free Press* 1971c:10, 1972a:3). As a recreational vehicle the ATV drew many complaints, but the fuel shortage of the 1970s refocused advertising away from the primary market of sportsmen to those that could use the vehicle as a utility vehicle for agriculture, an idea that bolstered the vehicle's popularity in the state (McNamee 2011).

Much like the regulations imposed on snowmobiles, the passage of the 1972 trespass legislation put in place regulations that prohibited motorized vehicles from traveling on private

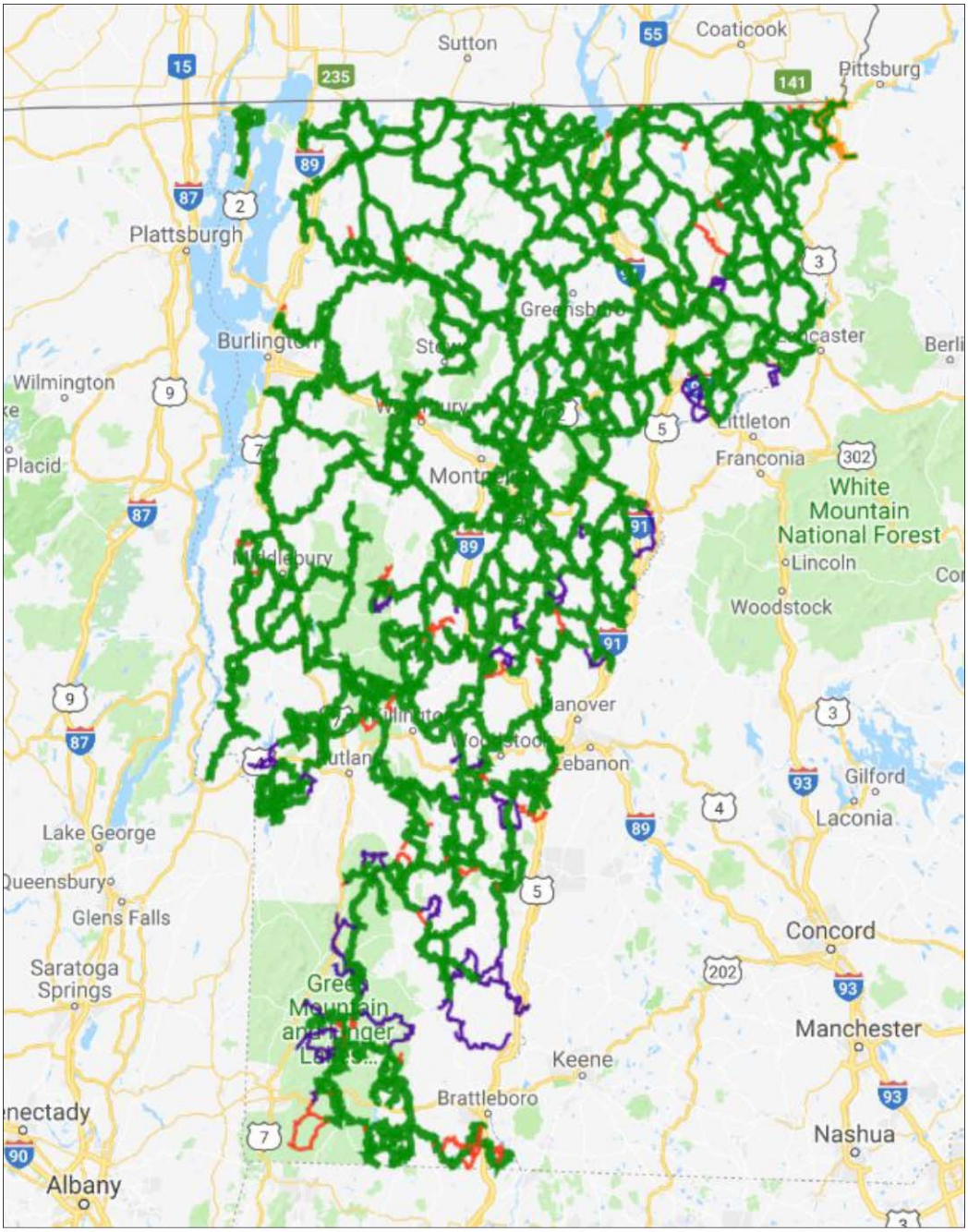

FIGURE 16: Map of the Vermont Association of Snow Traveler's Trail System, 2018 (Vermont Association of Snow Travelers 2018b)

property without the written consent of the landowner (*Burlington Free Press* 1972a:3). The only lands on which ATVs could legally operate without the necessary permissions were roads and state highways within state-owned lands if the vehicle was registered (*Bennington Banner* 1974b:7). The 1972 executive order from President Nixon regulating the usage of off-road vehicles on federally owned land (Garland 1976:8), expanded upon by President Carter in 1977, applied to ATVs as well as

snowmobiles. Although the Secretary of the Environmental Protection Agency had the authority to designate trails for ATV use, by 1975 no trails had been designated as such (Bishop 1975:16). Also in 1975 President Ford signed the Eastern Wilderness Areas bill, which designated a 14,300-acre tract at Lye Brook and a 6,500-acre tract in Bristol Cliffs as wilderness and inaccessible to off-road vehicles (*Bennington Banner* 1975b:14).

Following the model of VAST, Vermont ATV enthusiasts did eventually create their own state-wide umbrella organization, the Vermont ATV Sportsman's Association, Inc. (VASA), in 1998 (Vermont ATV Sportsman's Association, Inc. 2018).

Associated Building Types

- Roads
- Bridges
- Trails
- Trail markers
- Trail barriers
- Parking areas
- Tour company buildings

D. RAILROADS

The following section is a revised excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan.

Although Vermont railroad companies were being chartered as early as 1832, it was not until 1848 that the first tracks were opened by the Vermont Central Railroad from White River Junction to Bethel. By 1855 over 500 miles of track had been constructed. Prior to the Civil War the basic north-south spines of the Vermont railroad network were completed. Railroad construction ceased during the Civil War, then started up again in the 1870s with the construction of east-west lines linking the major routes. At the close of the 19th century Vermont had approximately 1,000 miles of steam rails, and 75 miles of electric rails. Every county had one or more railroads, and of 248 towns and cities in Vermont less than 100 were without rails. The railroad brought dramatic changes to the Vermont landscape. It created new towns, prompted the decline of others, and stimulated the development of key industries such as dairying, stone quarrying, and tourism. The advent of the automobile in the early 20th century eclipsed the role of the railroad, though it continues to be used for freight and limited passenger service to this day.

Establishment of the Railroad Network (1830-1870)

Planning for various railroad lines started in the 1830s with the legislature chartering the Vermont Railroad Company in 1832 and the Vermont Central Railroad Company and four shorter lines in 1835 (VDHP 1989:99). The Connecticut and Passumpsic Rivers Railroad Company was also incorporated in 1835, but the charter was amended in 1845. The Connecticut and Passumpsic River Railroad, which ran along the Connecticut River connecting the northern and southern sections of the state, started construction from White River Junction to Bradford in October 1848 (Interstate Commerce Commission 1931). In 1867 the Portland & Ogdensburg Railroad was chartered, envisioned to be a vital link between Maine's largest port and the Great Lakes shipping lanes. Because of the low population of the state and lack of large cities and industries at the time, railroads were constructed mainly to provide service to destinations outside the state. These early railroads provided lines linking the northern and southern sections of the state connecting to markets in Boston and Canada (Figure 17) (American-Rails.com 2018a).

Chartered by the State of Vermont in 1843, the Vermont Central Railroad headed by Charles Paine (eventually reorganized as Central Vermont Railway) and Timothy Follett's Champlain & Connecticut River Railroad (later known as the Rutland Railroad) were created in the midst of a fierce competition between the two men with two differing ideas about how best to reach Lake Champlain. Timothy Follett, a Lake Champlain steamship business owner, envisioned a rail line that ran west across the state, connecting to Mt. Holly and heading north to connect to Rutland and Burlington, where he could connect to his steamship line and ship freight along the Great Lakes. The Central Vermont Railroad (Vermont Central Railway) thought the best route followed along the White River near the New Hampshire border, turning west near Montpelier and following the Winooski River to Burlington (American-Rails.com 2018b, 2018c).

In 1848 the Vermont Central Railroad opened its first track between White River Junction and Bethel, and expanded to Windsor following the Connecticut River, Montpelier, and Burlington by the close of the following year. Establishing the line was not without issue, as 200 Irish workers at Bolton Flats rioted after having not been paid for three months. The workers blocked the local railroads and took a Vermont Central Railroad officer as a hostage, which prompted the Vermont State militia and an armed volunteer fire company to engage the rioters, some of whom were arrested and eventually released (Vermont Historical Society 2006a). Irishmen were drawn to Vermont as more and more work was required along the railroads, settling in areas such as Northfield (Vermont Central Railroad's initial headquarters), Burlington, Rutland, St. Albans, and Brattleboro. The Bolton Flats Riots were indicative

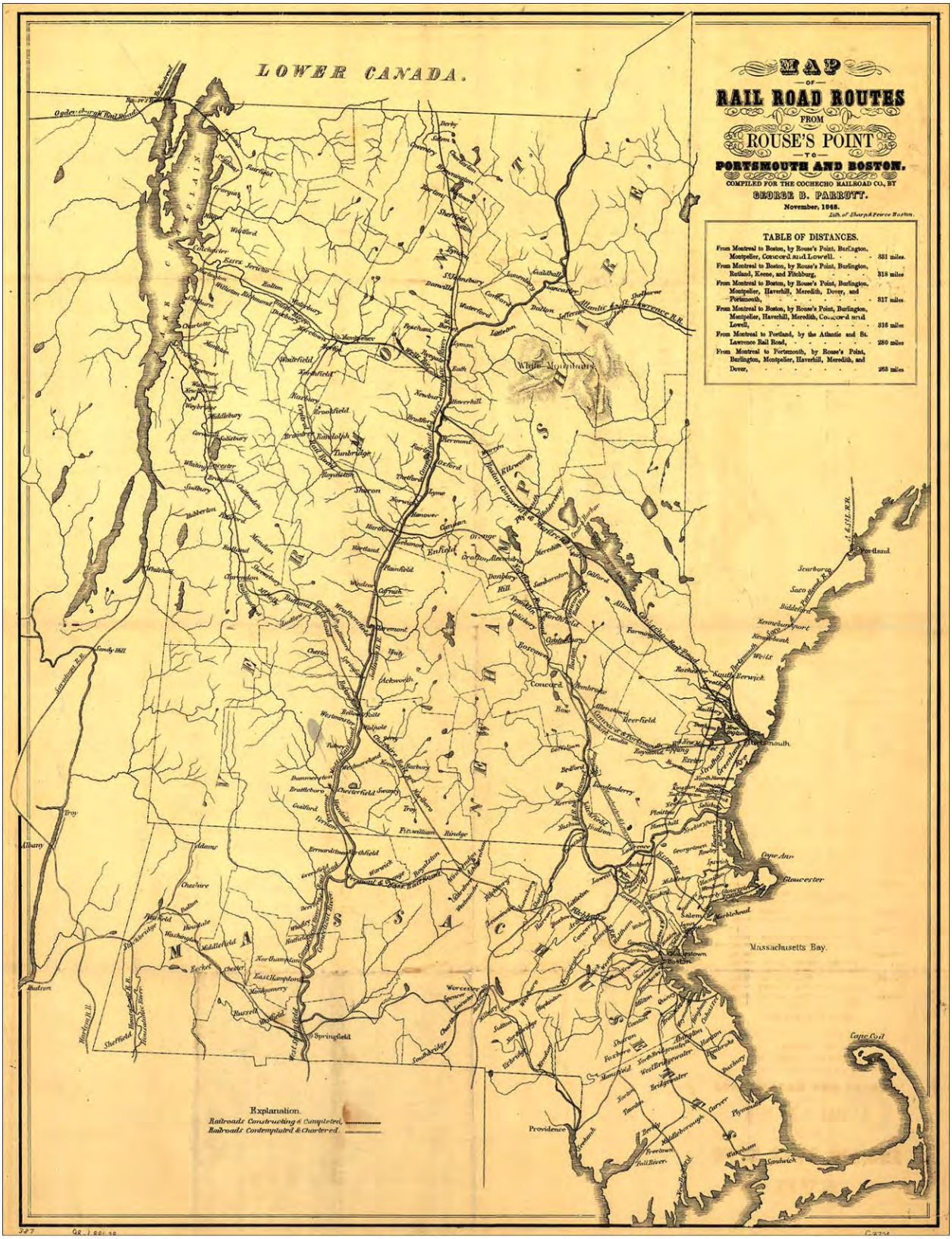

FIGURE 17: Railroad Routes from Rouse's Point to Portsmouth and Boston, 1848 (Parrott 1848)

of the problems these incoming workers faced working on Vermont's railroads. Unpaid Irish laborers called a strike in 1847 at Sharon, and disease and crime followed the "knockdown shacks" intended as temporary housing at the location of railroad construction (Sessions 1987:71-72).

The Champlain & Connecticut River Railroad was renamed the Rutland & Burlington Railroad (Rutland Railroad) in 1847, and two years later the railroad's first section of track located between Bellows Falls and Burlington was completed (American-Rails.com 2018c). Vermont Central Railroad moved against Rutland & Burlington Railroad, refusing to provide its rival an interchange. By refusing to share a junction point, Burlington had duplicate lines and facilities, a madness that was halted at the end of the century by the Vermont Legislature, which forced the companies to cooperate in Burlington. The Vermont Central Railroad had essentially trapped the Rutland & Burlington Railroad in its route, which had not been very prosperous, and the railroad went bankrupt in 1853, reorganizing in 1867 as the Rutland Railroad Company (American-Rails.com 2018b, 2018c).

The coming of the railroad brought with it equal parts boom and bust. Competition among the various lines meant that more and more areas were being serviced. Expansion of the railroad also expanded Vermont's markets, both in-state and out-of-state. The industries of agriculture, forestry, mining, tourism, and quarrying (specifically in marble and granite) rose with the spread of the railroads (McReynolds 2003:93). Town centers often shifted to accommodate the location of the rail line, and by the late nineteenth century, 56 percent of Vermont towns had reached their peak populations, all of them located on or very near a railroad (Klyza and Trombulak 1999:85; McReynolds 2003:93). This growth, however, corresponded with the loss of population in many towns across Vermont, as over half of the towns lost population between 1850 and 1880; the majority of these were cut off from direct railroad access (McReynolds 2003:93).

Associated Resource Types

- Right-of-way
- Train track
- Bridges
- Train depots
- Service industry buildings
- Switchyards
- Industrial sites and structures
- Water towers

Railroad Expansion (1870-1900)

The Vermont Legislature passed Act No. 23 of the Laws of 1886, thereby creating the Board of Railroad Commissioners and defining its duties, one of which was to submit a biennial report of the state of affairs and an accounting summary for Vermont's growing number of railroads and railroad companies. The organization of Vermont's Board of Railroad Commissioners and its regulatory requirements was planned almost identically to the Massachusetts Board of Commissioners. The board's duties included, among other responsibilities, the review of complaints and litigation for the biennial term; the oversight of railroad companies, particularly the enforcement of reporting all receipts and expenditures; the recommendation of new legislation concerning railway safety and technology, and the accounting and recordation of statistical records for Vermont's rail system (Vermont State Board of Railroad Commissioners 1886-1888:3-10).

In 1888, 12.8 new miles of railroad were installed in the State of Vermont and steel rails were being substituted for iron on all railroads because of their vast advantages in quality and strength (Vermont State Board of Railroad Commissioners 1886-1888:14). Also during the late nineteenth century, many railroad bridges replaced earlier versions throughout Vermont, and metal truss designs as well as other new emerging bridge technologies made their debut.

With railway safety regulations still in their infancy, accidents were commonplace but more frequent among railroad employees, trespassers, and pedestrians on the ground than passengers. In Vermont from 1888 to 1890, 72 fatalities occurred (Vermont State Board of Railroad Commissioners 1888-1890:6). One of the most notable train accidents was the derailment of the Montreal Express in 1877, traveling from White River Junction to Montreal, into the White River, killing 34 people and injuring 49 (Vermont Historical Society 2006b). Throughout the late nineteenth century the Board of Commissioners urged new safety recommendations, such as guardrails to be placed on the approaches to all railroad bridges, uniform designs for railroad crossing signs, switch lights and safety signals for night travel, improved ventilation of rail cars, and a push for steam-heated trains over car stoves, which were more likely to cause fires on board railroad cars (Vermont State Board of Railroad Commissioners 1888-1890:23-37). The Vermont State Legislature passed Act No. 25 during the biennial term of 1888-1890, authorizing the Board of Commissioners to make inquiry into all railroad-related accidents and allowing them to follow up with a public investigation, and by 1892 the State of Vermont required annual railroad inspections by law (Vermont State Board of Railroad Commissioners 1888-1890:1-6, 1890-1892:35-40). New state laws also banned the heating of rail cars by any method other than locomotive steam and prohibited the use of oil lanterns for lighting because of the high risk of fire

aboard the rail car (Vermont State Board of Railroad Commissioners 1888-1890:36-37). A major milestone improvement for rail safety affecting trains and railroad companies nationwide by the turn of the twentieth century was the requirement for all trains to possess safety appliances that were equipped with "power driving wheel brake and appliances" as well as couplers, grab-irons or hand-holds in the ends and sides of the rail cars. Furthermore, the Vermont Board recommended that legislation be passed to abolish all at-grade crossings and advocated for their replacement with under- and overpasses. The combined new safety requirements throughout the course of the late nineteenth century reduced the number of rail accidents dramatically (Vermont State Board of Railroad Commissioners 1896-1898:17-19).

During this period of vast development for railroad companies, following rail enterprise trends nationwide, Vermont experienced growing consolidation, reorganization, and restructuring of railroad companies. In 1888 the state boasted over 20 railroad lines, many of them making up the Vermont Central Railroad system. By 1894 the Vermont Central owned 189 engines, 3,800 freight cars, and employed nearly 2,400 employees (Vermont Historical Society 2006c). Between 1861 and 1873, the Vermont Central Railroad made significant track gains by acquiring lines from the Connecticut River Railroad (Boston & Maine Railroad), Ogdensburg & Lake Champlain Railroad (St. Johnsbury & Lamoille County Railroad), and the Rutland Railroad Company, and boasted the largest network of rails in New England with over 790 miles of track (American-Rails.com 2018b; Vermont Historical Society 2006d). In 1896 the overextended Vermont Central Railroad went bankrupt and was reorganized as the Central Vermont Railroad, two thirds of which became a subsidiary of the Grand Trunk Railway, which became a subsidiary itself in 1923 to the Canadian National Railways.

Released from Vermont Central Railroad's ownership, the Rutland Railroad laid a system of roads over the islands in Lake Champlain, connecting Burlington to Alburgh and Rouses Point, New York, in 1899 and acquired the Ogdensburg & Lake Champlain Railroad in 1901. The Ogdensburg & Lake Champlain line transferred significant amounts of agricultural freight, notably milk, for which the Rutland Railroad became known for shipping, and had connections with the Lake Champlain region that allowed Rutland Railroad to ship freight on the Great Lakes bound for Chicago. With further acquisitions of the Chatham & Lebanon Valley and Bennington & Rutland lines, the Rutland Railroad reached its peak track mileage with over 400 miles (American-Rails.com 2018c). In the north the Portland & Ogdensburg Railroad was established in 1867 and went bankrupt a decade later, becoming in part the St. Johnsbury & Lake Champlain Railroad Company in 1880, which was acquired by the Boston & Maine Railroad, and the Portland & Ogdensburg Railway in 1884, which became a subsidiary of the Maine Central Railroad (American-Rails.com 2018a).

The Panic of 1893 greatly affected the railroad system and their associated companies in Vermont, resulting in less activity, lower rates, and the decrease in construction of new track. By this time the Central Vermont Railway system had fallen into receivership. Still, five new miles of track were added during the Biennial term of 1894 to 1896 (Vermont State Board of Railroad Commissioners 1894-1896:7-9). Another significant development during the 1890s affecting the rail industry was the exponential growth of electric railways and street cars—nearly all employing the trolley system (Figure 18). In 1896 Vermont supported five operating electric railroads, which were instrumental to the

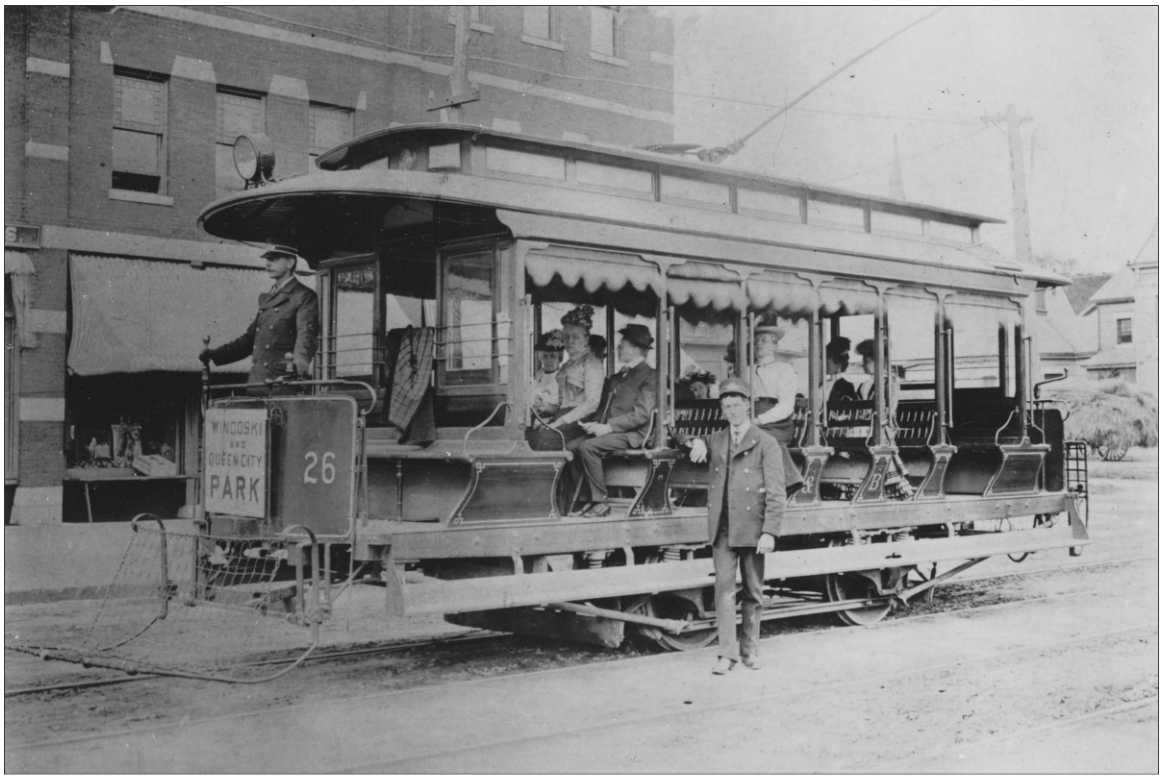

FIGURE 18: Chittenden County Electric Streetcar (Landscape Change Program 2011g)

economic vitality of the state's towns and larger villages (Vermont State Board of Railroad Commissioners 1894-1896:25-28). This development in part supplanted the need for new construction of steam railroads within the state of Vermont for local travel in and around the state's cities and small towns. The Board of Railroad Commissioners commented on the street car's profound impact in their 1898 report: "The electric road is a necessity not only to our prosperous and growing cities and larger villages but to the farming towns and communities wherever the latter are now removed from the lines of the steam roads" (Vermont State Board of Railroad Commissioners 1896-1898:20).

Although the state's railroads suffered a downward trend in passenger and freight traffic during the last decade of the nineteenth century, the physical condition of rail beds, railroad bridges, and stations

was markedly improved during this period. By 1896 a total of 992.06 miles of railroad was established in Vermont (Figure 19) (Vermont State Board of Railroad Commissioners 1894-1896:35-45). New railroad bridges, support structures, depots, round houses, and other railroad-related buildings were constructed and improved. The 1892 Biennial Report of the Board of Railroad Commissioners reported in detail on the new depots being built throughout the state: "The new depots constructed and several of those which have been built over have been of the modern and standard pattern, with broad roof coverings for the platforms, high and airy waiting rooms, commodious furnishings and, above all, most of them are provided with good drainage and neat and well-furnished closets" (Vermont State Board of Railroad Commissioners 1890-1892:40).

Marble and granite quarries expanded immensely from 1860 to 1900 as a result of the railroads, which eased transport of the heavy materials. In that same period the Vermont marble industry's value rose from $500,000 to $3.6 million, and granite quarries totaled nearly 80 facilities by the turn of the century. Slate quarrying also grew, with over 70 producers by the mid-1880s (Klyza and Trombulak 1999:111).

Associated Resource Types

- Right-of-way
- Train track
- Bridges
- Tunnels
- Train depots
- Service industry buildings
- Switchyards
- Industrial sites and structures
- Water towers
- Electric rails
- Streetcars
- Streetcar garages

Railroad Growth Stalls (1901-1926)

The continuation of railroad improvements carried into the beginning of the twentieth century. Notable improvements made to the Boston & Maine's lines included double tracking and straightening curves as well as the laying of new track between White River Junction and Bradford. The Central Vermont Railroad made extensive additions to its equipment between 1904 and 1906, purchasing 1000 freight cars, two new passenger trains, 11 refrigerator cars, and 23 locomotives. The railway also widened its lines to meet the current standards between Brattleboro and South Londonderry and opened a new line from Bethel to the nearby granite quarry (Vermont State Board of Railroad Commissioners

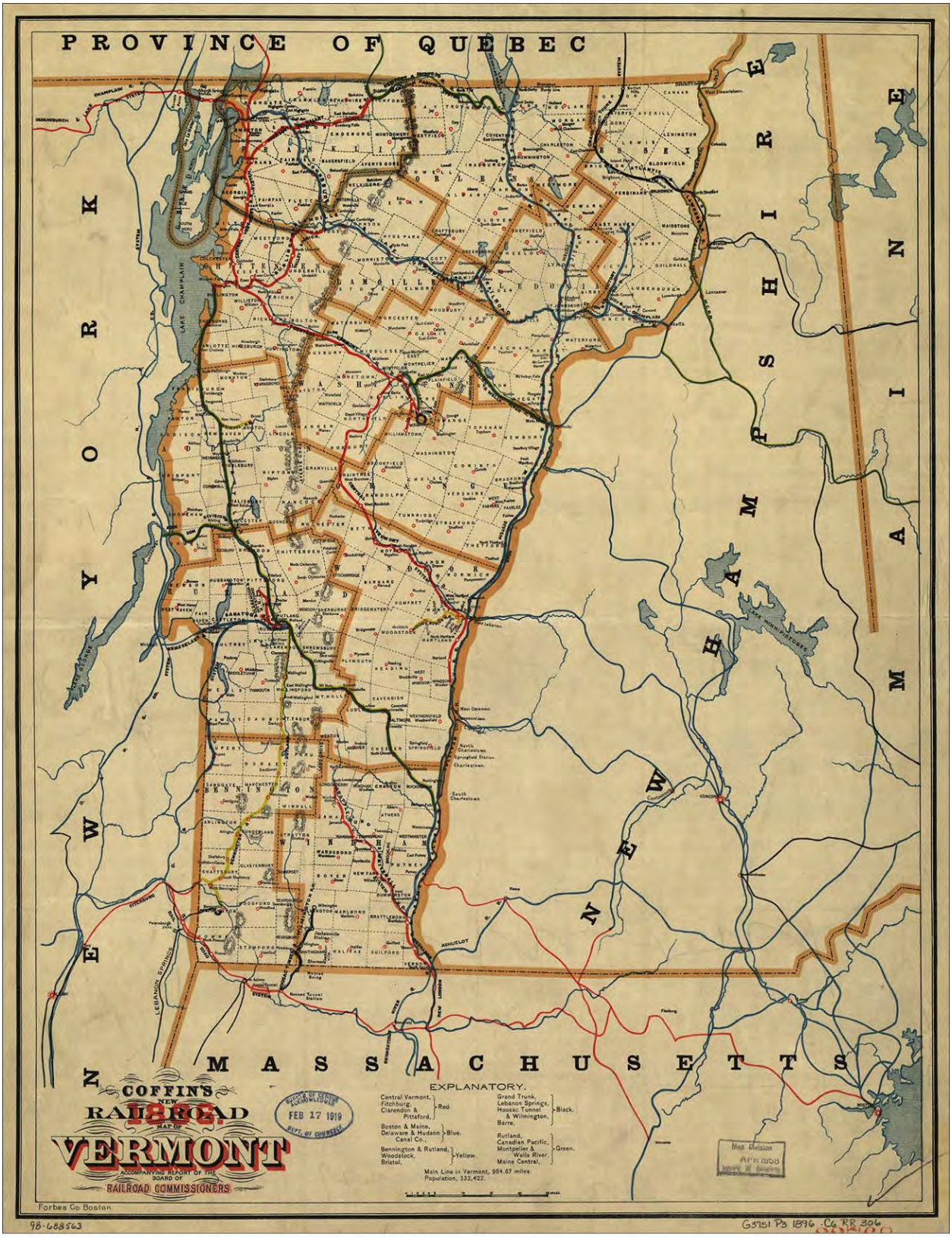

FIGURE 19: Railroad Systems in Vermont, 1896 (Coffin 1896)

1904-1906:14). Coming under the control of the New York Central Railroad in 1904, the Rutland Railroad also made significant strides in improving their lines.

The Rutland Railroad and a few others, however, were criticized by the Vermont Railroad Commissioner for having ignored the need to abolish the grade crossings, a matter of pressing concern, and for failing to install safety bells at several sites as previously ordered by the commission (Vermont State Board of Railroad Commissioners 1904-1906:14). It also appeared that under the leadership of New York Central Railroad, Rutland had developed a defiance against the commission. Neglect on some of the branch lines was also growing, and the Railroad Commissioner stated: "the policy of the Central Vermont and Rutland systems is such as results in positive neglect of their branches until these conditions become an actual menace to the traveling public; then the repairs made are seldom adequate to place the road in anything more than a serviceable condition for a short time" (Vermont State Board of Railroad Commissioners 1904-1906:15). These issues, as interpreted by the commission, was a direct defiance that resulted from a lack of clarity and unambiguousness in the railroad commission law, which they requested to have reissued to solidify their authority (Vermont State Board of Railroad Commissioners 1904-1906:24).

Early in the century, Vermont's electric rail service was at its height, consisting primarily of streetcars. At the turn of the century more than 100 miles of electric track were present in Vermont servicing 10 streetcar lines. In 1902 Vermont streetcars carried nearly 5.2 million people (Davis 2002:131-132). The streetcars helped developed transportation within the cities and towns of Vermont, which in turn helped promote the creation of city and town parks. Increases in automobile use caused the decline of the lines near World War I, but it was the hardships brought on by the Flood of 1927 that caused the demise of the electric rail system in Vermont (Vermont Historical Society [2012]).

The first decades of the twentieth century were a time of general decline in the railroad industries of Vermont. The decline was interrupted briefly by World War I. During the war the need for massive mobilization and coordination led to the takeover of the nation's railroads by the federal government between January 1, 1918, and March 1920. After the war, in 1920-1921, the Central Vermont Railroad faced financially difficult years (Landscape Change Program 2011). In 1922 Grand Trunk, under which Central Vermont Railroad was a subsidiary, was acquired by Canadian National Railways (American-Rails.com 2018b). The Rutland Railroad suffered a blow in 1915 with the passage of the Panama Canal Act, which forced the railroad to separate itself from its valuable steamship operations on Lake Champlain, costing the railroad its valuable interchange with markets connected to the Great Lakes as well as the interest of the New York Central Railroad, which relinquished most of its interest and its control of the Rutland Railroad. While increases in freight occurred in the 1920s,

namely in the Rutland's well-known shipments of milk, gains made by the Rutland Railroad were short lived (American-Rails.com 2018c).

Associated Resource Types

- Right-of-way
- Train track
- Bridges
- Tunnels
- Train depots
- Service industry buildings
- Switchyards
- Industrial sites and structures
- Water towers
- Electric rails
- Streetcars
- Streetcar garages

Disasters of the Twentieth Century (1927-1946)

Over the course of 25 years, Vermont experienced several high-water events that washed away portions of the state's tracks. These washouts occurred in the years of 1902, 1922, and 1924. For the most part the lines were repaired without issue (Landscape Change Program 2011). The Great Vermont Flood of 1927 was different; it caused widespread damage that affected not only railroads but Vermont's infrastructure as a whole. Over the course of two days in November, rain collected in the already oversaturated soils of Vermont, resulting in flooding across the state. Infrastructure losses totaled 1,285 bridges, countless buildings destroyed, and hundreds of miles of roads and railroad track swept away (Figure 20). The Rutland Railroad lost half of its mileage as a result of the flooding, and so much damage was sustained to the north section of the Central Vermont Railway that it went into receivership in December of that year (American-Rails.com 2018b; Weather.gov [2012]). As a valued line of the Canadian National Railways, who had acquired the line via the Grand Trunk Railway in 1923, the line was rebuilt, ending the receivership and creating a new company called Central Vermont Railway Inc. in 1929 (Parsons 2010).

As a result of the Flood of 1927, the state took on increased responsibilities, including road and bridge maintenance. The flood experience also generated the idea of a state highway system and state also shifted the importance of transportation to cars and away from railroads (Klyza and Trombulak 1999:113). Improvements to the roadways of Vermont as a result of the flooding provided the construction of more hard-surface roads. Increasing the network of automobile roads across the

FIGURE 20: Damage to Railroad After Flood of 1927 (Landscape Change Program 2011i)

state laid the groundwork for the Vermont interstate highways that would develop in the decades after the war and cement the automobile's place as the preeminent form of transportation in the state.

Following on the heels of the Great Vermont Flood, the Great Depression of the 1930s rattled Vermont's railroad industry. The stone market collapsed, resulting in the closure of quarries across Vermont and the ending of rail lines devoted to the moving of quarried materials (Bathory-Kitsz 2013). Line closures were common; the period between 1931 and 1933 saw the end of the Mt. Mansfield Electric Railroad Company, the last intrastate electric railroad in Vermont, the Woodstock Railroad, and the White River Railroad (Vermont State Public Service Commission 1931-1933:8). The Rutland Railroad's financial standing was precarious throughout the 1930s, eventually succumbing to its debts in 1938 (*Burlington Free Press* 1936:5). The railroad would remain in receivership until 1950, when it was reorganized into the Rutland Railway (Rutland Railroad Historical Society 2018). Requirements put in place by the federal government to ensure minimum standards strained railroad companies, which complained that they could not keep up with the financial demands required by such regulations. "Government policies in recent years have not made it any easier for the railroads. There has been insistence that the roads maintain certain wage scales and standards of service, whether they operated at a profit or not" read an article in the *Burlington Free Press (*1937:6).

After suffering difficulties in the first half of the century, the railroads experienced a marked increase in operations during World War II. American railroads moved 70 percent of all freight

transported in the United States in 1940. Between 1942 and 1944, railroad operations skyrocketed and America's railroads carried more than 90 percent of the military's freight and 98 percent of its personnel (Freight Rail Works [2012]:8). Overall, the railroad industry saw an increase in operation during the war years, but not all lines saw tremendous benefits. The Central Vermont Railway noted freight traffic losses in 1942 as a result of the war rationing, shortages, and other war priorities. The war was moving materials east and west, and the Central Vermont Railway's north and south lines offered no significant benefit to the war effort (Spear 1942:2). The Rutland Railroad, which boasted an increase of nearly 11 percent in freight revenues for the first six months of 1944 and an increase in operating revenue between 1940 and 1944 of nearly 50 percent, also experienced increases in operating expenses, which included restoration of standard wages, which in turn lowered the railroads' margins to almost nothing *(Burlington Free Press* 1944:9, 1945c:6). Clarendon and Pittsford Railroad saw little benefit from defense business but did report a slight increase in traffic of limestone products in 1941, and the St. Johnsbury & Lake Champlain Railroad saw an increase in deficit of about $10,000 between 1940 and 1941 (*Burlington Free Press* 1941a:2, 11).

Associated Resource Types

- Right-of-way
- Train track
- Bridges
- Tunnels
- Train depots
- Service industry buildings
- Switchyards
- Industrial sites and structures
- Water towers

Defense bases and structures

Postwar Decline (1947-1978)

Prior to World War II, decline in freight was traced to the relocation of industries to the southern and western regions of the United States. Boosted during the war when massive industrial mobilization was necessary, railroads in New England experienced a brief upturn. The conclusion of the war returned the railroads to their prewar decline. Relocation of industries continued, lowering the region's industrial output, and the growing dependence upon personal automobiles and travel via airplane, as well as the increase in automotive freight, resulted in serious declines in passenger and freight operations throughout the state (Parsons Brinckerhoff, Cambridge Systematics, and Fitzgerald & Halliday, Inc. [Parsons Brinckerhoff et al.], 2015:18). This problem was worsened by the

development of the Vermont interstate highway, which made motor transportation across Vermont faster and more efficient and more easily connected Vermont to outside markets via the large network of newly constructed roadways (Bathory-Kitsz 2013).

As the automobile continued its reign as the preeminent method of transportation in the state, rail lines and buses were faced with a dwindling number of passengers. A study of the passenger service of the Rutland Railway was completed in 1953, concluding that the service was no longer economically feasible (Vermont State Public Service Commission 1952-1954:12). And by the following biennial period, three railroad companies halted their passenger services, with only the Central Vermont Railway, the Boston & Maine, and Canadian Pacific continuing their passenger services, although these lines would continue to suffer low patronage on their passenger lines, and switched to seasonal runs or ended service along part of the line (Vermont State Public Service Commission 1954-1956:17, 1956-1958:8, 1958-1960:14). In 1966 the Central Vermont Railroad and Boston & Maine Railroad's passenger service between Montreal, Boston, New York, and Washington, D.C. was discontinued, ending Vermont's last intercity rail passenger service (Parsons Brinckerhoff et al. 2015:18). Trucking industries, which were often more economical than trains, had also developed greatly during the same period, putting pressure on the rail freight industry (Vermont State Public Service Commission 1956-1958:8).

These troubles plagued all of the railroads in Vermont. The financial standing of the New York, New Haven and Hartford Railroad was rocky by the 1960s, and the Boston & Maine and Central Vermont railroads were operating under heavy deficits. A strike in 1960 against the Rutland Railroad, resulting from operational cutbacks, and the Railroad Commission was concerned that the railroad could not survive the strike given its financial condition at the time. As the Rutland Railroad was the only railroad to serve some towns in western Vermont, concern was also expressed that towns such as Vergennes, Middlebury, Pittsford, and Brandon would be seriously affected (Vermont State Public Service Commission 1958-1960:15-16). A court decision in that same year favored the railroad, and employees returned to work. Management's refusal to increase pay led to another Rutland Railroad strike in 1961, and Rutland Railroad applied to the Interstate Commerce Commissions (ICC) for permission to abandon the line, which was granted in September 1962. The State of Vermont purchased the entire line in an effort to secure a buyer, which they found in Jay L. Wulfson, former president of the Middletown and New Jersey Railroad in New York, who signed a lease in 1963 to operate Vermont Railway on part of the line (Vermont Rail System [2014]). In 1964 the line between Rutland and Bellow Falls was purchased by F. Nelson Blount, a collector of steam locomotives, to begin both

passenger and freight operations as the Green Mountain Railroad. The Rutland Railroad's track over Lake Champlain remained abandoned at that time (Figure 21) (American-Rails.com 2018c, 2018d).

Decline of the railroad system as a whole continued through the 1960s. The 1970 fall of the Pennsylvania Central Railroad, which had been a merger of the Pennsylvania Railroad and New York Central Railroad that was completed in an effort to save the two railroads, was the largest bankruptcy of its time and shocked a railroad industry that thought the mighty railroad could never fail.

Pennsylvania Central Railroad's bankruptcy highlighted the larger problems plaguing the railroad industry (American-Rails.com 2018e). To curtail the decline of the railroad, the federal government passed the Rail Passenger Service Act of 1970, which established the National Railroad Passenger Corporation to operate intercity passenger rail services once operated by private railroads. In May of the following year, Amtrak service began across the United States, which removed the burden of unprofitable passenger services from private railroads (Amtrak [2010]). In 1973 and 1976, Congress passed two laws, the Regional Rail Reorganization Act and the Railroad Revitalization and Regulatory Reform Act, to further help declining rail services. The 1973 Regional Rail Reorganization Act sought to consolidate and revitalize the failing railroads of the Northeast by creating the Consolidated Rail Corporation (Conrail) to operate the designated failing rail services, including the remains of Pennsylvania Central Railroad, and the second law offered regulatory reform, procedures for carrying out mergers, and flexible railroad rates (Amtrak 2012; Bleich 2012:99, 107).

Not an instant success, the acts and the creation of Amtrak helped railroads work toward repairing both their physical lines and their management policies. The establishment of Conrail reduced multiple competitive connections to the national rail system, although success of this endeavor would not be evident until after the railroad industry was deregulated in 1980. Amtrak's passenger services removed the need for private lines to invest money in their failing passenger services, and now that money could be invested in repairing and maintaining their freight lines. Passenger service between Washington, D.C., and Montreal was restored in 1972 (Parsons Brinckerhoff et al. 2015:19). Although much of the old Rutland Railroad line was active once again, the section connecting Burlington with the islands of Lake Champlain remained closed until 1971. In that year Burlington volunteers worked to turn the defunct Rutland Railroad right-of-way between Shore Road and the Winooski River into a pedestrian dirt path (*Burlington Free Press* 1971b:8). Initially derided as a magnet for crime and lacking in resources, the trail would eventually develop into the Island Line Rail Trail (Gregg 1975b:19). Notable rail trails throughout Vermont include the Delaware & Hudson, Missisquoi Valley Rail Trail, Beebe Spur Rail Trail, and Lamoille Valley Rail Trail, all of which are overseen by VTrans,

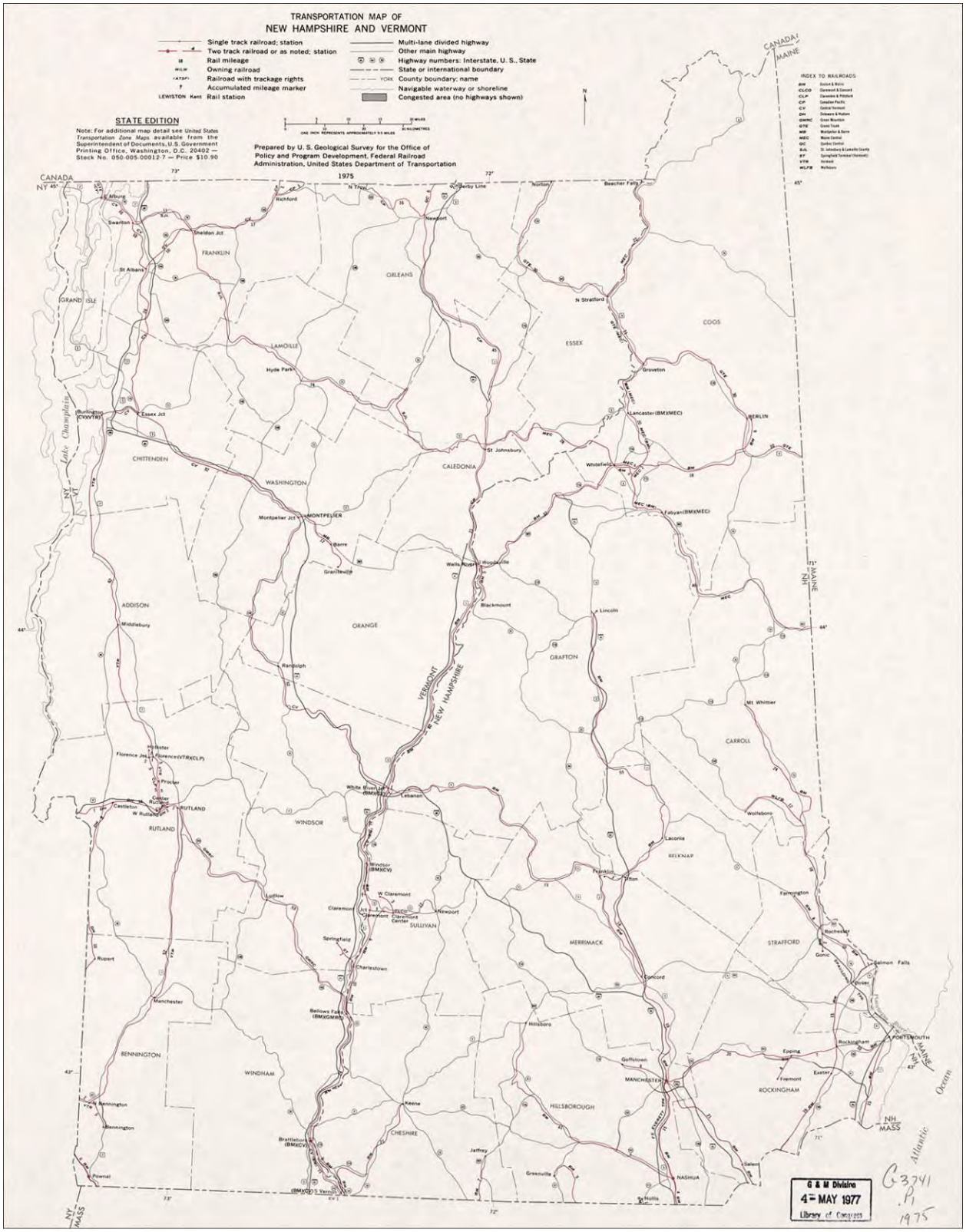

FIGURE 21: Transportation Map of Vermont and New Hampshire, 1975 (United States Geological Survey 1975)

which was designated the state's rail-planning agency in 1973 (Figure 22) (Parsons Brinckerhoff et al. 2015:5).

Associated Resource Types

- Right-of-way
- Train track
- Bridges
- Tunnels
- Train depots
- Switchyards
- Industrial sites and structures
- Service industry buildings
- Rail-to-trail pathways
- Trail barriers such as posts and chains

E. AIR TRANSPORTATION

The following section is a revised excerpt from the Transportation Theme in the 1989 Vermont Historic Preservation Plan.

The first flight in Vermont was made by Charles F. Willard of New York at the Caledonia County Fairgrounds in St. Johnsbury on September 24, 1910. Nine years later the first air field in the state was built by Governor-to-be James Hartness in Springfield. Hartness was also the first President of the Aero Club of Vermont, organized in 1916. The Vermont Airways Corporation was organized in 1928, probably the first commercial airline company in the state, with headquarters in the Newport/Derby vicinity. In 1929 the Legislature passed an act authorizing towns and villages to operate airports. During the Depression years the Works Progress Administration (WPA) built hangars and landing strips for local airports. By 1940 the state of Vermont had at least 20 municipal landing strips.

Early Air Travel (1910-1940)

As air carriers developed and airports grew during the decade of the 1930s, the growing acceptance by the public of flying as a reliable mode of transportation was encouraged and promoted by both private enterprise and the U.S. government. Federal regulations, such as the advent of Air Traffic Control as well as the Civil Aeronautics Act of 1938, improved the safety of air travel, standardizing air traffic control procedures across the country and eventually implementing the Civil Aeronautics Authority (CAA) in 1940 to enforce these regulations (Bilstein 1994:83-125). In Vermont the Flood of 1927 alerted many for the first time of the usefulness and necessity of air travel. The early years of aviation in the state of Vermont were primarily directed and funded through private enterprise, which would continue to be a key factor in the support of Vermont's regional airports through the mid-twentieth century (Pugh 1977a). Many local residents of Vermont owned private planes, and although small, the state boasted a number of flying enthusiasts as well as one of the

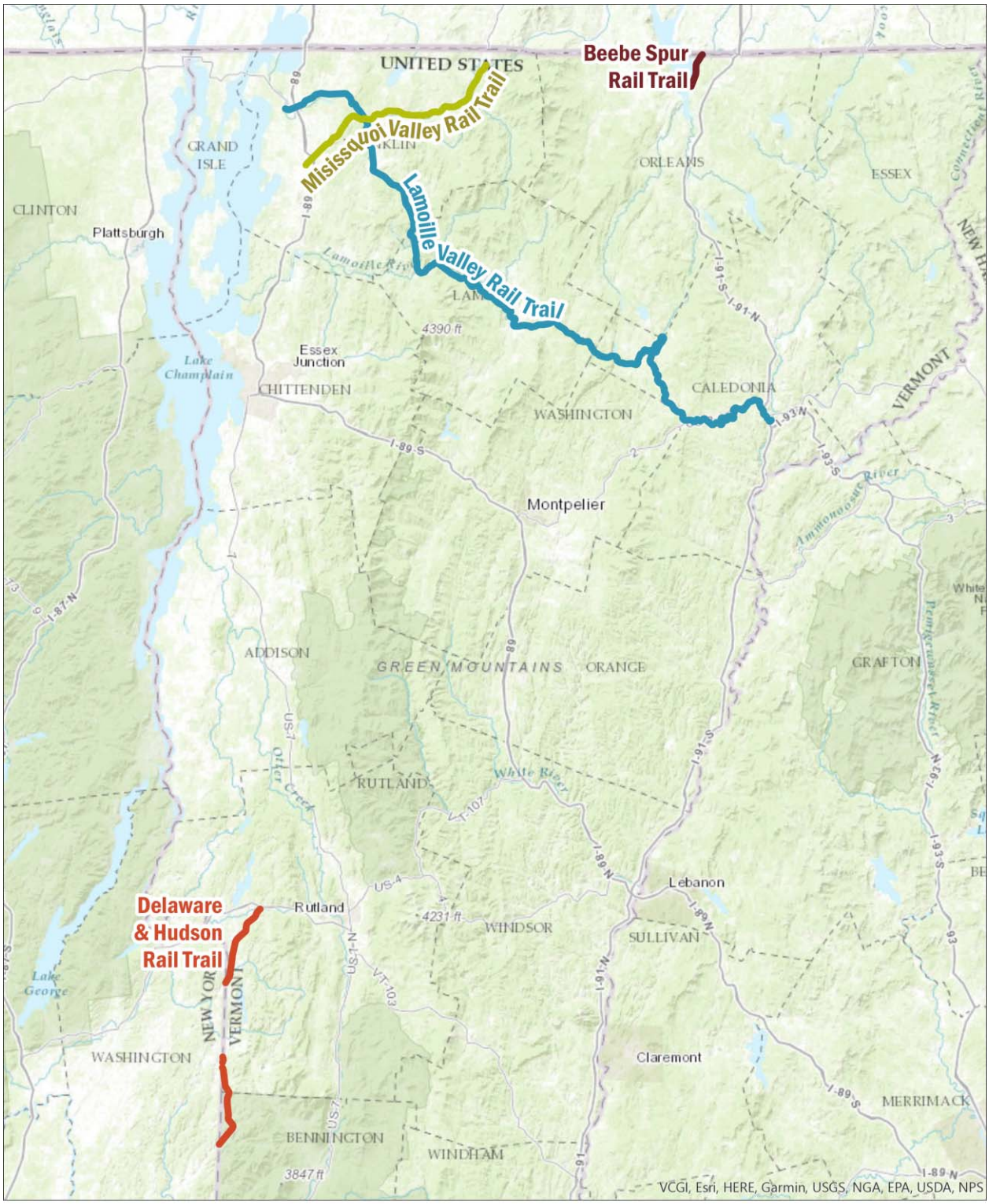

FIGURE 22: Vermont Agency of Transportation Rail Trails as of 2017 (Vermont Agency of Transportation 2017)

nation's earliest active aero clubs. The Vermont Aero Club organized in 1916 with 147 signers, electing James Hartness of Springfield as its first president. The organization was open to any interested citizen—not just pilots or passengers—and it promoted flying and the development of landing places for aircraft. Well-known flying clubs in the state included the Queen City Flying Club, the Waterbury Flying Club, and the Champlain Flying Club. Flying meets or shows were often sponsored to promote interest in aviation and encourage residents to learn to fly or become a regular air travel passenger (Pugh 1977a; Scharf 1991:3A).

The U.S. air mail service provided an early means of support to local airports and to the aviation industry, which since its establishment in 1918 had been taken over by private carriers in the 1930s. In Vermont the first air mail flight occurred during Flood of 1927, and in 1934 the state received its first air mail service with a stop in Burlington en route to Boston through Boston-Maine Central Vermont Airways (Pugh 1977a). During the 1930s, 15 Vermont communities were authorized for air mail landing sites (St. John and Carnahan 2016:1). The Burlington airport contracted with the *Burlington Free Press* in 1937 to carry newspapers to ensure that they would arrive on the train to Lake Placid every morning (Pugh 1977b).

In 1934 interested citizens and the Chamber of Commerce began an effort to build an air field at Bristol. The Town of Bristol used WPA funding to purchase 55 acres of land, and in 1936 the airport opened, with George Lathrop as the chairman of the Bristol Airport Commission and Joe and Cora Rock, instructors with Rock's Flying Service, serving as the airport's first operators. The airport hosted instructional programs (Civilian Pilot Training, or CPT) under the direction of the CAA for students, and the Rocks paid rent for the newly constructed hangar. In 1942 the CAA War Training Service designated the airport as a CPT program for Army and Navy students from Middlebury College. The program continued until 1944, and it was during this time that two new T-shaped hangars were constructed (Dearborn 2015).

The Barre-Montpelier Airport opened in 1929 and serviced the regions near Berlin, Barre, and Montpelier. In 1935 the airport was sold to the municipalities of Barre and Montpelier, who with the help of WPA funding constructed a new field for $95,000 in 1936. During World War II the airport hosted a CPT program for the training of future military airmen and the airport received improvements, bringing the facility conditions up to an acceptable standard for the purposes of national defense (Pugh 1977a). A year after the opening of the Barre-Montpelier airport, the Middlebury Airport was formed when local businessmen established a corporation and purchased an American Standard airplane. Eventually, that venture went bankrupt.

At the beginning of the 1940s, Vermont possessed a handful of airports and several landing strips—the largest of which was at Burlington—with a few major air carriers (Figure 23). In 1939 Colonial Airways began service from Burlington to New York and Montreal, and in 1940 Northeast Airlines operated 24 passenger DC-3 airplanes. Northeast Airlines had previously been known as Boston and Maine Central Vermont Airlines, providing commercial air service for passengers in the

FIGURE 23: Aerial View of Barre-Montpelier Airport, 1939 (Landscape Change Program 2011j)

New England area. Airplanes in Vermont also flew seasonally for local travel, for New England air tours, and quite often for military endeavors and training (Knapp 1946:26-29; Pugh 1977b).

Associated Resource Types

- Earthen runways
- Surfaced runways
- Garages
- Club buildings
- Passenger buildings
- Control tower
- Parking areas
- Hangars

World War II and Defense Activity (1940-1950)

One of the most important developments for the growth of Vermont's airports occurred in 1940 with the introduction of the CPT program at the University of Vermont. Congress appropriated $4 million for the program in 1939 under the direction of the CAA for the training of approximately 11,000 students in colleges and universities across the United States, with many students joining the military soon after graduating. At the Burlington airport students were given 45 to 50 hours of flight instruction as well as 72 hours of ground school instruction under the direction of the Fli-Rite School of Aviation, managed by the husband and wife team of Harold and Grace Pugh. At the completion of the program, pupils received a private pilot's license. The CPT program ensured that Vermont's small, fledgling airports would continue to function despite a low level of passengers for commercial travel (Knapp 1946:26-29; Pugh 1977b).

After the United States' entry into World War II following the attack on Pearl Harbor, most of the modifications and progress made to airports and air travel in the state of Vermont occurred through the U.S. military sector. In 1942 the Civil Air Patrol was organized by Wing Commander F.W. Shepardson and airline service was suspended between Boston and Montreal because of war activity. Air force cadets began training at the Fli-Rite School of Aviation in 1943, with 200 students attending per month flying 36 planes. In the same year the Burlington airport possessed the busiest airport in the country on a single day in February with 793 flights. By 1944 the Air Force Cadet program had been canceled and the Northeast pilot training program had also left the Burlington airport. Reflecting Vermont airports' sluggish activity levels as the war grew to a close, the Northeast Airlines hangar was sold to Matco, a manufacturing company (Pugh 1977b).

General improvements and safety measures were implemented during this time at the Burlington airport, such as contact lights on runways and the addition of safety strips, the construction of a new control tower, and the awarding of a contract for a new Northeast hangar, built at a cost of $101, 500 and dedicated in 1943 (Figures 24 and 25) (Pugh 1977b).

In 1945 the Vermont Legislature passed a bill establishing the Vermont Aeronautics Board, an agency responsible for enforcing regulations at airports for flying, the supervision of airline services, and the development of existing and new airports (Knapp 1946:26-29). Edward Knapp, the first appointed director of the board, served in the position for 25 years, until 1970. Knapp himself was an early flying enthusiast and a flying instructor during World War II for the CPT program through the University of Vermont. Under Knapp's tenure the Vermont Aeronautics Board helped to plan and

FIGURE 24: Burlington Airport Taxi Strip Before Grading, 1934 (Landscape Change Program 2011k)

FIGURE 25: Burlington Airport Taxi Strip After Grading, 1945 (Landscape Change Program 2011l)

recommend locations for new airports—which were strategically placed so that a majority of the state's population would be within 10 miles of an airport. Knapp's efforts and significance to aviation in Vermont were eventually memorialized when the Barre-Montpelier Airport was named in his honor (Pugh 1977a; Scharf 1991:3A).

Airport activity picked up again in 1946 with the recruitment of the Vermont Air National Guard, one of the first units of its kind in the nation. By 1947 the first of 25 P-47 Thunderbolts had arrived for the Army National Guard 134th Fighter Squadron at Burlington. Major early organizers of the unit were Maj. Gen. Murdock Campbell, Adj. Gen. Col. Albert Cate, and Lt. Col. William M. Bowden. In addition to its regular duties as a fighter squadron, the unit fulfilled a secondary mission as an air-sea rescue team for Lake Champlain. In 1949 the Air National Guard reorganized, and the Vermont unit became part of the 101st Fighter Wing in Maine (Air National Guard [2018]; Pugh 1977b).

At the state's busiest airport, in South Burlington, established in 1921, Northeast Airlines resumed service to Boston, New York, and Montreal in 1945, and in 1946 Colonial Airlines began service from New York to Ottawa with stops in Burlington. Furthermore, in 1946 a 30-minute plane service began between the Newport airport and Burlington. Hugh Finnegan became the City of Burlington's first full-time airport manager. A major event of 1947 was the destruction by fire of the former Northeast Airlines hangar at Burlington. In 1948 plans for a new administration building at the Burlington airport had begun with voters approving a bond referendum for $150,000. The original 1935 terminal had been influenced by the modernist architecture displayed in the "Century of Progress" exhibition at the 1933 Chicago World's Fair. The Burlington airport ranked third in the northern United States for air exports, and in 1948 the first international air parcel post—Vermont maple syrup—was shipped to Bermuda on Colonial Airlines. The first jet, an F-80, landed in Vermont at the Burlington airport in 1949. Two of Vermont's most well-known aviation promoters associated with the Burlington airport during the mid-twentieth century were Grace Hall Pugh (1908-1996) and her husband Harold Pugh. Grace Hall was the step-daughter of Arthur Ashley, the Burlington airport's manager, and became the first woman in the state of Vermont to earn a private pilot's license, in 1938. She married Harold Pugh in 1934 and, as noted above, the couple directed and instructed for the Fli-Rite School of Aviation at the airport in addition to Harold's position as manager of the airport. The Fli-Rite School held programs not only at the Burlington airport but also at Swanton, Plattsburgh, and New York (Pugh 1977b).

Associated Resource Types

- Earthen runways
- Surfaced runways
- Garages
- Club buildings
- Passenger buildings
- Control towers
- Radar towers
- Parking areas

Postwar Era (1951-1957)

By 1951 the two major carriers totaled 33,464 passengers for the year at Vermont's Burlington airport. The CAA moved into the new administration building in 1950, and the Air Force continued to lease most all airport facilities. In 1950 a new high-intensity lighting system was completed and construction began for a new parking lot and access road. Additional taxiways were built for use by the Air Force. Mr. Robert Fulton landed an amphibian plane at the Burlington airport in 1951 (Pugh 1977b).

Military training and maneuvers continued in Vermont and consisted of a sizable percentage of its flight activity—including "Operation Snowfall," in which 10,000 paratroopers made jumps at an Air Force show in 1952 with 25,000 people in attendance. "Operation Cold Spot" and "Operation Hospitality" in 1953 were a few other noted exercises. In 1955 the Burlington Airport witnessed the groundbreaking for the $1.5 million Vermont Air National Guard construction program—beginning with a new $800,000 hangar. Vermont's Air National Guard unit served a mission as an integral part of the Eastern Air Defense structure. It largely operated at the Burlington airport with a support base at Fort Ethan Allen (Air National Guard [2018]; Pugh 1977b).

In the 1950s four new hangars were built along with new taxi strips, runway improvements, and new facilities for the Air Force. Colonial Airlines began night-coach services. The state's primary airports providing service were Burlington, Barre-Montpelier, and Rutland, with the Newport Airport also conducting a fair amount of traffic. Ten smaller air fields provided access to personal air travel and light commercial planes at other points throughout the state of Vermont, mostly consisting of sod fields, in Bennington, Manchester, Fair Haven, Middlebury, Springfield, White River, Bristol, Swanton, St. Johnsbury, and Post Mills. These fields had strips ranging from 1,200 to 3,000 feet (Knapp 1946:26-29; Pugh 1977b).

Plattsburg Field, a government-funded airport project, was later renamed the Clinton County Airport. Although located in New York, the airport was used by Vermonters because it is close to the

border of Vermont, on the western side of Lake Champlain. The airport held the V5 Navy CPT program through the Fli-Rite School of Aviation in conjunction with the Plattsburg State Normal School during the 1940s (Pugh 1977a).

In the 1950s flights began to decline at the Bristol airport despite the continuation of pilot training, and the administration building became a youth center for the city. Joe Rock was tragically killed in a plane crash in 1960, and in 1966, unable to justify the expense of the airport with the low level of flight activity, the Town of Bristol sold the airport and land to the school district for the future site of a new high school (Dearborn 2015).

The Rutland Airport grew during the mid-twentieth century with the rise in popularity of the ski and mountain resorts in southern Vermont during the winter season. A town with a long history of aviation, Rutland had been the first town in Vermont to form an aero club, beginning with balloon ascensions in 1909. The Rutland Airport continued to harbor a fair amount of private and general aviation flight activity throughout the mid-twentieth century.

Another smaller airport was the Missisquoi Airport, which became the Warren Austin Airport in Swanton in 1946. Established by a group of local businessmen and flying enthusiasts in 1928, the airport was one of six national border airports designated as a port of entry. In 1940 it was chosen for a non-college CPT program. Initially owned by Chester Way, the State of Vermont purchased the airport in 1969 (Pugh 1977a).

The Barre-Montpelier Airport serviced several small and regional carriers, and in 1968 the State of Vermont offered to take over the airport, to which the municipalities agreed. An official ceremony was held in 1970 recognizing state ownership of the facility, during which it was renamed the Edward F. Knapp State Airport after the former Vermont Aeronautics Board director. The airport continues to be used for general aviation, but most commercial airline service ended during the 1980s (Pugh 1977a; Turner 2011:1-5, 33-53, 81-92).

Other smaller airports supporting private and general aviation included the William-Morse Airport in Bennington, the Caledonia County Airport in Lyndonville, the Springfield Airport (Vermont's first airport established by James Hartness in the 1920s), and the Newport Airport. Associated with the Caledonia County Airport in Lyndonville, Anne Mercer served as a vice president of the Vermont Pilot's Association and was the only female pilot to fly out of the Caledonia County State Airport during the latter part of the twentieth century (Newpher 1993:3; Pugh 1977a).

Tourism fueled air travel during the 1950s in Vermont, which soared during the winter ski season. Vermont became nationally known as a resort destination, and airline ticket sales across the

nation during the decade skyrocketed as flying became more affordable, accessible, and mainstream (Bilstein 1994: 227-245, Knapp 1946:26-29, Vermont Air Policy Plan 1998:138-141).

Associated Resource Types

- Earthen runways
- Surfaced runways
- Garages
- Club buildings
- Passenger buildings
- Control towers
- Radar towers
- Parking areas

The Jet Age in Vermont (1958-1978)

The rise of the jet age in air travel defined the 1960s and 1970s—known as the "golden age" of flying. The leading passenger jet airliners were American, United, Eastern, and TWA, with Pan American Airways the major international airline and the largest of all. In 1969 Boeing premiered the world's first ever 747 "jumbo jet." Air travel was safer than ever before after the passage of the Federal Aviation Act of 1958, which created by the Federal Aviation Agency (later the Federal Aviation Administration [FAA]) to provide great regulatory control and oversight to the airline industry and to improve the security of American airspace (Bilstein 1994:257-265, 285-290).

Commercial airline travel in Vermont, however, remained modest and limited with a relatively small number of passengers passing through airports in comparison with other states across the country with large airport hubs. General aviation, on the other hand, persisted steadily enough in the state to continue operation of many of Vermont's smaller, regional airports and in many cases surpassed commercial aviation in the number of flights and passengers utilizing the services. Private and general aviation aircraft were used for business endeavors, for agricultural applications, for air mail service, and many other functions that aided in boosting Vermont's economy. Airport and general aviation advocates even argued that they played an instrumental role in keeping large industries and companies operating within the state when company executives often lived outside Vermont (Figure 26) (*Burlington Free Press* 1978d:3; Heaney 1962:19; Wells 1965)

With more travelers flying than ever before, large commercial jet engines' increased need for fuel, and the oil and gas crisis of the 1970s and its associated high fuel costs, the airline industry faced challenges. Airliners were forced to find a way to maintain affordable flying costs and luxurious flying experiences while still being able to purchase enough fuel to power the jet engines in the wake of the

FIGURE 26: Locations of Public-Use Airports in Vermont, 2007 (Wilbur Smith Associates, Inc. 2007)

energy crisis (Bilstein 1994:257-265, 285-290; Moll 2008) This brought changes at the local and regional level for many of Vermont's airports, some of which were threatened with the removal or loss of facilities if they failed to generate enough business, enforced by the Civil Aeronautics Board's "Use it or lose it" program (*Burlington Free Press* 1962:1; Maxwell 1974:1-15).

The 1970s marked the beginning of the State of Vermont's acquisition of airports that had previously been operated by cities and towns. Vermont's busiest airport remained at Burlington with a few major airline carriers; however, much of the state's private aviation industry was serviced at smaller regional airports, in part a result of dissatisfaction with Northern Airways, the Burlington airport's private aviation franchise during the 1960s. Moreover, the "grassroots aviation" movement of the 1970s in Vermont encouraged businessmen to fly their own private planes for faster travel rather than drive by car or commercial airliners. This movement strongly supported the smaller regional and general aviation airports throughout the state. In 1973 the State of Vermont published a Vermont Airport System Plan calling for $4 million to be spent from 1974 to 1978 to improve 23 airports throughout Vermont, with future funding planned for both Class I, "air carrier" airports and Class II "economic development" airports. As a result of the budget shortfalls and freezes of the mid-1970s in Vermont, many of the proposed improvements were never realized (Spence 1979:10). The issues were further compounded with the 1975 lapsing of the Federal Airport and Airway Development Act of 1970, freezing the federal dollar matching programs needed to implement the measures laid out in the Airport System Plan.

With flying related closely to big business and economic growth, the Vermont Aeronautics Board aimed to lure new industries to the state by making provisions for airports to be accessible and convenient to future factory sites (Spence 1979:10). Greater regulation and standardization in safety protocols, led by the FAA, were a few of the defining themes that permeated Vermont's mid- to late twentieth-century aviation industry (*Burlington Free Press* 1978d:3; Heaney 1962:19; Herman 1976:15; Spence 1979:10). Additionally, aviation education began to become more institutionalized, with Norwich University establishing an Aviation Administration Department for students interested in careers in the burgeoning aviation industry (*Burlington Free Press* 1954:3; Bilstein 1994:285-290).

Associated Resource Types

- Earthen runways
- Surfaced runways
- Garages
- Club buildings
- Passenger buildings
- Control towers
- Radar towers
- Hotels
- Service industry buildings
- Hangars

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