

The History of Transportation at Colgate University:  
An Analysis of the Environmental, Economic, and Social Impacts

By Marisa Chiodo, Kathryn Deaton, and Jonathan Morales

Colgate University

## Executive Summary

This report looks at how students, faculty, administrators, and staff from Colgate University have traveled to and from campus and around campus over the last two hundred years. With this data, we consider how transportation practices have been sustainable considering the environmental, social, and economic pillars. We operationalized sustainability by looking at fuel emissions and landscape changes for the environmental pillar, money expenditures, feasibility, and affordability for the economic pillar, and accessibility, time efficiency, and passenger health for the social pillar.

We focused on four modes of transportation from the early 1800s to the late 1900s. These include stage lines on country roads and turnpikes, packet boats on the Chenango Canal, railroads, and automobiles. Stage lines on country roads and turnpikes were the primary mode of transportation in the early 1800s when traveling around Hamilton, but the region first really began to change with the introduction of the Chenango Canal. While the Chenango Canal was ultimately a financial failure for New York State, it moved the Chenango Valley away from subsistence agriculture to a commercial economy. The Canal influenced Colgate by bringing students in from farther states, and had a small impact in increasing the student population. The Chenango Canal was abandoned because railroads provided a much more attractive alternative as a faster, more economically feasible transportation mode. In the mid-19th century, the first railroad was built through Hamilton, to be followed by two more in the upcoming years. In addition to revolutionizing the town and the school's shipping abilities, more students had access to the school, while the school had more access to the world. Not only did the popularity of trains pick up steam rather quickly, but train cars began to be specialized for luxuries and trains kept breaking speed records. Trains were prominent for about a century until the more private and affordable automobiles entered the picture in the 1920s. Automobiles offered a seat of luxury and independence that was new to transportation. Fitting perfectly into the "American Dream," cars allowed individuals to travel wherever they desired, at the time that was most convenient for them. The extensive roadways put in place helped bring an even greater number of students to Colgate's campus, particularly as roads expanded and improved through the decades to become more interconnected and safer. Automobiles not only revolutionized how people traveled to and from Colgate, but also how people traveled around campus, as students entered an era when driving up the hill was valued over walking.

The transportation data we found about Colgate and Hamilton showed how each transportation pushed out the last transportation mode based on economic and social factors. The history of the economic and social pillars dominating decision-making around transportation is why we recommend balancing the pillars of sustainability when making future transportation decisions at Colgate. The environmental pillar should become a priority in balancing these pillars because of how it has been historically neglected, and because of increasing concerns of how modern transportation contributes to climate change. Our last recommendation is to prioritize the environmental pillar by better incentivizing communal transportation around Colgate's campus and in how students come to Colgate.

## Table of Contents

EXECUTIVE SUMMARY.....	<i>i</i>
I. INTRODUCTION.....	1
II. LITERATURE REVIEW.....	1-5
A. Stage Line and Canal Literature Review.....	1
B. Railroad Literature Review.....	3
C. Automobile Literature Review.....	4
III. METHODS.....	6-9
IV. RESULTS.....	9-17
A. Stage Lines and Turnpikes.....	9
B. Chenango Canal.....	10
C. Railroads.....	12
D. Automobiles.....	14
V. ANALYSIS.....	17-23
A. Environmental Criteria: Fuel Consumption and Landscape Changes.....	17
B. Economic Criteria: Money Expenditures, Feasibility, and Affordability.....	19
C. Social Criteria: Money Expenditures, Feasibility, & Affordability.....	21
VI. CONCLUSION.....	23
VII. RECOMMENDATIONS.....	24

## **I. Introduction**

This report examines how students, faculty, administrators, and staff from Colgate University have traveled to, from and around campus since the establishment of the university in 1819. We researched this to assess how different modes of transportation were sustainable, considering the environmental, economic, and social aspects of sustainability. We approached our research question by looking at the fuel consumption, landscape changes, money expenditures, feasibility, affordability, accessibility, time efficiency, and health impacts for each transportation mode and comparing them to each other. These different criteria give a narrowed focus of sustainability to understand the impacts and changes of transportation. This report is being written for the Colgate Bicentennial; we hope that by giving the history of Colgate's transportation in terms of sustainability, our university will be able to be more sustainably conscious in transportation decision-making in the future. Our report relies on archival data from the Colgate University Archives, with outside academic information on broader U.S. transportation themes to supplement the archival materials.

In this report, we will first go through our literature review to explain the broader transportation trends in the U.S. and New York to give the context for the archival data we found about transportation in Hamilton and at Colgate. The literature review will be broken down into sections by different transportation modes. In our methods sections, we will discuss how we operationalized the three pillars of sustainability and why we chose our criteria to best answer our research question. We then report the results of our research, primarily the archival data found about transportation in New York, Hamilton, and Colgate. This is followed by an analysis of how our findings reflect environmental, economic, and social sustainability in transportation to, from, and around campus. Lastly, using the research gathered, we provide our recommendations as to how Colgate can move forward to make their transportation decisions more sustainable.

## **II. Literature Review**

Our research covers four modes of transportation, including horse and buggy, canal, railroads, and automobiles. We primarily relied on archival material from the Colgate University Archives, and then used outside academic information to supplement this. Our literature review will be divided by transportation mode, with details of archival and academic material themes in each section.

### **II. A. *Stage Line and Canal Literature Review***

As transportation trends changed, so did the infrastructure that supported them. In the 1800's roads were minimal, meant to serve only the local people and used for horse and buggy travel. These dirt stagecoach routes were bumpy, dirty, and very difficult to travel, fatiguing the horses and leaving passengers uncomfortable on their long journey (Raitz, 1998, p. 365-375). Travel was incredibly time-consuming, and people often measured their travel in hours endured in time spent on the road instead of distance covered. These stagecoach routes and country roads were not environmentally intrusive, and the stones and tree stumps were removed only for what was absolutely necessary to allow transportation passage (Taylor, 2015, p. 16). The country roads were maintained by local people, primarily to lead to "the nearby village...to the mill, the cotton gin, or the country store," and the roads would only be maintained for transportation to these points (Taylor, 2015, p. 15).

Following the reliance on country roads, the years from about 1800 to 1830 have been described as the “turnpike era,” (Taylor, 2015, p. 16). Turnpikes and country roads coexisted for a long time, and the reason that country did not upgrade into the faster and better paved turnpikes was because creating turnpikes required more labor and capital than rural communities could afford (Taylor, 2015, p. 16). Turnpikes were primarily designed for travel between larger towns or to westward states across the mountains (Taylor, 2015, p. 16). Turnpikes became a more luxurious and faster method of traveling, over smoother roads in shorter, more direct distances. Investments in turnpikes went up after the War of 1812, where there was unanimous enthusiasm for improved transportation routes after the difficulties that had been experienced in the war of moving troops on the Canadian frontier and southern boundary (Taylor, 2015, p. 18). While turnpikes were popular in their thirty short year boom, “the failure of turnpikes to provide the means of cheap transportation over considerable distances sealed their doom,” leaving the way for canals to take over as the dominant form of U.S. transportation (Taylor, 2015, p. 27).

The motivation for improving transportation after the War of 1812 was directed to canals as much as it was directed towards turnpikes (Taylor, 2015, p. 32). The Erie Canal in New York is what really began the boom of canal development throughout, as its unexpected and immense success inspired hundreds of other canal projects (Taylor, 2015, p. 34). At the peak of canal development in New York during the early nineteenth century, there were more than 16 canals stretching nearly 750 miles into nearly every area of the state (Beyer, 1954, p. 1). The primary success of the Erie Canal and its lateral canals in New York state was in the freight that it carried, its passenger travel was significant and its packet travel was more extensive than any other canal in the era (Shaw, 2014, p. 48). Packet boats carried immigrants throughout New York, and although canals did not replace the stage, “its waybills reveal local usage as well as packets offered an attractive alternative to poor roads...and the canal was a comparatively cheap mode of transportation” (Shaw, 2014, p. 48). The importance of packet boats in the canal period illustrates its social importance as a faster, more convenient mode of transportation during its time. Canals were dug out by hired laborers and, “contracts were let locally, usually for a mile or more to contractors who hired their own labor and were in effect excavating a tiny canal,” (Shaw, 2014, p. 38). Without the use of fuel to power such labor, there were little environmental impacts besides the degradation caused by clearing land digging out the ground for the canals.

So many canals were created across the U.S. in the canal era between 1816 and 1840 primarily because of the great wealth canals initially brought in, inspired by the economic success of the Erie Canal. Tolls also played an important role of the success of the Erie Canal in bringing wealth to New York state, as “the tolls of \$687,976 collected in 1826 were doubled to \$1,375,673 collected in 1835. In 1847, the high point of toll receipts before the Civil War was attained with collections of \$3,333,347” (Shaw, 2014, p. 49). The Erie Canal reached its peak in 1872, surviving past the rise of railroads in the way its lateral canals could not (Shaw, 2014, p. 49). While the Champlain and Oswego lateral canals were profitable for the Erie Canal and New York State, the Chenango, Genesee Valley, and Black River canals “yielded only fractions of their total cost” (Shaw, 2014, p. 49). The end of the canal era was roughly around 1840, but by this point the U.S. had created over 3,326 miles of canals across the country, a distance greater than that across the continent from New York to Seattle (Taylor, 2015, p. 52). As transportation moved from buggies into more canal and train based modes in the 1800s, the presence of roads was beginning to increase, with 1.5 million miles of roads built between 1850-1900 to connect canals, ports, and rail depots (Raitz, 1998, p. 367-372).

## II. B. *Railroad Literature Review*

America was around two centuries behind Britain when it began to adopt steam-powered locomotives (Vance, 1995, p. 13). America's economic situation in the early nineteenth century, in unison with an eagerness for innovation, was able to take advantage of Britain's technological understanding of railroads and trains to revolutionize transportation in the country (Vance, 1995, p. 13). Similar to when Europe began investing in railways, America's economy was only being hindered by a lack of innovation in transportation (Vance, 1995, p. 13). There were many benefits to investing in railways, an important one being that railways have access to areas that rivers and canals do not. With the incentive to pursue innovation to improve the country infrastructurally, Stevens and many others shaped the independent, American tradition of constructing railroads (Vance, 1995, p. 16).

It was not until 1825 that the first locomotive was built in America by John Stevens (Veenendaal, 2003, p. xv). The Erie Canal also opened in this year, allowing for more branching out of the available transportation options in upstate New York. The first railway public carrier in New York, the Mohawk and Hudson Railroad, was opened in 1831 (Larkin, 1995, p. 39). A few months after the construction began, the value of the railroad company's shares were valued at \$110, and by July 1831, the stock peaked at \$196.75 (Larkin, 1995, p. 22). In fact, the crowd awaiting the opening of this railroad was immense and everyone could not be seated in the limited amount of available cars (Larkin, 1995, p. 39). At this time, new routes could cost up to \$220 thousand (around 10 thousand per mile), and trains could not go too much over ten miles per hour (Larkin, 1995, p. 52). From here, locomotives would improve in design, to be faster and pull greater weight. With growing ridership, the first sleeping car was built a few years later in 1837 (Veenendaal, 2003, p. xv). Railways continued opening throughout New York, specifically because of the state's population and economic capability (Veenendaal, 2003, p. xvi). The first refrigerator car was patented in 1867, revolutionizing the ability for transporting perishable goods (Veenendaal, 2003, p. xvi). Railroads were a huge success, being very economically profitable as well and time efficient for passengers who wanted to travel across the state or even country.

Unlike in Britain, when American railroads began to expand its network, the main focus was not the coal industry. However, coal did become the largest economic incentive for railroad construction in New York state a few decades later (Vance, 1995, p. 120). The economic incentive was large enough for railroads to expand in certain areas that were more rural and secluded. As Vance mentions about these specific railways, "so long as coal flowed, such a peculiar line could survive" (Vance, 1995, p. 119). Beginning in 1868, The New York & Oswego Midland Railroad was a major component in providing railway access to upstate New York. Hamilton, New York was one of the "important Ontario cities," and this railway company provided rural areas a better opportunity for purchasing Pennsylvania's "black diamonds," referring to coal (Vance, 1995, p. 119). One of the largest issues when constructing the New York & Oswego Midland Railroad was the Shawangunk Mountain, which led to the creation of the 3,855-foot tunnel that goes right through the mountain in 1871 (Muller, n.d.). It was very unsafe, requiring inspections almost every day during most of its usage because of frequent rockfalls (Muller, n.d.).

Railways in upstate New York prospered with coal, milk, and a large ridership base of tourists in the summers (Vance, 1995, p. 120). As previously mentioned, Britain had undergone their railroad revolution, providing Americans the ability to embrace railway infrastructure more economically. America was more efficient with their spending and building (Vance, 1995, p. 35).

People also realized that engines could be produced in America that were better than the imported engines, allowing for the railway industry to grow even more by providing more jobs (Vance, 1995, p. 16). The New York Central Railroad was also one of the more prominent railroad companies in New York, and according to James Vance, it was one of the “two giants among American railroads” (Vance, 1995, p. 129). The New York Central’s first route eventually helped to establish a firm subcontinental line (Vance, 1995, p. 129). By 1890, the Ontario & Western Railway, after having bought the New York & Oswego Midland Railroad, had already carried over half a million tons of coal (Vance, 1995, p. 119). Railroads themselves were one of the largest coal consumers at the time (Kudish, 1996, p. 59).

Eventually, the automobile industry came into the picture and its popularity grew so that it began to seriously compete with railroads. This trend began in the early 1900s, and it became evident in the 1920s that railways were losing passengers to automobiles (Vance, 1995, p. 120). There was actually extensive competition from trucks and buses, and many railways resorted to merging to remain alive (Vance, 1995, p. 121). The American economy during the 1930s was not doing very well, and this definitely correlated to the coal industry’s decline (Vance, 1995, p. 121). While many railroad companies were losing profits, companies such as the Ontario & Western Railway were able to remain afloat from the company’s revenue from coal (Vance, 1995, p. 120). In 1931, the company’s revenue from coal was \$5.8 million, but the revenue from passengers descended from \$2.5 million to only half a million. The company stopped transporting people in 1932 and ultimately closed on March 29, 1957, when the revenue from coal no longer sufficed (Vance, 1995, p. 120). Coal stopped being profitable for railroad companies after 1945, and stations began closing and railroads were scrapped. The scrap was sold for around \$10 million at the time (Vance, 1995, p. 120). The railroad companies with more investment and assets in the coal industry were ultimately the last ones to die out (Vance, 1995, p. 122). By this time, automobiles were a hot commodity and is responsible to the massive losses in ridership that railroad companies dealt with.

### **II. C. *Automobiles***

The first automobiles were introduced in America in 1899 through importation from Europe and quickly became a symbol of the owner’s success. Sold at \$7,500 each, they were only economically feasible for the wealthy elites. These models were viewed as a luxury; a toy for the rich that provided a diversion from their everyday lives. In 1908, Henry Ford released the first American-made car, the Model-T, at the astonishingly reduced rate of \$850 (Raitz, 1998, p. 372-373). With the revolution of the assembly line in 1914, these cars were able to be mass produced at high rates, with over one billion cars manufactured in the twentieth century (Urry, 2016, p. 25). This highly efficient production allowed the price of each automobile to drop to about \$510 (Raitz, 1998, p. 372-373). This was well within the range of affordability of middle-class Americans in the 1920’s and automobile ownership skyrocketed. Through the decade, automobile travel increased six-fold, overtaking the railroad industry (Lawyer, 2007, Automobile Replaces Trains section, para. 2). The systematic domination of the automobile culture subordinated all other previous modes of transportation, including buggies, boats, and trains. The incorporation of the automobile into American lifestyles brought significant changes to the nation, setting new social standards for commuting, family life, and community, as the car became an integral piece of the American Dream. Automobiles ushered in an era of freedom, independence, and flexibility (Urry, 2016, p. 26-28), allowing personal, private and individually owned modes of transportation (Raitz, 1998, p. 375).

These first automobiles had engines that were powered by fuel. This petroleum-fueled car system was an almost accidental design. Steam and electric battery were known to be more efficient ways to power automobiles, but a competition to build a horseless carriage in 1896 was won by a petroleum-fueled car. This set the pathway for future automobile manufacturing, which locked onto and continued to use the fuel design, even though this system was originally only intended for small-scale use (Urry, 2016, p. 32). Even so, the first automobiles were five times more fuel efficient than trains, requiring less fuel to power their movement (Lawyer, 2007, Fuel Efficiency Save Energy section, para. 4). However, the spread of cars became viral and most American families owned at least one automobile from the 1920's onward (Urry, 2016, p. 27). This drastic increase in travel, in the number of people traveling, the frequency of travel, and the distance traveled, cancelled out any positive effects of the increased fuel efficiency. Automobile transportation actually increased fuel consumption forty times what it had been when trains dominated transportation (Lawyer, 2007, Fuel Efficiency Save Energy section, para. 4).

However, individually, the first cars introduced in the early 1900s had relatively good gas mileage, likely due to their small frames and tiny engines. These first models are recorded to have gotten about 25 miles per gallon of gas. This low power input meant that the first automobiles reached top speeds only comparable to the speeds reached on bicycle. As models improved and speeds increased, automobiles became larger and more powerful, causing a decrease in gas mileage. After the 1920s, automobiles typically got only 13-15 miles per gallon of gas, until fuel economy regulation standards were enacted in the 1970s by the federal government. After these regulations were put in place, gas mileage increased to 21 miles per gallon of gas over the next quarter century (Lawyer, 2007, Rise of Energy Efficiency section, para. 2).

With the popularization, prevalence, and overall domination of automobiles, the history of dirt and gravel roads began to change in the twentieth century. The first American concrete road was poured in Ohio in 1891 (Raitz, 1998, p. 367), marking the beginning of a new era of transportation infrastructure. As cars became increasingly pervasive and the public desired extended routes into other areas of the country and demanded improved road conditions, more roads were built. In the early 1900s this was known as the Good Roads movement, and by 1914 over 250,000 new roads had been constructed, with many more being planned (Raitz, 1998, p. 373). Initially, the cost of construction fell into the states. But the public pushed for improved, paved roads, and in 1916 the Federal Aid Road Act was enacted, which provided money for the pavement of roads. Engineers, contractors, and planners were employed to design and construct the roads as more care was directed towards the planning and layout of transportation routes (Raitz, 1998, p. 368-374).

Even as roads extended further into rural areas, people continued to value the environmental aesthetics of the landscape. Some areas created regulations on road construction, mandating that a row of trees must be left intact on the sides of newly constructed roads (Raitz, 1998, p. 370). There are historical reports of wildlife retreating further into the woods and deeper environment as the extend of roads expanded into natural areas, displacing the wildlife from their natural habitat. These new roads of the twentieth century created distinct divisions in the landscape (Raitz, 1998, p. 370-372), a side effect of the automobile revolution and human expansion.



### III. Methods

This research project analyzes the history of Colgate's transportation systems through the lens of sustainability. The research conducted was aimed at answering the question: When it comes to traveling to, from, and around Colgate, how have different forms of transportation been sustainable considering the economic, environmental, and social pillars of sustainability? Sustainability became a national focus after the Brundtland Commission in 1987, where the concept of sustainable development was proposed. This called for development that meets the needs of the present populations without compromising the ability of future generations to also secure and meet their own needs (Kates, Parris, & Leiserowitz, 2005, p. 10). In 2002, the World Summit on Sustainable Development helped to clarify and refine this definition, by adding the Three Pillars of Sustainability (Kates et al., 2005, p. 12). This divided the idea of sustainability into social, economic, and environmental pillars, in order to encompass the main aspects that are impacted by development.

However, this expansion of the sustainability framework lacked universal agreement on how to quantify each pillar (Kates et al., 2005, p. 12). The criteria used to define these pillars are very broad and flexible, with the ability to cover nearly unlimited social, economic, and environmental aspects. Therefore, these three pillars must be operationalized according to our specific topic. This allows us to organize the data in a way that is effective to conduct and convey our research findings. It also provides a structured framework in which we can analyze the data to determine if and how sustainability was incorporated in the history of Colgate's transportation systems and decisions. We have relied on the emergent theory framework to determine our criteria for each pillar of sustainability (Clegg & Bailey, 2008, p. 426). The emergent theory is a framework in which "theory is allowed to come to light through a systematic data collection" (Clegg & Bailey, 2008, p. 426). For our project, we searched through transportation data in the Colgate University Archives, and based on what we found, we determined our different sets of criteria. This criteria will be detailed in the following paragraphs, by the environmental, economic, and social pillars.

The environmental pillar is operationalized using two criteria, including fuel consumption, and infrastructure impacts to the environment. Fuel consumption was an important criteria to focus on because of the great evidence we saw in the academic literature for our literature review about how transportation fuel consumption affects climate change. In 2015, 27% of all greenhouse gas (GHG) emissions in the U.S. were due to transportation (EPA, 2015). While we were not able to measure the specific GHG emissions, we compared fuels used between different transportation mode. This is because we found great evidence in the archives of how stage lines and canals used no fuel but animal and human labor, and how railroads and automobiles depended on fuels like coal and oil. Comparing different fuels over different transportation modes will give us a unique look at how transportation's environmental impact has worsened as it has innovated over the last two hundred years. We chose our second criteria, infrastructure impacts, because of the large landscape changes that had to be made to make way for different forms of transportation. We found a great amount of data in the archives showing how infrastructure changes for transportation would impact the environment, such as how land had to be dug up for canals, mountains blown apart for railroad tracks, and large swaths of highway had to be cleared for automobiles. Transportation has disrupted different environments both in the actual routes that were carved out for transportation, and then how in how development sprung up around these routes. As canals, railroad tracks, and highways were further developed across the U.S., they brought greater populations and development around

their routes that would disrupt environmental habitats and spaces. We use this criteria to understand the environmental costs of how transportation routes were built, such as particularly damaging practices like blowing holes into mountains for railroad routes, and their actual impact on the environment once the routes were in place. We thought these criteria were the most important for transportation because it examines how vehicles moved in terms of their motive power and the routes they needed to create to travel across land or water. Our criteria also best addresses the two most environmentally impactful factors within the transportation sector. We decided that while other factors may play an important role in determining transportation's environmental impact, such as the energy that is used to build vehicles, looking at fuel and infrastructure better addresses our research question of the transportation of people because people's primary experience with transportation is in how they individually use vehicles on transportation routes.

The economic aspect of sustainability focuses on how economic incentives drive decision making. We are operationalizing the economic pillar with two criteria, including money expenditures, and feasibility and affordability. Money expenditures addresses the economic costs of transportation, whether it is building transportation routes or the costs for an individual buying a vehicle. We found a lot of evidence in the archives detailing proposals for new transportation routes, like canals and railroad tracks, that would describe the economic costs of creating routes versus the economic benefits of what such transportation development would bring. Analyzing the broader costs for large transportation routes is useful for comparing the different modes of transportation, and why different transportation modes succeeded where others failed based on their economic success or failure. Since so much of our data showed how one transportation failed because of the economic success of a new transportation, we want this criteria to illustrate why certain transportation modes were more profitable than others. This criteria also allows us to look at costs to larger institutions like the state of New York or the town of Hamilton, to better compare to our more narrow criteria of feasibility and affordability that affects individuals. Our other criteria is feasibility and affordability, which is addressing the economic relationship between individuals and their chosen transportation modes. We chose this criteria because of evidence we found in the archives that detailed how individuals would often choose modes of transportation because they were more inexpensive. This criteria focuses more on the micro scale of people's economic relationship to transportation, whereas our first criteria centers on the macro scale. These two criteria will give us a broader economic picture of how transportation developed.

The social pillar of sustainability is being operationalized in three main criteria: accessibility, time efficiency, and health. These three social aspects recur throughout the Colgate archives and are intended to be expressive of people's values and well-being (Theis and Tomkin, 2012, p. 6). Accessibility in the social pillar refers to the ease at which a person can use a mode of transportation, which was commonly referred to in archived articles and letters, signifying its value to the public. One measurement we are using to determine accessibility is the presence of the infrastructure needed for transportation, whether that is stage routes for buggies, canal ways and docks for boats, railways and stations for trains, or roads for cars. Without these infrastructures, transportation would not be possible to that area, therefore playing an important role in the social value of the mode. Another determinant of accessibility is the availability of transportation modes. Specifically, this is referring to the frequency of departures and the destinations offered, which differs depending on whether the mode of transportation is public or private. These differences in accessibility are an important social aspect because it puts controls

on where and when people can travel, a theme found throughout our archival research. We are also operationalizing the social pillar by measuring time efficiency of the different modes of transportation. People value their time. This is apparent given the numerous archival materials that reflect information about the time required to use each mode of transportation, leading us to include time efficiency as one of our social pillar criterion. Throughout history, particularly as modernization became more widespread, people have put an increasing emphasis on time efficiency, not wanting to waste the hours they have each day. This is particularly relevant in transportation, and each new mode of transportation introduced worked to improve the time required to travel from one destination to the next. This importance that the public placed on improvement in speed and travel time led us to include time efficiency as a criterion for the social pillar. Time efficiency will be quantified by researching the time it takes to travel over distances for each mode of transportation. Typically this measures the time it takes to travel between cities by buggy, boat, train, and car. This is influenced by the infrastructure and the transportation model in use, which are the two aspects we will be primarily examining to assess time efficiency under the social pillar. The quality and design of the infrastructure, particularly in terms of dirt and paved roads for buggies and automobiles and the locks in the canal, affect the time required to traverse the terrain. The speed of trains and cars is largely derived from the model engine and the power it is able to provide. As a result, the infrastructure and transportation model used become the criteria on which we base our assessment of time efficiency. The social pillar of sustainability is also being assessed in terms of human health impacts of the various modes of transportation. We found multiple archival sources detailing human lives injured or lost due to train and automobile crashes, therefore justifying our use of health as one of our criteria for the social pillar. This is an important aspect to include in the social pillar because it refers to the safety and well-being of passengers, and life and safety are highly valued by people and society. Health impacts of the various modes of transportation is being quantified primarily through the frequency and severity of the risk of injury or death due to transportation accidents. These are most common with trains and cars, although there are also health risks associated with transportation by horse and buggy and boat. Modes of transportation that are connected with larger health risks will be deemed less socially sustainable than modes that are safer in terms of risk of injury or death.

To conduct our research, we are relying heavily on the Colgate Special Collections and University Archives for data. We have examined multiple collections, gathering data about the broader transportation trends of New York, and continually narrowing information to Central New York, Madison County, Hamilton, and Colgate specifically. When examining these collections, we asked ourselves about how each of the main modes of transportation being studied were introduced and involved with Hamilton, and how they impacted Colgate University, particularly in terms of student attendance demographics. The Hamilton History Collection provided a broad overview of the transportation trends from horse and buggy stagecoach routes, to boats on the canal, to trains on multiple railways, and finally to automobiles. This collection provided a baseline and supplemental information for each mode of transportation. Additionally, we have focused on certain collections for specific modes of transportation, when appropriate. We have primarily gathered data on the Chenango Canal from the Chenango Canal Collection, with further information found in the Hamilton History Collection. The Chenango Canal Collection in the Colgate Archives is our primary source regarding information on the canal era as it relates to the Hamilton era. This collection has committee meeting notes about canal proposals, economic data on canals, and overarching historical background pamphlets about the

Chenango Canal's history. We have decided to focus on canals because we discovered more information on the transportation of passengers in this collection, and because the Chenango Canal played an important role in changing the Hamilton area. A good portion of the railroad information has been synthesized from the Winfield W. Robinson Railway Collection, with a good portion also stemming from the Hamilton History Collection. To gather information about transportation around the Colgate University campus, documents and pictures have been examined from the Buildings and Grounds Collection, as well as the Student Handbook Collection and the Course Catalogues. All of these collections, when analyzed along with outside literature, helped create a full story of the history and sustainability of Colgate's transportation systems since the opening of the university.

#### **IV. Results**

These results are all the relevant data we found in the Colgate University Archives to answer our research question. These have been organized chronologically by transportation modes, beginning with the earlier transportation of turnpikes and stage lines, canals, railroads, and then automobiles. We would like to note that we used the student admissions data from the archives to connect transportation time periods to how it impacted Colgate's population. We did not find specific information on staff, faculty, and administrators for each transportation mode, but we kept them in the research question because we still wanted to find general information on the transportation of people to Colgate. We think that the student population data speaks to general population trends, especially because they relied on these transportation modes more since not all students would live in Hamilton year-round and would need to return home.

##### **IV. A. Turnpikes and Stage Lines**

In the 1820s the Chenango valley was still very isolated from the rest of New York by harsh, densely forested terrain (Plum, 1983). In an interview with Harry A. Lippit, who operated a horse-drawn stage in Hamilton in the 1800s before switching to buses in the early 1900s, he described the difficulties of operating the stage line in winter weather (Colgate University, 1948). For many weeks in the winter Lippit and others using horse and buggy would have to travel roundabout through fields when the main roads were blocked with snow (Colgate University, 1948). Lippit was the first person to buy a snowplow in Hamilton, operating it for several years between Hamilton and Clinton (Colgate University, 1948). He discussed how often he would bring Colgate students to the school in his carriage, and said "that more Colgate songs and cheers have bounced off the back of his neck than ever ricocheted from the chandeliers in the Colgate chapel" (Colgate University, 1948).

The dense forest and isolate conditions of the area left transportation in and out of the valley reserved only for wagons on the Skaneateles Turnpike and small boats on the Chenango river (Plum, 1983). The Skaneateles Turnpike went from Richfield in Ostego County, to Skaneateles in Onondaga County, and connected through Hamilton and then westward to Brookefield (Colgate University, 1963). Turnpikes were created by private stock companies, which were chartered by state governments, and that would then charge tolls to travellers (Taylor, 2015, p. 17). The tolls had gates operated by gatekeepers to charge the money, unless the travel was going



***Horse and buggy in downtown Hamilton***

*Source: Guide to the Hamilton History Collection, Special Collections and University Archives, Colgate University Libraries*

to a meeting and they could then pass through for free, so travellers would sometimes lie about the intention of their travelling to bypass tolls (Walker, 1879). The Skaneateles Turnpike and other similar roads around the Hamilton area “...made the motto ‘The Mail Must Go Through’ one to which the early mail carrier could adhere 99 times out of 100” (Colgate University, 1963). The Skaneateles Turnpike was important for the Hamilton area as it was the first gravel paved road into the area, and was a much more feasible option to bring out of town people into the area; this is particularly relevant for Colgate students as they would have used this primary route of transportation into Hamilton if they lived out of state.

#### **IV. B. *Chenango Canal***

Local and political support for building the Chenango canal was primarily inspired by the success of the Erie canal, and the hope to bring greater population and development to the valley (Plum 1983). The Erie canal reflects the height of the canal boom period and it became an immediate success that spawned many lateral canals, like the Chenango Canal, throughout New York (Colgate University, 1963).

Support to build the Chenango Canal came primarily from local people, “although first mention of an artificial waterway between Utica and the Susquehanna River was made by state officials, the canal was ultimately built as a result of a tremendous amount of pressure from residents of the Chenango Valley” (Beyer, 1954, p. 2). The canal saw potential competition from railroads as early as 1832 when it was being proposed, yet the people of Chenango Valley still insisted on the canal’s construction (Beyer, 1954, p. 25). When the Legislature of the State passed an act for construction on the Chenango Canal in 1833, “everyone expected that Hamilton was going to be a great seaport town” (Walker, 1879). People built up businesses in Hamilton in anticipation of this, such as the Eagle Hotel and Canal Coffee House (Walker, 1879).

The Chenango Canal connected from Utica to Binghamton, passing directly through Hamilton, and “construction was authorized by the State February 23, 1833 and it was opened to traffic in May 1837. It was 97 miles long and cost \$2,316,186.29. There were 117 Lift Locks” (Colgate University, 1963). While the Chenango Canal was in its prime in the early to mid 1800s though, there were strong efforts in the Chenango Valley focused on supporting its success and goals of development and population by building surrounding transportation routes like roads. In a letter appealing for a 10 percent payment on subscriptions for stock to build a road through Hamilton so that it would “...greatly promote the interests of the entire community, and develop the resources of the Chenango canal” (Colgate University, 1853).

The most common boats on the canal were freight barges, line boats, and packet boats, with the packet boats for passengers being the second most common on the canal (Beyer, 1954, p. 13). As the Chenango Canal began to dominate over turnpikes and became the primary mode of transportation into the isolated Chenango Valley, Colgate students coming from out of state would very likely have depended on the packet boats to come to the school. Yet packet boats were still greatly lacking in the social criteria, as the boats were uncomfortable and slow. The packet boats were “basically nothing more than a barge with one cabin running the entire length of the deck” (Beyer, 1954, p. 13). There were many rules governing the Chenango Canal, and packet boats had some of the greater privileges. Packets were always given right of way, and had the



*Reproduction of water color of passengers on packet-boat on the Chenango Canal.*  
Source: Chenango Canal Collection  
Folder 45, Special Collections and  
University Archives, Colgate University  
Libraries.



privilege of being able to pass slower moving boats going in same direction but no other boats were allowed to do this (Beyer, 1954, p. 14). Such rules were often violated without being cited by proper officials, such as packets in particular would race each other, despite racing being illegal, and would make bets of who would win with other passengers on the boat (Beyer, 1954, p. 14). Packet boats relied on animals to fuel their movement, as...

“Horses and mules provided the motive power for these canal boats although it was the practice for only the packets to use horses...the packets had to change teams every ten or twenty miles. There were never less than two nor more than four animals used in a team and they always worked in tandem with the driver either riding the rear horse or walking alongside. Most captains allowed one team to pull six hours while the other rested aboard the craft; the fresh team could be put ashore via a portable bridge that was placed from the boat’s deck to the towpath.” (Beyer, 1954, p. 14)

While packet boats were already slow due to relying on transportation by horse and mule, the 117 locks on the Chenango Canal slowed them down even more (Colgate University, 1963). Locks are devices used to raise and lower boats on stretches of the canal, used to cross land that was not level. Since only one boat could pass at a time, the process for passing locks greatly slowed transportation on the canal. Sometimes fights would break out over which boat would go through a lock first and would have to be settled by an arbiter (Beyer, 1954, p. 14). While many factors made transportation on the Chenango Canal risky and slow, the large amount of locks slowing traffic was the most significant factor for the failure of passenger packets making it so they could not compete with Stage Lines (Colgate University, 1963). Weather was another important aspect that slowed down canal transportation, such as when sudden rainstorms happened that washed out entire sections of the canal bank would then tie up canal traffic for months (Beyer, 1954, p. 17). The other safety hazards for packet boats along the Chenango Canal included fire and sinking (Beyer, 1954, p. 14).

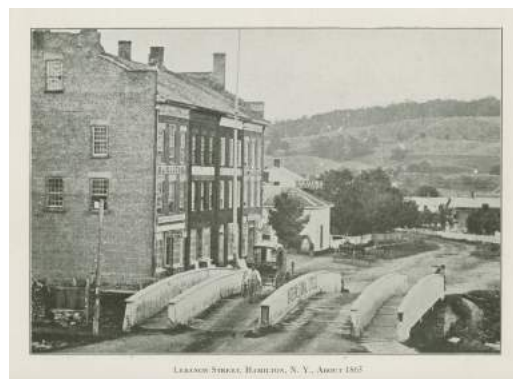
Packet boats were also a social place where passengers would sit on the top of the deck in good weather, although passengers on the deck had to carefully monitor the progress due to the common occurrence of low bridges (Beyer, 1954, p. 17). Every fifteen minutes passengers would have to throw themselves to the ground or they would be thrown overboard or have their head crushed by the bridge



THIS IS THE SERIES of locks in Oriskany Falls as viewed looking west from the four corners of the village in 1865. Unlike many locks on the canal, those pictured here were not lined with wood, but merely had strips of wood spaced along the sides to serve as bumpers. The wide water at the right offered a place for boats to load or unload goods.

**Picture of the Chenango Canal running through a town with a series of locks.**

Source: Chenango Canal Collection Folder 45, Special Collections and University Archives, Colgate University Libraries.



**Photograph of horse and buggy crossing a bridge over the Chenango Canal.**

Source: Guide to the Hamilton History Collection Folder 434, Special Collections and University Archives, Colgate University Libraries.

(Beyer, 1954, p. 17). In bad weather, passengers would congregate inside, "...sitting on crude, uncomfortable benches next to window-like portholes. At night the benches were replaced by a series of narrow shelf-like bunks upon which the unlucky passengers were enjoined to have a 'pleasant night'" (Beyer, 1954, p. 13). The uncomfortable conditions and incredibly slow speed of transportation on the Chenango Canal played an integral role in its general failure.

The costly upkeep, lack of traffic, and competition from railroads are ultimately what led to the Chenango Canal's downfall, and the canal was abandoned on May 1, 1878 (Colgate University, 1963). The competition from railroads was the most significant factor because railroads were less costly to operate and more time efficient; the success of the railroads also worsened the canal's situation by driving up the price of labor and upkeep and driving down the cost of tolls and tonnage. (Plum, 1983). While there were some repeated attempts to reopen the canal, the last as late as 1907, they all ultimately failed (Beyer, 1954, p. 25). The Chenango Canal failed to bring greater population and development to the Chenango Valley like it planned to, but it did have some effects that began larger changes to the valley.

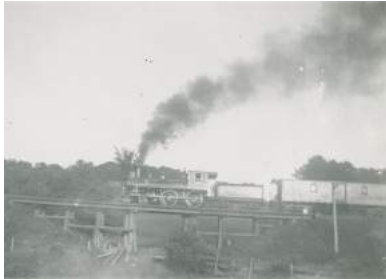
"The canal transformed the relatively isolated Chenango valley. The region, surviving on subsistence agriculture before the canal, realized the benefits of commerce with other parts of the state with the opportunities that the canal provided. Hamilton never experienced tremendous growth. It did undergo some expansion, but not as much as one would think would occur with the development of an inexpensive and convenient mode of transportation." (Plum, 1983 )

The small-scale transitions spurred by the Chenango Canal set the foundation for later development in Hamilton. It did this by creating some new business and occupations, giving incentives to exploit the valley's resources, and bringing people in off the isolated farms to villages along the canal's route (Beyer, 1954, p. 27). The Chenango Canal impacted Colgate's student population by making travel to the isolated valley easier. The Chenango Canal first opened in 1837, and at this time Madison University had 157 students attending (Colgate University, 1837). These students were mostly from New York, but other states included Vermont, Pennsylvania, Ohio, Massachusetts, New Hampshire, New Jersey, South Carolina, Georgia, Connecticut, Maryland, and Michigan (Colgate University, 1837). Comparing this with the student population numbers for 1870 are useful because this was about the time railroads were introduced, so out of state students between 1837 and 1870 would have most likely been on a packet boat on the Chenango Canal to come to Colgate. In 1870, there was a total of 182 students coming from new states like Kansas, Missouri, Wisconsin, Minnesota, Mississippi, Iowa, Delaware, and Illinois (Colgate University, 1870). While information detailing how each of these students made their way to Colgate was not available, it was likely that many of them used the Chenango Canal at least some point in their journey, as it has been cited as many times as the only convenient way to make it into the isolated Chenango Valley. While the student population numbers only saw twenty-five new students coming to the school, it does show how students from the midwest were more able to come here with both the Chenango Canal and other canals across the U.S. in this period.

#### **IV. C. Railroads**

The Ontario and Western Railroad passed through Hamilton beginning in 1873, (Colgate University, 1990). Railroads improved a lot after the time of canals and before the time of automobiles. Train cars were being specialized and upgraded to offer more luxurious comforts, dining, even having entire cars be refrigerators to have food for the ride (Colgate University,

1990). Eventually reclining chairs were invented and even a honeymoon car (Colgate University, 1990). In 1895, the fastest train to date was a New York Central line train that went to Syracuse from New York in about four and a half hours (Colgate University, 1997). According to the Walton Reporter (1980), “passenger trains became increasingly popular after the coal run was



**Train smoke**

Source: *Guide to the Hamilton History Collection, Special Collections and University Archives, Colgate University Libraries.*

established and city residents flocking to the resort hotels of the Catskills added much needed revenue” (Colgate University, 1997). Sight seeing was a large selling point for increasing ridership (Colgate University, 1997). For many, riding trains across the state of New York was their only way of seeing the Catskills; the railroad was a way for people to “see the world” (Colgate University, 1997). Some railroad companies offered ticket flexibility so that people may pay less during the holidays

so that they may visit family (Colgate University, 1997). Despite these benefits, trains were sometimes unsafe and wrecks would hurt both passengers and crew workers (Colgate University, 1990). In fact, “train wrecks were common before the days of air brakes, electric switching, and automatic

dispatching” (Colgate University, 1990).

For the sake of time efficiency, railroad companies used nitro-glycerine to literally blow out tunnels through mountains, the longest one was the Shawangunk Mountain near Bloomingburg that was 3,800 feet long (Colgate University, 1990). While driving through these tunnels, the fumes emitted from engine’s smokestack would have nowhere to go, and as a result would often enter the train cars and get inhaled by the passengers (Colgate University, 1990). Sometimes people would stand on train tracks to help put out forest fires caused by the burning cinders from the old locomotives, and when action was taken \$70,000 was saved per year from preventable damages (Colgate University, 1990). Constructing railroads to new locations was costly, such as how the Ontario & Western railroad company once spent over \$26 million when they were only planning on spending \$12 million (Colgate University, 1990).

Eventually, stations began closing throughout the 1930s to the 1950s (Colgate University, 1990). In 1956, the Ontario & Western railroad, often referred to as the “the Old Woman,” closed down permanently (Colgate University, 1990). Dying railroad companies tried to promote more scenic trips, but tourists were already switching to automobiles as a more comfortable form of transportation. The company soon declared bankruptcy. Railroads were promptly scrapped and sold for around \$59 per ton (Colgate University, 1990).



**Train station in Hamilton, NY**

Source: *Guide to the Hamilton History Collection Folder 441, Special Collections and University Archives,*

Period of years	Number of years data available for that period	Percentage of fires caused by railroads in New York State as a whole		
		minimum	maximum	mean
1893-1909	10	9%	32%	20.6%
1910-1919	7	11%	28%	18.6%
1920-1929	9	12%	25%	16.4%
1930-1939	10	5%	11%	6.7%
1940-1949	10	5%	17%	9.7%
1950-1959	10	2%	6%	3.5%
1960-1965	6	5%	8%	6.3%
All years	62	2%	32%	11.6%

**Table about percentages of fires caused by railroads in NY State**

Source: *Kudish, 1996, Special Collections and University Archives, Colgate University Libraries*



As the 1970s were the first years in which people coming to Colgate could use railroads to come directly into Hamilton, we looked at the year 1870 to 1920 analyze how railroads impacted the student population. We ended with the year 1920 because that is when automobiles began to dominate, so the railroad impacts can be better analyzed between 1870-1920. In 1870, there were 182 students enrolled at Colgate, where 2.7% of the students were international. In a letter to Professor P. Spear in 1853, it was estimated that a railroad through Hamilton would increase the school's student population to 500 (Colgate University, 1990). Ten years from then the student population increased to 227 students, which is a considerable jump (Colgate University, 1880). In 1920, 692 students attended Colgate, and in 1930 there were 1,009 students. During this time, cars had been introduced to Hamilton within recent years, likely influencing these numbers as well. The leaps in hundreds of students show how much accessible railroads made the isolated Hamilton area, in comparison to the canal era that saw little student population changes.

#### IV. D. *Automobiles*

The New York, Ontario and Western Railway (NYO&W RR) was overtaken by the automobile industry in the 1900s, especially as good highways were built and people could depend on the convenience and independence of their own automobile for their transportation needs (Colgate University, 1980). Initially, automobile engines were very similar to those of trains, particularly in regards to the ignition and fuel pumps (Colgate University, 1947). Yet, people were unwilling to leave their spacious, comfortable, fast-moving personal automobiles to return to the crowded, public, slow-paced train cars (Colgate University, 1953). Photos provide a history of Hamilton's automobile and road use and regulations in the 1900s.



***Automobile in downtown Hamilton***

*Source: Guide to the Hamilton History Collection Folder 676, Special Collections and University Archives, Colgate University Libraries.*

In 1920, cars had become a part of people's lifestyles in Hamilton. With many people driving cars, white posts were situated in the middle of intersections to control driving traffic, with signs saying "slow, keep right" (Colgate University, 1920). Even though cars and motorcycles were used in the Hamilton area, the roads of downtown Hamilton were still unpaved, dirt roads in 1927 (Colgate University, 1927).

By 1960, roads in downtown

Hamilton had been paved and painted with clear white lines indicating where to stop at intersections, and marking parking

spaces along the sides of the roads (Colgate University, 1960). In 1974, double yellow lines appear down the center of roads as well (Colgate University, 1974). As early as 1974, directional signs marking interstate 12B, a main road leading into Hamilton. Parking regulation signs also first appeared at this time, dictating where and at what times automobiles may occupy the spaces along the sides of the roads (Colgate University, 1974). Photos of downtown Hamilton show a Shell



***Shell gas station in downtown Hamilton***

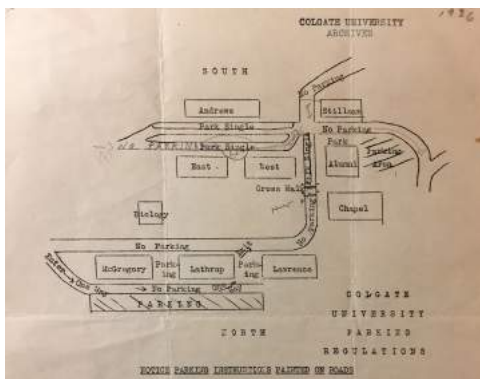
*Source: Guide to the Hamilton History Collection Folder 441, Special Collections and University Archives, Colgate University Libraries.*

gas station, with three gas pumps (Colgate University, 1968). Other photos of Utica Street in 1974 depict Mobil and Texaco gas stations on either side of the road. These stations are set up according to more current designs, with two freestanding pumps that automobiles pull up next to in order to fill their gas tank (Colgate University, 1974).

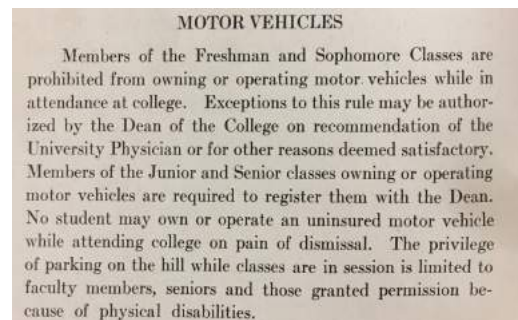
As the university grew throughout the 1900s, the campus moved closer to downtown and more side streets were created to encompass the needed space for students and facilities (Colgate University, 1950). Maps of Colgate's campus and the downtown Hamilton area show an expansion in the number and location of roads. This included both paved roads for automobiles, as well as the creation of more pathways on the hill for walking around campus (Colgate University, 1916; Colgate University 1950). While automobiles became a predominant form of transportation up the hill in the 1900s, students continued to walk around campus. As a result, photos of Colgate's campus indicate that walking pathways became a major part of the campus layout. Walkways were constructed between academic buildings, and to connect the academic and residential quads (Colgate University, 1968). Often, people used automobiles to get up the hill, where they would then use walkways to travel between buildings. This expansion of Colgate's transportation routes coincided with an increase in the number of students attending the university. In 1930, 1,009 students attended Colgate, rising to 1,049 students in 1940, and 1,420 students in 1950 (Colgate University, 1927-1932; Colgate University, 1938-1943; Colgate University 1950-1954). From 1930 to 1960, Colgate saw an increase in the number of students from foreign countries, as well as diversification of home states represented by students. By 1960, students represented the countries of Brazil, Canada, China, Iran, Japan, Northern Rhodesia, Malaya, Pakistan, Sweden, and Venezuela (Colgate University, 1958-1962).

On the university level, the mid 1900s was a time when transportation decisions and regulations were actively made by administration and staff. Thinking about transportation pervaded many aspects of Colgate life, including academics. While not instituted, there was discussion among professors and administrators about the addition of a course that would examine the impacts that automobiles have had on the environment (Colgate University, n.d.).

From an administrative standpoint, in 1938, Colgate released official regulations regarding automobile operation and parking on campus (Colgate University, 1938, p. 1). This ruling dictated that students owning a car must register their automobile and put the sticker on their windshield. Photos and documents depict regulations on traffic flows and acceptable parking up the hill, which was broken down into 7 specific rules. Everyone's cooperation in abiding by these new regulations was deemed essential (Colgate University, 1938, p. 1-2).



**Parking regulations on Colgate's campus**  
 Source: Buildings and Grounds Collection  
 Folder 4, Special Collections and University  
 Archives, Colgate University Libraries.



**1936-1956 Handbook regulations on automobiles**  
 Source: Colgate University Student Handbooks,  
 Folder 7A, Special Collections and University  
 Archives, Colgate University Libraries.

Starting in the 1936-1937 Student Handbook, a section for automobile regulations was added. This section stated the rules for Colgate students regarding automobile ownership, operation, registration, and parking on campus and in Hamilton.

In 1964, there began a movement to allow sophomores to own and operate cars on campus (Colgate University, 1964-1968). Undergraduate students proposed that sophomore earning a grade point average of 2.8 and above be permitted the privilege of having an automobile. This proposal, given to the Dean at the time, also included restrictions on usage, such that sophomores are still not allowed to park up the hill, and if their GPA falls below that designated in the proposal, they receive a traffic violation, or fail to register their automobile, that their license be surrendered. This proposal also suggested the registration fee increase to \$20, instead of the previous \$10 (Colgate University, 1964-1968).

#### **Motor Vehicles**

Sophomores with less than a 2.8 grade point average for the preceding semester, all members of the freshman class, and students holding scholarship awards (other than honorary), are prohibited from possessing or operating motor vehicles in or about Hamilton while in attendance at college. Exceptions to this rule may be authorized by the Dean of Students on recommendation of the University Physician or for other reasons deemed satisfactory.

Students authorized to own and operate motor vehicles are required to register them with the University Proctor and pay an annual \$20 registration fee. Authorization will be granted only for automobiles insured for public liability which have seat belts and are certified to be safe.

#### ***1965-1966 Automobile regulations and restrictions from 1964 enacted***

*Source: Colgate University Student Handbooks, Folder 7A, Special Collections and University Archives, Colgate University Libraries.*

In 1968 these rules regarding student automobile use once again changed. All class years were finally permitted to have a car on campus, with automobile bans placed solely on students receiving financial aid. However, other regulations were put in place, such as the university requiring students under the age of 21 to have parental permission as well as proof of insurance in order to register their car.

Along with this paperwork, seat belts had to be installed in the front seat of the car for it to be approved for use on Colgate's campus. The first restrictions on motorcycles appeared at this time as well, with only students that were members of the Colgate Motorcycle Association allowed to possess

and operate motorcycles or motorbikes on campus. (Colgate University, 1968-1969, p. 13-14).

Even as rules regarding what class years were permitted to own and operate an automobile on campus changed every few years, rules regarding registering one's vehicle on campus remained constant. Automobile registration was set for one week in the fall semester, during which all upperclassmen and specially approved underclassmen must pick up a C sticker to put on the windshield of their car (Colgate University, 1932, p. 1). However, the fee to register one's car on campus fluctuated over the decades, returning back to a \$10 fee in 1973 (Colgate University, 1973-1974, p. 114).

During the recession of 1957, it was hoped that the introduction of a new car model would boost automobile sales and revive the economy. However, car sales continued to drop (Colgate University, 1958, p. 2). In 1988, during the election of the forty-first president of the United States, Colgate students encouraged other students to vote because perhaps the new president could address age discrimination in automobile insurance rates (Colgate University, 1988, p. 4).

Colgate University ramped up their automobile regulations during major sporting events, such as games against Syracuse and Cornell. A Colgate Maroon article from November 7, 1951 writes that cars are not allowed to be used for vandalism, nor to chase Syracuse cars because excessive speeds may lead to arrest or accidents. The same article gives regulations for road blockades, indicating that none are allowed on public roads, but campus road blocks are to be put up at the discretion of the freshman class and Syracuse Week Committee, as is tradition. All

students owning cars were made to sign a pledge, stating: “I pledge that I will not use my automobile or permit it to be used by others for the purpose of committing vandalism or abducting Syracuse students. I further pledge that I will use the automobile in a responsible manner at all times.” (Colgate University, 1951, p. 2). Yet accidents still happened, for instance on Halloween night on 1979, a Colgate basketball player and fraternity member was killed in an automobile accident (Colgate University, 1979).

In 1966, Colgate instituted rules about student hitchhiking on and around campus and the Hamilton area. This was amended in 1972, when the hardware store in downtown Hamilton was designated as the area to wait for a ride (Colgate University, 1972-1973, p. 9).

#### Hitchhiking

The University calls to the attention of all students that the Motor Vehicle and Traffic Laws prohibit hitchhiking or soliciting rides in the village of Hamilton. The law states that “where sidewalks are provided and they may be used with safety, it shall be unlawful for any pedestrian to walk along and upon an adjacent roadway.” The law also states that “no person shall stand in a roadway for the purpose of soliciting a ride.”

#### **1966 Hitchhiking rules for students**

*Source: Colgate University Student Handbooks, Folder 7A, Special Collections and University Archives, Colgate University Libraries.*

## V. Analysis

Our analysis will be organized by criteria, analyzing the environmental, economic, and social pillars of sustainability in regards to our research. In each criteria subsection we will look at our data through the lens of our criteria, and compare different modes of transportation together by looking at them through a chronological timeline starting in the early 1800s and going until the later 1900s.

### **V. A. Environmental Criteria: Fuel Consumption and Landscape Changes**

The environmental impacts of transportation has greatly changed over the last two hundred years of transportation innovations. Preceding the canal era generally between 1816 to 1840, the wagons on country roads were an incredibly environmentally beneficial form of transportation. There were almost no direct carbon emissions from the wagons themselves as their “fuel” came from horses; carbon emissions that might have arisen from horse dung would have been extremely minimal compared to later uses of coal and oil in transportation. Landscape changes were made by creating country roads for transporting wagons into the Chenango Valley, but these country roads did not intrusively destroy large swaths of environment. These country roads were essential to rural communities, although they were “unbelievably poor by mid-twentieth century standards, they were hardly more than broad paths through the forest” leading from farms, villages, and small stores (Taylor, 2015, p. 15-16). The Chenango Valley was still in the frontier stage in the mid 1820s surrounded by harsh, densely forested terrain, so changes to the landscape would have been very unobtrusive and ill-managed, allowing the environment to largely grow undisturbed (Plum, 1983). These country roads were also mainly left to farmers and locals to maintain, which they did not have enough time, energy, or capital to do (Taylor, 2015, p. 17). For people traveling to Colgate, they would have to rely on rough country road connections between small villages throughout New York to reach the isolated Hamilton area.

The time between 1800 and 1830 is generally considered to be the turnpike era, and this time period saw more environmental damage than the preceding wagon-country road period in terms of infrastructure impacts (Taylor, 2015, p. 17). To create turnpikes, private stock companies had to destroy larger areas of forest to clear way for roads to be paved with stone and gravel. These larger roads made it much easier for students and other Colgate personnel coming from out of the state to have a more straightforward path into the still relatively isolated Hamilton area. The push for improved roads followed the War of 1812, due to the experience of difficult transportation in the war, as well as to promote the “generally improved commercial conditions following the war” (Taylor, 2015, p. 18). The U.S. government began to push for



greater landscape changes by sponsoring turnpike roads, as well as canals. The turnpike era would have been similar to the earlier years in terms of fuel consumption because it was still horse and buggy transportation that were using the turnpikes.

The Chenango Canal and other canals in this time period had a rather limited environmental impact. Clearing land for canals did not use fuel but rather relied on labor; men would clear the land and with scrapers, plows, and farm animals (Shaw, 2014, p. 5). Canals were a more environmentally friendly choice than the railroads and automobiles that would follow it, but canals had more harmful infrastructure impacts to the country roads and turnpikes preceding it. Laborers would have to dig up tree stumps, and dig their way deep into the ground to direct canal water. As the Canal Era impacted Chenango Valley residents and they began to move out from the farms to villages built along the canal, the indirect effects of landscape change due to the Chenango Canal was also much greater, although still not as impactful as the infrastructure changes seen in the railroad and automobile eras.

When regarding carbon emission, railroads not only burnt a lot of fossil fuels themselves, but they also helped grow the coal industry with the accessibility that trains offered to the country. Railroad companies made most of their money through coal, and the railroad companies with the most assets in the coal industry were the ones who died out last (Vance, 1995, p. 119). When trains switched from steam to diesel, the concerns were not environmental but instead just economic. Landscapes were destroyed for the construction of railways. To reduce travel time, explosives were used to get through mountains, which was not safe because of chemicals and other uncontrollable factors associated with explosions (Colgate University, 1990). The explosions were so unsafe that tunnels sometimes needed to be inspected almost every day (Muller, n.d.). Railroads were causing forest fires, and being constructed right over rivers (Colgate University, 1990).

In *Railroads of the Adirondacks: a History*, Kudish discusses how the expanded outreach of the railroads allowed for heavier logging and forests were completely stripped of trees, an issue that was so dire that a reforestation program began (Kudish, 1996, p. 35). Mountains were blown up for tunnels with toxic chemicals, allowing for an expedited trip for passengers and freight trains (Vance, 1995, p. 119). For these reasons, the locomotives used to transport people around New York were very harmful and caused a lot of environmental degradation.

Railroads environmentally impacted the Colgate community because it used more fuel and traveled farther distances when compared to packet boats on the canal, meaning that students and anyone else traveling to colgate will almost certainly have a larger carbon footprint if they chose to ride trains. This is when Colgate as a whole really starts to develop a larger carbon footprint. Regarding the town of Hamilton, the railroads were in place for a little less than a century, however the railroads were torn up and sold as scrap. Railroads ultimately affected all the land it was placed on, which is very intrusive to the nature of the landscape and causing environmental degradation from paths that had to be cleared from it and development that cropped up around railroad tracks.

Automobiles were designed to be run on petroleum fuel, even though it was known to be less efficient than steam and electric power (Urry, 2016, p. 32). While originally the engines of automobiles were not that different from trains (Colgate University, 1947), automobiles were able to process fuel five times more efficiently than trains (Lawyer, 2007, Fuel Efficiency Save Energy section, para. 4). This allowed cars to be more fuel efficient, requiring less fuel for power than trains. While this makes cars more environmentally sustainable than trains individually, the extensive use of cars negated this energy advancement, resulting in a much greater use in fuel

when compared to trains. Therefore, while the introduction of cars was a step in a more environmentally sustainable direction regarding fuel efficiency, overall automobiles were less environmentally sustainable in fuel consumption than previous modes because of their extensive use.

The discussion of a new course offering titled U.S. 306 “The Automobile: Effects on Environment” indicates that there was academic acknowledgement of the environmental impacts that the increase and dominance of automobiles has had on the environment (Colgate University, n.d.). This is one of the first indications that Colgate was aware of environmental sustainability in terms of transportation, even though it was not set in current environmental sustainability framework as understood today. While the expansion of roads for automotive transportation connecting the Colgate campus and downtown Hamilton made driving more accessible for people, it further altered the landscape (Colgate University, 1950). By constructing and paving more roads and walkways, it removes permeable ground area. This destroys natural habitat, and creates hard divisions in the landscape, causing degradation. Therefore, the expansion of road systems in Hamilton and on Colgate’s campus is categorized as environmentally unsustainable overall.

#### **V. B. *Economic Criteria: Money Expenditures, Feasibility, and Affordability***

The transportation in Hamilton New York, as well as the U.S., progressed from “nothing more than the original crude Indian trails to narrow dirt paths and from there later to privately-owned log roads and turnpikes, state-built canals, railroads line, and finally to state and county networks of roads and highways” (Beyer, 1954, p. 1). The economic upkeep for country roads in the early 1800s at the beginning stages of transportation development was thus very minimal, because locals were in charge of road maintenance and they were free for anyone to use. These two factors are what make country roads much more economically sound than later modes of transportation, involving much more complicated economics for infrastructure, fuel, tickets, etcetera.

Turnpikes could be a bit more costly than country roads because the gatekeepers would charge travelers tolls, although these extra fees could sometimes be bypassed if travelers were going to a meeting, which was then free. Financing the construction of turnpikes was up to the “corporate form or organization appears to have been used for the turnpikes practically without exception” (Taylor, 2015, p. 24). The economic costs of building the roads turned into some profits due to the tolls. The economic benefits really was for the travelers benefit though, because “turnpikes generally did not cheapen and stimulate land transportation sufficiently to provide satisfactory earnings from tolls” (Taylor, 2015, p. 27). People traveling to Colgate at the time thus would have definitely been able to use these turnpikes as a quicker route of transportation without having to worry much about varying socioeconomic statuses. Turnpike’s failure to garner sufficient profits is why they did not really fall due to competition from canals and railroads, because “many turnpike companies had failed even before this competition appeared, and those which lasted after about 1830 had for the most part already demonstrated their financial unprofitability” (Taylor, 2015, p. 28). In terms of affordability and feasibility, using country roads or turnpikes were largely available to anyone that could afford a carriage and horses. Considering that Hamilton was an agrarian based society in this period, horses would have been plentiful. The need for transportation in this period also would have only been to the local stores, which is why country roads for wider travel routes were consistently neglected (Taylor, 2015, p. 17).

While the Erie Canal was a huge financial success, and thus spawned lateral canals like the Chenango, the Chenango Canal was ultimately a financial failure. Constructing the canal cost New York state \$2,316,186.29, and the lack of profits from operating the canal put the state in debt (Colgate University, 1963). The cost of the Chenango canal was more than three times the total revenue it produced over its forty years of operation, making the Chenango Canal ultimately a failure in economic terms (Taylor, 2015, p. 36). Competition from railroads played a huge role in pushing canals out, and part of this was because trains were less costly to operate; their success drove up the price of labor and upkeep for canals, while driving down the cost of tolls and tonnage (Plum, 1983). These changes in cost as canals died out would have benefited passengers as costs would have been driven down for them as well with the driven down cost of tolls and tonnage. We found no other evidence to see what price passengers had to pay for a ticket on packet boats, but for those that could afford such transportation to use the Chenango Canal they likely would have used the canal to get to Colgate as it was faster than relying solely on stage lines. If local residents in Hamilton wanted to travel places, they were likely still relying on horse and buggy during this time period, and only using the canal to travel to farther locations. While Hamilton residents might not have used the canal personally for transportation uses very often, the canal brought some greater amount of economic development and population to the area; this would be important for shaping the future character of Hamilton and Colgate as railroads and automobiles expanded on this development.

America was in need of technological innovation when the railroads were being built in the 1930s. America's economy was doing well and with a mixture of innovative engineers such as John Stevens, who built the first steam locomotive in the United States, railroads were very successful. This is evident when people were associating having a railroad in Hamilton with economic success (Colgate University, 1990). The catalyst that really allowed for railroads to be very successful in New York state is how railroads reached places that people may not have thought possible. Many different unaffiliated railroad companies emerged, because there was profit to be found; however, when certain railroad companies got big enough, they were able to obtain more railways, like New York Central (Vance, 1995, p. 129). Railroads were economically feasible for both companies and citizens, such as being able to turn a rural area into the "hub of the empire state" (Colgate University, 1997). However, sometimes there were losses. Constructing railroads to connect new places may have been costly, such as how the Ontario & Western railroad company once spent over \$26 million when they were only planning on spending \$12 million (Colgate University, 1997).

Although railroad companies may have lost money when investing in railroad infrastructure, riding trains across the state and country was very feasible. It was affordable enough that people were able to go sightseeing, which is a luxury service that is not a necessary cost to anyone, meaning people both had money to spend and it was affordable. Hamilton also benefitted immensely from the shipping possibilities with the nearby stations, so much that when the last station closed the town was economically hurt (History, 2015). At this time, trains were the fastest form of transportation and for it to be so affordable for people coming to Colgate, and thus people never had an easier and more affordable time of getting to school.

The automobile industry appeared just as innovative as railroads once were, and began to take over railroads as the newer, more comfortable competitor. The American economy was not doing as great as it had in the past, and the coal industry was slumping with railroads (Vance, 1995, p. 121). Railroad companies tried to merge with opponents to remain alive, but this tactic

was not enough against the dominance of automobiles (Vance, 1995, p. 121). Locomotives were not as cheap or available as a car, making automobiles the more economically viable option.

The state of the local economy at any given time influenced the economic sustainability of automobiles. When cars were first introduced, only upper-class Americans could afford such a luxury (Raitz, 1998, p. 372). However as the 1900s progressed and advancements were made in automobile production, the price of cars fell and became economically feasible for a majority of society and automobile ownership became popular and common among Colgate students. However, cars were still considered to be a symbol of moderate wealth, as Colgate students on financial aid were not permitted to register cars on campus (Colgate University, 1968-1969, p. 13-14), likely because administration thought that if one could afford a car, they could also pay for tuition. During times of recessions, people did not have the money to purchase automobiles at the same rate as previous years, making them unaffordable to the general public, and therefore economically unsustainable for a time (Colgate University, 1958, p. 2). Students were not only concerned about the cost of purchasing an automobile, but also the annual insurance fee, which was higher for younger drivers (Colgate University, 1988, p.4), particularly because they were required to be insured in order to register their car on campus. Along with this, a registration fee for having a car on campus was added to the student economic cost of an automobile. While Colgate administration did reduce the price of these registration fees, likely in response to student outcry, drivers were still responsible for purchasing their own fuel for their automobile. However, there were multiple gas stations available in downtown Hamilton (Colgate University, 1974), creating economic competition between each company and helping to keep fuel prices reasonable. While the combination of all of these fees strained the affordability of automobiles as a mode of transportation for Colgate students, ultimately, the possession and operation of an automobile is economically sustainable. This is seen by the increase and continuance of ownership. However, Colgate students continually pushed to reduce the costs of automobile maintenance, to which the administration was receptive and responded adequately when possible.

#### ***V. C. Social Criteria: Accessibility, Time Efficiency, and Health***

While country roads and turnpikes were such a success in environmental and economic terms, it is because they lacked in the social realm, particularly in terms of time efficiency. Carriages or wagons were generally pulled by two or four horses, meaning that they were extremely time inefficient compared to later transportation mode of canals, trains, and automobiles. In winter, this time was slowed down even further in Hamilton as horse and buggies traveling to Colgate would have to go through fields when the main fields were blocked with snow (Colgate University, 1948). Stage lines were useful really only for going to other parts of Hamilton, and transportation outside of Hamilton in horse and buggy could take from days to weeks. The limitations to this transportation is what kept Hamilton in such an isolated, lowly populated, undeveloped area for so many years. Accessibility to the Hamilton area was reserved mostly for locals or people attending or working at Colgate. Due to the difficulties and slowness of traveling with horse and buggy on either country roads or turnpikes, it made it very difficult for individuals to travel outside of the Chenango Valley, which made this time period of transportation very inaccessible. We found no evidence of accidents that resulted in injury or death due to horse and buggy usage in the archives.

The accessibility of the Chenango Canal to Hamilton residents was fairly high because the canal ran straight through the town. For people traveling to Colgate from other locations, the Chenango Canal was a more accessible option because it ran 97 miles and could bring you



straight from Binghamton to Hamilton. The time efficiency again seems to be the Chenango Canal's largest flaw when compared to the speed of later railroads and automobiles. As discussed in the results, canal transportation was very time inefficient in being slowed by inconveniences like going through locks, and weather storms that would wash up the bank and tie up traffic for months (Colgate University, 1963). Locks were a particular struggle of time inefficiency seen all over the country with canals, as the "time-consuming procedure, to enter the lock, fill the chamber with water or release it, and...were subject to delays from accidents and damages to the locks," (Shaw, 2014, p. 154). Health concerns were also a huge issue on the canal, as accidents were not uncommon, such as fights, fire, sinking, or being thrown overboard by a low bridge. Accidents along the Chenango Canal do not parallel the death and injury we see in automobile accidents, but again this is likely because of the slow speed of the vehicles as well as fewer boats going along a single canal, rather than hundreds of cars down a highway. Beyer analyzed the Chenango Canal's failure as a "sort of temporary fill in between an era of very inadequate transportation facilities and the era of railroads and highways and it came at a time of immense national as well as local expansion in all areas of life" (Beyer, 1954, p. 27).

Trains became very comfortable for people to ride, having specialized cars for sleeping dining, entertainment, freezing food, and more (Colgate University, 1997). Compared to packet boats on canals, trains had more access to secluded areas and were much faster, and that didn't stop trains from consistently becoming faster than before (Colgate University, 1997). The reduction of ticket pricing allowed families to travel together more often during holidays as well (588). Trains were very accessible and comfortable for its passengers.

The largest negative social value of trains were how prone trains were to accidents. Accidents often happened before the innovations in brakes and movements, and sometimes no one may get injured, but in the worst case scenario people could die (Colgate University, 1997). People could be injured from riding a locomotive, and crew members could get injured from freight train accidents (Colgate University, 1997; Colgate University, 1990).

In terms of speed, trains were very fast; in 1895, trains were able to get to Syracuse from New York in roughly the same amount of time it takes a car to get there today (Colgate University, 1997). While there were great risks of accidents, passengers usually ignored them for the great time efficiency and accessibility that trains offered. The success of trains during their height can be seen in ridership alone. The reasons that automobiles began to dominate over trains is simply because they were even more time efficient and accessible than trains, and began to be favored for their independent qualities rather than the communal qualities that defined railroads.

Trains were comfortable, and offered a lot of service during the ride, making anyone's travel to the school an easy one. Accidents were definitely always a possibility, however no records mentioned any accidents involving students, faculty, staff, or administration.

Isolated town like Hamilton that had been so difficult to reach previously were now made all the more accessible by a train system running all over the state and country being able to connect directly into the town of Hamilton.

Automobiles were desired over trains because of the social benefits, particularly their accessibility, because people can personally own cars and can drive to any destination at the time that is best for them, as well as their time efficiency because cars are able to travel at much faster speeds than trains (Urry, 2016, p. 28). The initial regulations that Colgate placed on automobile ownership and operation around campus in the mid-1900s minimized the accessibility of cars as a mode of transportation for students. Therefore, the social sustainability of automobiles

increased through the decades as more class years were allowed to own and operate cars on campus (Colgate University, 1956-1957, p. 66-67). However, parking regulations again placed restrictions on accessibility, for only faculty, administration, and seniors were permitted the luxury of parking up the hill, making it difficult for underclassmen to drive up the hill to class (Colgate University, 1938, p. 1) and reap the benefits of independence and flexibility associated with automobile ownership on campus (Urry, 2016, p. 28).

Colgate always put an emphasis on ensuring the health of their students in automobile transportation, as seen by the seatbelt requirement (Colgate University, 1968-1969, p. 13-14), even though seatbelts were not yet common across the US. This care for student well-being is also represented by hitchhiking regulations, intended to prevent people from being hit while trying to flag down a ride in the road. Yet, administration recognized the importance of carpooling to students, and later instituted a designated waiting spot downtown (Colgate University, 1978-1979, p. 115) to assist students while also keeping them safe. To further protect people, during major sporting events when Colgate students get rambunctious and wild, extra regulations were put in place to protect the health and safety of Colgate students, Syracuse students, and the public. Regulations on blockades of public roads were also meant to minimize disturbance to the everyday traveller, and reduce the risk of accidents (Colgate University, 1951, p. 2). Records of automobile accidents, such as the basketball player killed on Halloween night (Colgate University, 1979), are cases where car transportation is socially unsustainable because of the harm to human health and wellbeing. Reports of fatal crashes are rare in Colgate records though, indicating that while the deaths are tragic and worthy of mourning and memorial, automobiles are overall a safe mode of transportation, which is attributed to Colgate's oversight and regulations.

White posts were placed in the center of intersections (Colgate University, 1920), in an attempt to control traffic and prevent traffic confusion and injurious or fatal collisions. This addition provides support to the social pillar of automobile sustainability under the health and wellness criterion. This is strengthened by the painting of white lines indicating where to stop at intersections and double yellow lines on roads to direct traffic flow and designate specific sections of the roads for directional traffic (Colgate University, 1974) which improved the quality of the roads (Raitz, 1998, p. 374). All of these measures to control and organize traffic signify that automobile transportation is socially sustainable, both in Hamilton and on Colgate's campus.

## **VI. Conclusion**

Transportation has defined the characteristics of our country, and shaped the population and development at Colgate and in Hamilton. The way students, faculty, administrators, and staff have traveled to and from campus as well as around campus has played a crucial in defining Colgate's campus by determining the people that were able to come to Colgate and how they moved about the campus. Canals began to transition the Hamilton area away from subsistence agriculture to more commercial development, and had a small impact in expanding the Colgate population. Canals coexisted with the horse and buggy era, providing a transition period from very inadequate transportation modes to the era of railroads and automobiles. Canals did very well in the environmental pillar, but this was because they suffered so much the social and economic pillars; the Chenango Canal was extremely slow, and ended up putting New York state in debt because it was such a poor economic venture. This is why the Chenango Canal, and canals across the U.S., were ultimately abandoned as railroads began to rise. While the Chenango

canal made Colgate more accessible to the entire state and parts of the midwest, railroads made the school more accessible to the entire country. Railroads brought economic prosperity through the transportation of coal and the increase of shipping options, and ultimately brought more students to the school which in itself is an economic benefit to the school. In addition to how trains impacted the school economically, students from around the country had more access to the school, which made it a more viable option when students were looking into schools. Environmentally, railroads allowed the coal industry to prosper, and landscapes were destroyed. Cars further enhanced the ability of students from all across the US to attend Colgate. Personal ownership of automobiles skyrocketed throughout the 1900s, becoming the dominant form of transportation due to their economic feasibility and social value. Automobiles provided a convenient way to travel, giving a larger demographic of people access to and around Hamilton and Colgate. However, automobile models were run on fuel and required the construction of roads that fragmented the landscape and were, therefore, not environmentally sustainable. Yet, Colgate faculty in the mid 1900s recognized the harmful effects of automobiles on the environment, even though environmental sustainability was not considered in the individual or university level decision-making process at that time. Each mode of transportation generally tended to push out the last transportation mode based on economic and social factors. While transportation was not the only factor influencing how Colgate and Hamilton changed in the last two hundred years, it did play an integral role. Transportation is a part of everyday lives, and it is important to consider the history of transportation when making decisions for how our world will travel in the future.

## **VII. Recommendations**

Our primary recommendation is to balance transportation decisions between the three pillars of sustainability. Based on our research, we saw that the economic and social pillars consistently dominated the decision making process regarding transportation. This decision making process primarily refers to how individuals decided they would travel places based on the speed and cost effectiveness of the transportation modes. Our general recommendation for transportation is that the environmental pillar should be prioritized to better balance sustainability. The environmental pillar is also important to focus on because of the degree to which modern transportation causes environmental degradation, and contributes to climate change by producing greenhouse gases.

While this is a broader recommendation for transportation as a whole, Colgate should more specifically prioritize the environmental pillar as well. Colgate can prioritize the environmental pillar by further incentivizing communal modes of transportation for people affiliated with the university. This includes encouraging students to take the Cruiser around campus and downtown Hamilton, instead of their own personal automobile. Knowing that student driving is unlikely to stop completely, Colgate should also put an emphasis on student carpooling up and down the hill. Colgate could also play a larger role in coordinating carpooling across the campus community, so that people from the same states could carpool home together.

Another recommendation would be putting greater restrictions on parking and driving up the hill. Students should have to apply to be able to drive or park up the hill, even after class hours. This is to lessen the traffic up the hill, ensure greater safety, and reduce emissions from individual's constantly driving everywhere. Applications for parking could also help with safety issues at Colgate, because Colgate has problems with congestion up the hill leading to fender benders in tight parking lots like the Alumni parking lot. A simpler way to reduce traffic is

generally to instill a fee of some kind, however, this leave room for a socially negative influence of economic inequality for the student body that would then be parking up the hill. This recommended application process will ensure that that a fair procedure is in place to assure that the students with the ability to park on campus are receiving this privilege in a way that disregards their socioeconomic status. Students may receive priority for certain reasons, such as needing to get to an on campus job.

## Sources

- Bewkes, E. G. (1932, September 30). "Automobile Registration." *Colgate Maroon News*, p. 1.
- Beyer, Barry K. (1954). *The Chenango Canal*. (M2025, Folder 45). Chenango Canal Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University (2009). *Colgate University Student Handbooks Collection, 1898-2009*. Hamilton, NY: Colgate University Press.
- Colgate University. "*Students & Automobiles*." (A1105, Folder 95). Colgate University Division of University Studies Records, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1828). *Report of the Committee on Canals and Internal Improvements, Relative to the Construction of the Chemung Canal*. (M2025, Folder 37). Chenango Canal Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1846). *Colgate University Course Catalogues* (A1327), vol. 1, 1832-1846. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1853). *Request for Payment on Stock, Railroad Committee*. (M2025, Folder 40). Chenango Canal Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1869). *Colgate University Course Catalogues* (A1327), vol. 4, 1846-1869. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1880). *Colgate University Course Catalogues* (A1327), vol. 7, 1869-1880. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1890). *Colgate University Course Catalogues* (A1327), vol. 13, 1883-1890. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1890). *Madison and Broad Streets looking south 1890. Looking North 1985*. (M2046, Folder 439) Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1904). *Colgate University Course Catalogues* (A1327), vol. 16, 1895-1904. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1913). *Colgate University Course Catalogues* (A1327), vol. 18, 1904-1913. Colgate University, Special Collections and University Archives, Hamilton, NY.

- Colgate University. (1916). *Campus Print*. (A1000, Folder 6). Buildings and Grounds Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1920). *Village Square*. (M2046, Folder 676) Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1923). "Reminiscence of Old Hamilton: 'Canal Street' as Maple Avenue was Formerly Known." (M2046, Folder 443). Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1924). *Colgate University Course Catalogues* (A1327), vol. 29, 1920-1924. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1927). *Corner of Kendrick Ave. and Broad St.* (M2046, Folder 430) Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1928-1963). *Buildings and Grounds Misc.* (A1000, Folder 5). Buildings and Grounds Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1932). *Colgate University Course Catalogues* (A1327), vol. 31, 1927-1932. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1936-1937). *Student Handbooks*. (A1049, Folder 7A). Colgate University Student Handbooks Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1943). *Colgate University Course Catalogues* (A1327), vol. 33, 1938-1943. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1947). "Reporter Describes Trip on O&W Diesel Engine" (M2046, Folder 565) Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1948). *Saga of Transportation in Valley of Chenango as Told by Harry Lippit*. Alumni News, Folder 33, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1950). *Maps of Campus*. (A1000, Folder 7). Buildings and Grounds Collection, Special Collections and University Archives. Hamilton, NY.

- Colgate University. (1951, November 7). "An Open Letter to the 'Daily Orange.'" *Colgate Maroon News*, p. 2.
- Colgate University. (1954). *Colgate University Course Catalogues* (A1327), vol. 36, 1950-1954. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1960). *Corner of Maple Ave. and Lebanon St. looking down Maple Ave.* (M2046, Folder 440) Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1962). *Colgate University Course Catalogues* (A1327), vol. 38, 1958-1962. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1963). *Trichepax: Erie Sesquicentennial Historical Summaries.* (M2025, Folder 42) Chenango Canal Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1965-1966). *Student Handbooks.* (A1049, Folder 12). Colgate University Student Handbooks Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1966-1967). *Student Handbooks.* (A1049, Folder 13). Colgate University Student Handbooks Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1968-1969). *Student Handbooks.* (A1049, Folder 15). Colgate University Student Handbooks Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1968, 1974, 1985). *Utica Street.* (M2046, Folder 677). Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1968). *Maple Ave. beyond Lebanon St. corner looking North.* (M2046, Folder 441) Hamilton History Collection, Special Collections and University Archives. Hamilton, NY.
- Colgate University. (1971). *Colgate University Course Catalogues* (A1327), vol. 41, 1968-1971. Colgate University, Special Collections and University Archives, Hamilton, NY.
- Colgate University. (1972-1973). *Student Handbooks.* (A1049, Folder 19). Colgate University Student Handbooks Collection, Special Collections and University Archives. Hamilton, NY.

Colgate University. (1973-1974). *Student Handbooks*. (A1049, Folder 20). Colgate University Student Handbooks Collection, Special Collections and University Archives. Hamilton, NY.

Colgate University. (1979, November 6). "In Memoriam." *Colgate Maroon News*.

Colgate University. (1988, September 13). "Student Votes Can Make a Difference." *Colgate Maroon News*, p. 4.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046). Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 388) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 394) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 400) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 406) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 562) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 588) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 569) Hamilton, NY: Colgate University Press.

Colgate University. (1990). *Hamilton History Collection, 1800-1990*. (M2046, File 571) Hamilton, NY: Colgate University Press.

Colgate University. (1997) *Winfield W. Robinson Railroad Collection, 1831-1997*. (M2026, File 407). Hamilton, NY: Colgate University Press.

Colgate University. (1997) *Winfield W. Robinson Railroad Collection, 1831-1997*. (M2026, File 443). Hamilton, NY: Colgate University Press.

Colgate University. (1997) *Winfield W. Robinson Railroad Collection, 1831-1997*. (M2026, File 559). Hamilton, NY: Colgate University Press.



Colgate University. (1997) *Winfield W. Robinson Railroad Collection, 1831-1997*. (M2026, File 569). Hamilton, NY: Colgate University Press.

Colgate University. (1997) *Winfield W. Robinson Railroad Collection, 1831-1997*. (M2026, File 588). Hamilton, NY: Colgate University Press.

Colgate University. (1997) *Winfield W. Robinson Railroad Collection, 1831-1997*. (M2026, File 569). Hamilton, NY: Colgate University Press.

Colgate University. (2008) *Buildings and Grounds Collection, 1834-2008*. Hamilton, NY: Colgate University Press.

Colgate University. *U.S. 306 The Automobile: Effects on Environment*. (A1105, Folder 95). Colgate University Division of University Studies Records, Special Collections and University Archives. Hamilton, NY.

History. (2015, May 06). Retrieved April 18, 2017, from <http://www.townofhamiltonny.org/history/>

Human, S. (2008). Emergent theory. In S. R. Clegg & J. R. Bailey (Eds.), *International encyclopedia of organization studies* (Vol. 4, pp. 426). Thousand Oaks, CA: SAGE Publications Ltd. doi: 10.4135/9781412956246.n148

Kates, R.W., Parris, T.M. & Leiserowitz, A.A. (2005). What is sustainable development: Goals, indicators, values, and practice. *Environment: Science and Policy for Sustainable Development*, 47 (3), 8–21.

Kudish, M. (1996). *Railroads of the Adirondacks: a History*. Fleischmanns, NY: Purple Mountain Press.

Larkin, F. D. (1995). *Pioneer American Railroads: the Mohawk and Hudson & the Saratoga and Schenectady*. Fleischmanns, NY: Purple Mountain Press.

Lawyer, D. S. (2007). Fuel Efficiency of Travel in the 20th Century. Retrieved from <http://www.lafn.org/~dave/trans/energy/fuel-eff-20th-1.html>

Plum, James (1983). *The Chenango Canal and Its Effects on Hamilton, New York* (M2025, Folder 43). Chenango Canal Collection, Special Collections and University Archives. Hamilton, NY.

Raitz, K. (1998). American roads, roadside America[a]. *Geographical Review*, 88(3), 363.

Ryan, L. (1958, March 19). "Problems of Recession." *Colgate Maroon News*, p. 2.

Shaw, R. E. (2014). *Canals for a nation: the canal era in the United States, 1790-1860*. University Press of Kentucky.

Taylor, G. R. (2015). *The transportation revolution, 1815-60*. Routledge.

Urry, J. (2016). The 'System' of Automobility. *Theory, Culture, & Society* 21: 25-39.

Vance, J. E. (1996). *The North American Railroad: its Origin, Evolution, and Geography*. Baltimore: Hopkins.

Veenendaal, A. J. (2003). *American Railroads in the Nineteenth Century*. Westport, CT: Greenwood Press.