

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

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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.

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).

II. B.

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.

The first automobiles were introduced in America in 1899 through importation from

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-fuelled 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

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

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

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...

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 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” (

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.

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-

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

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).

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.

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-

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, wasy tcountry. R1md com

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.

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,

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.

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, an

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.

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).

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.

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