



Implementing Bike Paths in the City of Worcester

A Proposal to Start a Biking Culture

An Interactive Qualifying Project
Completed in
**Partial fulfillment of the Bachelor of Science Degree at
Worcester Polytechnic Institute**

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May 1, 2013

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IQP-AW1-BIK1

Abstract

The goal of this IQP was to address the need for an alternative form of environmentally friendly and affordable transportation, and to make aware that biking not only helps to create a healthier, greener lifestyle, but it also provides the city residents a more affordable and equally accessible means of transportation. In creating a greater awareness of biking, a proposed implementation of a city wide bicycling network was established which would seek to connect the Consortium Colleges and Universities of Worcester into the downtown area. In turning this conceptual vision into a city initiative, a Focus Group was held on February 21, 2013, which through inviting city officials, sustainability members, and university representatives, allowed the collective insight, expertise, and personal experience to be used to further the process of implementing a bicycling network on a citywide level. Through creating this Focus Group, we were able to design a clearly defined blueprint that would serve future group projects with the knowledge and steps needed in order to respond to all the issues and concerns that were addressed during the Focus Group. An agreed outcome from the WPI Biking Implementation Focus Group was the confirmation that the City will move forward with this proposed network through the creation of a “Worcester Bike Work Group,” which will consist of community, governmental, university and sustainability representatives. Furthermore, a new WPI MQP for Civil Engineering students was created to take on this challenging implementation problem. The team will work closely with the City of Worcester towards the actual reality of biking through the urban communities. Now with a “Worcester Bike Work Group” being set in motion, the conceptual vision of creating a city wide bicycling network, which connects Worcester’s surrounding communities and universities into the downtown area, has become a tangible reality, allowing the foundation for a more sustainable and healthier community for the future of Worcester.

Executive Summary

Once known primarily as a manufacturing city, Worcester has transformed itself greatly to be the city that it is today. Ultimately, the city shifted its goals into becoming a leader in higher education, biotechnology, advanced manufacturing, information technology, health care, and medical research. The City of Worcester is now in the process of working to revitalize and renew its urban landscape. With many improvements including the construction of new, state-of-the-art buildings, to revamping the depressed urban cultural into a more sophisticated, lively, new city scene, Worcester is modernizing its landscape. This transformation can be seen in one of many Worcester urban renewal projects, the City Square Project, which has completely transformed the abandoned shopping outlets into the beginnings of a diverse developmental area, which will house businesses, medical centers, social venues and living spaces alike. Worcester now offers innovative municipal support for business growth and development and educational institutions as well as setting the pace for balanced economic growth and development throughout Massachusetts. These new additions are expected to funnel college students and other Worcester residents into working in these new and increasingly advancing fields, and this requires a demand for efficient and healthier modes of transportation. By traveling to these areas with an easily accessible citywide bike path, Worcester has great potential for an economic boost and to create the “college town” feel that it definitely should have, but currently lacks.

With this dedication to economic and technological development throughout the City of Worcester, there has never been a greater opportunity in which to expand a greener, more sustainable transportation method by improving biking infrastructure within the city and beyond its limits. Through the establishment of upgraded biking facilities as well as other biking infrastructure, the City of Worcester can help create a safer and cleaner environment to meet the demand of a more sustainable living style, in which all of the city’s residents may partake in and benefit from. The general theme and mission of this particular Interactive Qualify Project (IQP) was to create such a biking environment and

culture throughout the city that will build upon the current city goals of revitalization that Worcester is in the process of working towards today.

Additional research was conducted on top of the work done by a previous IQP group on urban renewal projects across the nation to supplement their case studies. These case studies along with new research revealed that additional local cities, such as Fall River and Providence, and national cities such as Washington DC, Pittsburgh and Minneapolis have also gone through a similar sustainability phase as Worcester is currently doing now. Biking was a critical factor to consider for any city that wanted to retain the professional populations from the academic institution. From this research, one can see the benefits that a biking culture and its associated means of transportation has given back to the local communities, which can be seen from the infographic featured in Appendix 7.3. This conclusion can be used to make the case for why Worcester should also begin its urban renewal process with a more involved biking community.

Despite the number of college campuses, Worcester has far from fully utilized its potential as a college town due to the current social, cultural, safety and economic factors. Young professionals choose to not live in the city, even with its low cost of living and short distance from other major cities such as Providence and Boston. However, by connecting the college campuses together with efficient and reliable bike paths, creating a younger, innovative atmosphere will make living and connecting to other students easier than before. Visiting other schools, research facilities and even taking classes elsewhere would be a more realistic option for current students. A real question from hours of brainstorming occurred: How could this IQP group gain adequate attention for this great “biking problem” that needed wide support? How could this problem be made known to the overall community? With the help of Linda Looft and by pulling ideas from interviews and continuous networking, the changes and the politics of Worcester were better understood. This led to the decision to bring together various key stakeholders from across the region in order to discuss bicycle path deployment and implementation.

The WPI Biking Implementation Focus Group, which was held at WPI on February 21st 2013, was a student run design and proposal event where a series of possible roads that could make up the city wide biking network were presented. The fifteen city and campus officials, activists, and planners in attendance were able to share their perspective on the feasibility of the path, identify unforeseen issues, and propose the steps that could be taken to begin this movement. After the WPI Biking Implementation Focus Group, several outcomes were identified that could lead to a future including bicycle paths in Worcester. The network proposed is definitely possible, but over a series of small steps with strong support to insure the longevity of the actual implementation. Finding roads that could easily support the painted lanes would be the first to be implemented. Slowly, the paths would be implemented on a larger scale with cycle tracks and additional infrastructure. An entire network would be created connecting all of the City's colleges to the downtown area as well as other community buildings and housing areas. The keystone of this group was the involvement of the DPW and Mr. Robert Moylan's suggestion for the compilation of a Working Group. This would include students from WPI's Civil Engineering Department working closing with professionals, specifically for biking and associated implementation to complete the actions needed for the success of a bikeway in Worcester. Thus, a WPI Biking Implementation MQP was created under the advisement of Professor Suzanne LePage, with additional help from past advisors and WPI Electrical and Computer Engineering Professors, Alex Wyglinski and Peder Pedersen.

For the hope of a widespread notion of implementation across the city, future activities should include, but not be limited to, WPI hosting a Bike Day to kick off the beginning of the biking network making the movement more of public venue to help expedite the actual awareness process. There could be some obstacles that need to be handled appropriately in regards to the awareness process and community support. This includes educating the urban city population on bicycle road-sharing safety by way of encouraging the Worcester Police Department to enforce speed limits and state transportation laws along roads with bike paths. In addition, easy access should be provided to additional emergency services booths (i.e. blue light towers), especially in dense college populations.

In the end, the goal is to create a healthier environment where biking unifies the city community and makes the streets a safer, more sustainable place. The citywide network of paths connecting the college campuses that reside in the City of Worcester and bringing them to the downtown area will hopefully be fully implemented sometime in the near future.

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1 Introduction

1.1 Motivation

The landscape changes in the downtown area of Worcester may be the attraction that the City needs to start on a bikeway network implementation. The previous Bike IQP group showed that the increasing population in America and the demand to be in an urban setting is only going to make congestion and traffic in cities even worse in the future (Capizzio et al., 2012). An inexpensive alternative form of transportation such as biking will not only help to decrease car traffic, but the bikeways that are implemented would help to clean up the city and reduce crime (Racca, 2006). The decrease in CO₂ emissions, increasing parking space availability, and greater health benefits would also come along with more involved active biking in the City of Worcester. Appendix 7.3 highlights some of the main benefits that can come from biking.

Bicycle transportation in Worcester today is mainly for sport and exercise, and in most cases not even considered a means of transportation (League of American Wheelmen, 2013). Biking should be seen not only as a healthy activity, but more so as an economically beneficial alternative to driving, especially for commuters who drive alone and to small distances less than five miles one way (Gotschi, 2008). According to a report from Denmark's Capital, Copenhagen, biking each mile is equivalent to a positive economic gain, while each mile that is driven results in a negative economic gain (Mims, 2012). America is trying to catch up to other countries in regards to biking infrastructure, and they are making a valuable effort to increase the amount of cycling transportation by building the "U.S. Bicycle Route System," geared toward creating a large-scale path connecting a much broader network (United States, 2012).

Research proposed that violence starting in urban youths could start to be removed with the implementation of safe and reliable biking infrastructure to have safer routes to school programs and extra circular activities (McDonald et al., 2010). As of 2010, Worcester ranks fifth for the highest violent crime rate out of the ten largest cities in New England (Sutner, 2012). It has been shown though, that several of the key benefits of structured and well-maintained bicycle paths include increasing city property values and

a decrease in the crime rate (Racca, 2006). A major outcome from research which was presented to WPI Bike Focus Group is the identification of the key important areas, populations and cultural attractions that would utilize the proposed bike paths the most. Connecting them to the downtown area would have a positive impact on eliminating crime and boosting the economy. Also, those who don't own a motor vehicle or can't afford them would also benefit from these paths, especially college students.

1.2 Analysis of Bicycle Transportation

With plenty research already done by the last IQP group, it was fully utilized to help with the approach this year's group took to achieve the goals that were stated. A more global holistic approach was needed to gain an understanding of how different major cities across the globe where approaching bicycle transportation and how they deal with the demand for more efficient and healthier alternatives to motor vehicles.

Several cities around the world are transforming into bicycle friendly communities. European cities such as Copenhagen and Berlin all the way to US cities of Boston, Pittsburgh, and New York are just some of the cities that have integrated this biking culture for the benefits that it brings. Congestion and gridlock are common and inevitable in large, growing cities. Most travelers spend about an average of roughly 36 hours a year caught in traffic congestion in urban and/or suburban populations, when this time could be used for more productive things (James, 2009). Alternative modes of greener transportation, such as biking to desired popular locations, can help to reduce congestion, pollution and allow the people of Worcester to spend their time how they want to, whether it is spending more time with their families or increasing productivity by having additional time working on technical research.

To note, the previous IQP group also provided several case studies on Copenhagen, New York, the past Worcester biking projects, and bicycle rental programs that several cities are starting to adopt. In addition, a path was laid out to connect several of the colleges in Worcester, which can be found in Appendix 7.1. Funding and cost analysis of the paths was also researched and provided through last year's IQP research.

Finally, several suggestions were made as to what the City of Worcester can do now to start a biking transformation, including installing a bike czar, implementing a test path, having a bike day, and creating a website to advertise for bikeways.

The case study research helps to back up our proposition that efforts made within a city usually start with an initial push for greener transportation, such as biking activity, and then the city transforms itself in a positive way with healthier, happier urban individuals living in a cleaner environment. One of the aims for this IQP is to show the benefits that are reaped from these “smaller-scaled” transformations to cities and how it can be applied to Worcester.

In addition to the national bicycle route, other more local bicycle path initiatives are being made. Local bicycle clubs in many cities make partnerships and use resources such as the Department of Conservation and Recreation to locate funding and other necessities for creating a new path (“MassBike”, 2012). Organizations such as *Bikes Belong* provide grants for smaller scale projects with the ultimate goal of increasing the number of bicycles on the road (“Grants”, 2012). Cities such as Miami are approving “bicycle plans” that are being supported by city officials and committees that oversee the direct implementations and transformations that will make biking seamlessly integrated in the society (Miami, 2012). These are only some examples of the efforts being made to promote biking today.

1.3 The Current Urban Renewal Project of the City of Worcester

Worcester already has several urban improvement projects underway, with the largest project, the Urban Renewal Project of the City of Worcester and the City Square, revitalizing the downtown culture so younger, more professional groups will be attracted to spending time and money at the local businesses and entertainment venues. Known by most of the local residence in Massachusetts, Worcester is an old city, a blue collar working class town, and this IQP will work closely to meet the demands and expectations of the current city projects to allow for steps to be taken towards making a cleaner and more modernized place to live, work and play.

The new City Square project is already aiming toward bringing people together and enlivening the population of Worcester with the new development, proximity to attractions and ease of transportation access (Leggat McCall Properties LLC., 2013). The very core of this IQP is to find the most feasible routes that can be most easily implemented and that somehow bring together communities that also are enthusiastic about bringing a pro-biking attitude to Worcester. Since these projects are up-to-the-minute in progress now, this is the perfect time to propose a new method of transportation to the City of Worcester that would be beneficial to all.

The WPI Bike Focus Group was held on February 21st to bring together city officials, including Robert Moylan and the city traffic engineer, representatives from Becker, Clark, and several members of the WPI community to find a common ground and see what can be accomplished overall for the biking community of Worcester. Each guest contributed something in regards to approving and implementing the paths that this IQP group has outlined, along with showing general support towards creating a larger biking community in the City of Worcester.

1.4 Focus and Potential Outcomes

The Working Group proposed at the February 21st Focus Group will be the key to the success of bicycle paths in the city of Worcester, since it will hold all of the key people with the power to implement the paths. Hopefully, they will consider the network that was proposed at this Focus Group. By first identifying the streets that meet the requirements for implementing a shared lane or an isolated bike lane, several different paths can be proposed depending on what is going to be connected. Also, even if some streets cannot be connected initially, as more bikers start using the path, it is likely that something will be implemented eventually to connect the paths together. In addition to the paths that were proposed in the previous IQP, several additional paths have been outlined since then, connecting Becker, WPI, and UMass. The plan that will be enacted by the Working Group will probably span several years, ending when a sophisticated bikeway network has been implemented.

In addition to the research done during this project, the information gathered during the previous IQP was used to build new professional relationships and make

connections to more people willing to support the construction of new bicycle paths. Meeting with Robert Moylan, Alan Gordon, Suzanne LePage, Linda Looft, and Melissa Lukas allowed for more insight into the work that needed to be done to put forth a proposal to the city for a bike path implementation.

Also, the international, national and local case studies that were completed during the previous IQP were used as inspiration to find more cities and universities that started with nothing and completely transformed the culture to become more a biker friendly atmosphere. These methods used by the mentioned cities, including Fall River and Providence, were analyzed and used as a successful blueprint to see how Worcester could follow suit with their own movement towards creating biker friendly communities. Every city has its own set of obstacles that need to be handled differently, but understanding the problems faced by other cities and how they were solved there may be helpful when the same problems are faced in Worcester.

The objectives for this IQP include building upon the research done by the previous IQP and building relationships with key city officials and bicycle advocates from local colleges so as to ultimately implement a bicycle path connecting WPI and the surrounding colleges to the downtown area. This was achieved at the Focus Group, and even more relationships were made between the cities of Worcester and Boston. There is a lot of community support, and many people in power that are willing to start making an effort to creating this biking community.

1.5 Report Organization

In this report, the background research that was done in addition to the research from the previous IQP will be explained in detail. In addition to the original case studies, more were added for New England cities, as well as others outside of this area that are more comparable to Worcester. Included are the summaries and outcomes from each of the meetings that the group had with Robert Moylan, Linda Looft, and several others. The proposed paths that were designed are also presented with detailed maps and key interest points along each path. The details of the workshop are also discussed, including the preparation and outcomes. Finally, several suggested next steps for the

continuation of this project are outlined, most importantly the formation of the Worcester Bike Working Group.

2 The Research of Case Studies: Populations and Social Values in Urban Settings

When beginning upon any given goal or task, one will find out there needs to be a concrete background of evidence to use to convince others to share your opinions and aspirations. In building upon the case studies already performed by last year's IQP group, additional research was conducted as well as previous cases revisited, through studying such cities as Minneapolis, St. Paul, Pittsburgh, and the District of Columbia, while taking a closer look at the city of Worcester itself. In researching these cities, the IQP group focused on the effects that an urban population would experience in order to understand the effect that the current social class views and urban populations have in helping or hurting a movement toward a friendlier biking community. Simultaneously, the funding for possible paths was also researched through obtaining information on federal and state grants that have been used in the past for biking implementation projects.

In this chapter of this report, a closer look into demographic transitions will be discussed and the potential hurdles that may be need to be overcome to have a successful implementation of bicycle paths or networks will be addressed. Identifying the urban population of Worcester as of today and understanding the growing trends in the city populations of America's once great old "Mill Working Cities," was of interest to this IQP group for many reasons. While a tremendous task, it was not to be ignored and was looked at to make sure all aspects of Worcester were clear to the IQP group to achieve the proper approach. It was crucial to find the most amicable solution to implementing bike pathways in the city and to predict how the city's urban population would respond to the new transportation incorporated into their familiarized roads, since most associate the use of these roads primarily with motor vehicles only.

The city of Worcester could be considered a general case when compared to cities like Washington D.C., Pittsburgh, PA, and urban areas of Minnesota because of the struggle to work with old road layouts that make it difficult to implement bike paths sharing the road with motor vehicles. These cities all have a strong, middle working class and hard poverty levels above the 8% line of the national poverty level. However,

they have a rising and growing professional social class from the higher educational research institutions, government and biotechnological research facilities that demand higher living standards. In addition, they demand knowledge of the status of national and global issues such as depleting fossil fuels, pollution, global warming, health issues such as rising depression, diabetes and obesity levels in various populations as well as economic factors that come from all of the mentioned issues.

Cities similar to Worcester, where biking implementation has taken place, were used as case studies to develop an argument that Worcester too, can overcome the battle that nationally is becoming more common. Case studies were conducted with the local New England cities of Fall River, Massachusetts and Providence, Rhode Island, in order to study the methods and efforts used by cities more comparable to the size and culture of Worcester. It became clear how these cities went about building a friendlier biking community and increasing biking infrastructure within their own city limits.

To conclude, additional case studies were also researched to consider urban psychology and social views, which have been shown to be key issues in biking implementation throughout the nation's biggest U.S. cities recently and from the past. This section of the chapter will help appropriately analyze the needs for Worcester, and how to deal with a population that has a significantly lower class population with the mix of the highly dense student populations across the city as well.

2.1 New England Case Studies

2.1.1 Fall River, MA

Over 100 years ago the Southern New England city of Fall River emerged as one of the leading industrialized cities, hosting over 100 mills, which supported a population of 130,000 people. As the region developed into the 20th century, it would become an economic giant that led the nation in health care, culture, and vocational education. Presently, Fall River is home to roughly 90,000 people making it the 10th largest city in Massachusetts, according to the U.S. Census in 2010, with some of the state's highest poverty and unemployment rates.



Figure 1: Map Outlining the City of Fall River, MA (Google Inc.)

Although the thriving economy of Fall River has since been stifled with the disappearance of textile manufacturing in the area over the course of the past century, today, a collaborative effort by private, government and education partners is focused on recycling existing assets while also developing the innovative economy of the 21st Century. The development of a diversified economy built on financial, niche manufacturing, green technology, life sciences, transportation, distribution, professional services and a vibrant creative atmosphere serves as the infrastructure to sustainable growth for the preceding generations of the city of Fall river.

One of the components that have been included in the creation of a more sustainable and vibrant economy in Fall River is the push towards building a friendlier biking culture, along with the creation and extension of biking projects and infrastructure, leading both within and outside the city.

Implementation of Fall River Bike Path

Fall River's efforts into expanding its biking network has only begun in the past decade. In 2003, Fall River's mayor at the time, Mr. Edward Lambert, working with members of Partners for a Healthier Community, invited over one hundred community

leaders in order to begin an initial visioning session for the future of Fall River. From this group, a design team was formed and issued the task of conducting over 30 visioning sessions during the summer of 2003, which involved over 1,000 Fall River residents ranging in all ages and yielding hundreds of recommendations for the way of improving the quality of life in Fall River (“Partners for a Healthier Community”, 2011).

These recommendations were then posted on the governmental website of Fall River as categories and its citizens were asked to vote for which categories they felt to be the most beneficial ways of improving the quality of life as a whole in Fall River. The categories that received the most votes were then grouped into five Action Priorities. One of the categories that received the most votes was the category Environment, which entailed increased and improved recreational opportunities for youth and adults. One way in which the city looked to fulfill this need was its Open Space Plan, which included a component dedicated to connecting existing biking networks between parks and existing bicycle trails together, while also building a 7 mile long, off street biking trail known as the Quequechan River Regional Bike Path. (“Partners for a Healthier Community”, 2011)



Figure 2: Map of Fall River Biking Network (Quequechan River Regional Bike Path – Yellow Dotted Line (Green Futures))

In March of 2009, a second Summit was held at the Fall River Government Center. Following a series of informational surveys evaluating the outcomes of the first five-year Action Plan, a second survey and plan was published in December 2009 outlining the Strategic Action Plan for the 2010-2014 periods. Currently this strategic plan also includes sections dedicated to the further expansion and creation of more bicycle paths and routes to be established in and around the city in the following years ahead. Fall River's current Mayor William Flanagan has taken even greater initiatives towards

creating a healthier and more sustainable city by bringing in such organizations as Mass In Motion and biking advisor and enthusiast Nicole Freedman. (“The Herald News”, 2012) Mass In Motion is a statewide initiative to combat obesity and the chronic diseases that result from being overweight and lack of physical exercise. The organization is privately funded by the state’s largest insurance carriers and seeks to create policy and improve the environment through the use of such recreations as walking and biking, in order to promote making healthier life choices. (“Partners for a Healthier Community”, 2011)

At this time Fall River is one of only two communities that have received an implementation grant under the organization. Nicole Freedman, who served as Boston’s bicycle Czar during their transformation from one of the worst to one of Massachusetts’s best bicycling cities, has been asked to help advise and oversee Fall River during their own attempts to transform their community into a friendlier bicycling culture and assist in building high quality bicycling projects that will bring greater creditability towards Fall River’s Bicycling agenda. (“The Herald News”, 2012)

Together with Mass in Motion, the two entities have helped to gain approval for biking lanes to be created upon Plymouth Avenue when repaved, as well as proposing the expansion of the Quequechan River Regional Bike Path and the bicycle lanes found on the Veteran’s Memorial Bridge to be expanded and connected into Fall River’s city streets. Although there is a long way to go, Fall River serves as a prime case study in observing the steps and methods that can be taken in beginning the process of creating a successful biking culture within a city.

2.1.2 Providence, RI

Founded in the 1630s by Roger Williams, Providence was a port city, whose economy depended on maritime trade. It wasn’t until the revolution that the city became more industrialized and manufacturing became more prominent. Today, Providence still is a manufacturing center, but they are home to several colleges, including Providence College and Brown University, and many shopping attractions. There have been many efforts made to connect these attractions with paths within the city, and to also help

build larger bikeways, connecting Providence to other cities along the east coast (“Providence”, 2012).

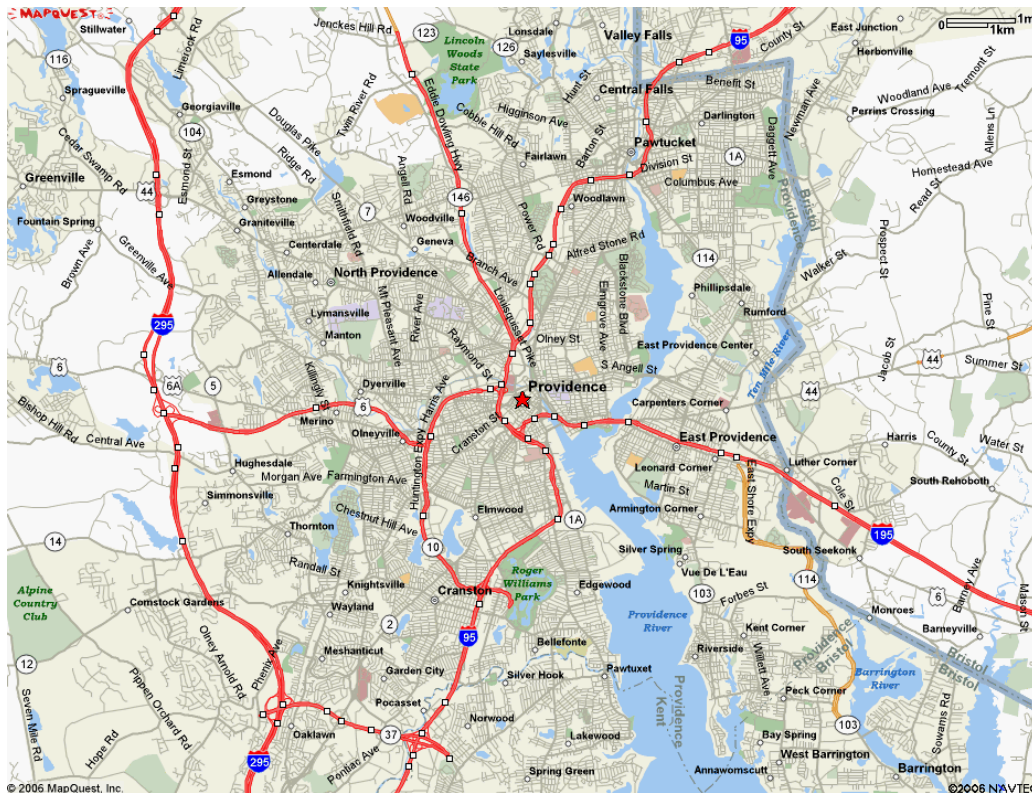


Figure 3: Map of the City of Providence, RI (rususa.com)

One of the largest trails that currently exists in Providence is the East Bay Bike Path. Built between 1987 and 1992, this 14.5-mile path extends from East Providence all the way down to Bristol, RI. Currently under construction is the path connecting the East Bay Bike Path to the Blackstone River Bikeway (East Bay Bike Path, 2012). The path connects several attractions, including boating and fishing locations, historical homes, and shopping centers (Greenways Alliance, 2012). One of the main advocates for this trail was George Redman, who created a petition that received 4,200 signatures for the Rhode Island Department of Transportation to create the path. This was the start of major bikeway creation in the state, and around Providence (Congressional Record, 2005).

The 10-mile Washington Secondary bike paths extend almost to Providence’s west side, and go through Cranston, Warwick, West Warwick, and Coventry. Although the

trail ends right outside of Providence, within the city there are bike friendly roads and some dedicated lanes that connect this path with the Blackstone River Path. These trails, including the East Bay Bike Path, are also part of the Easy Coast Greenway, which is a trail running from Maine to Florida, shown in Figure 4 (Greenways Alliance, 2012).

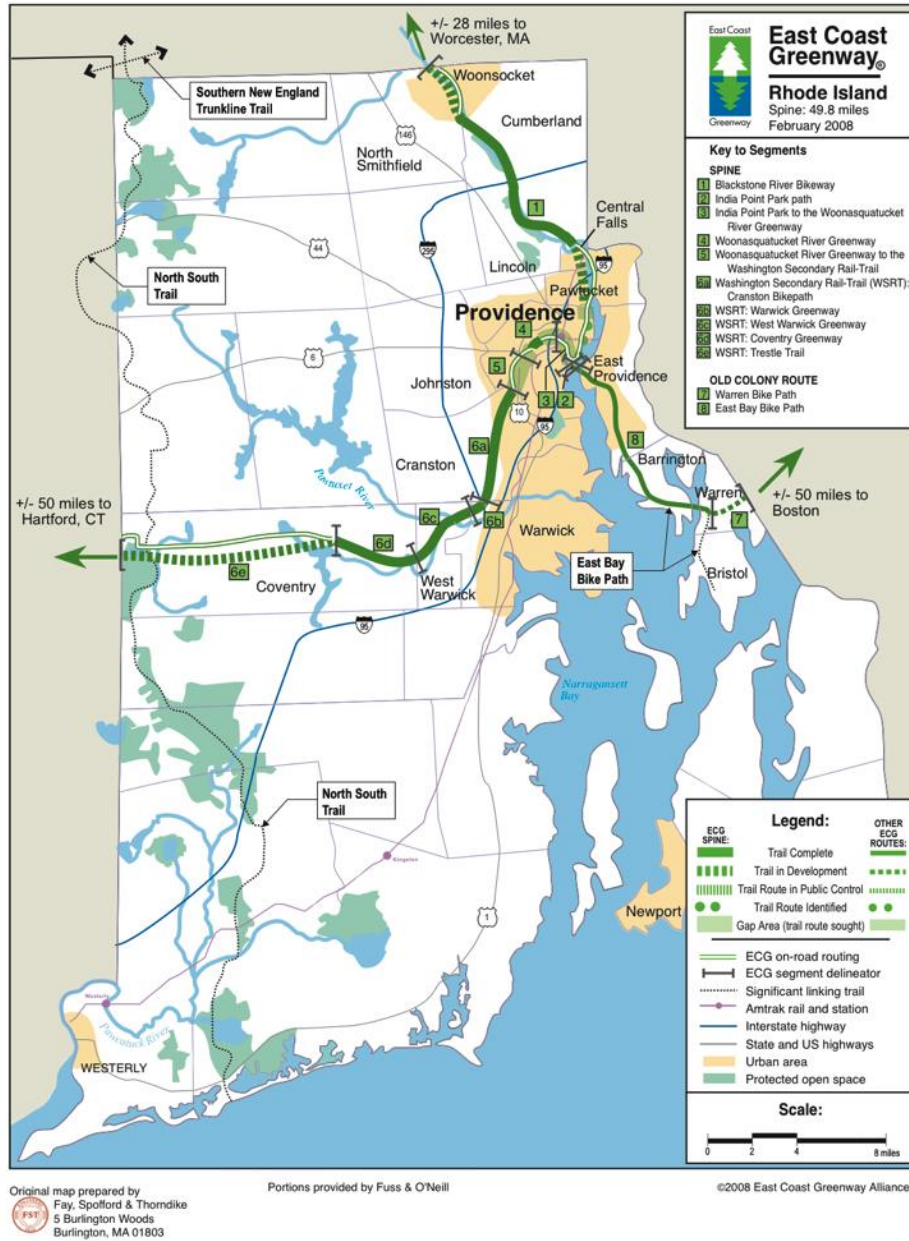


Figure 4: East Coast Greenway Overview (Greenway Alliance, 2012)

Beginning in 1997, the city of Coventry opened the first section of the path, and more sections were added up until 2010. The Rhode Island Department of Transportation (RIDOT) is looking to further extend the path to reach the eastern Connecticut border, making it a 25-mile long path (Greenway Alliance, 2012). In addition, the Fred Lippitt Woonasquatucket River Bikeway extends from the Providence Place Mall through Johnston, RI. Fred Lippitt was the chairman of The Providence Plan during the 1990s and began the transformation of run-down manufacturing sites and started other cleanup projects near the river (Aurecchia, 2012).

After Fred Lippitt, the Woonasquatucket River Watershed Council has been the primary advocate for further development in the area (Rhode Island, 2012). The projects to clean up the river are aimed toward making more recreational land, business complexes, and reducing crime in the area (Aurecchia, 2012).

The bikeways within the city now, including actual painted lanes and share the road signs, were planned in the early 2000s. Figure 5 shows the trails, signed paths, and dedicated painted lanes that are in the city now.

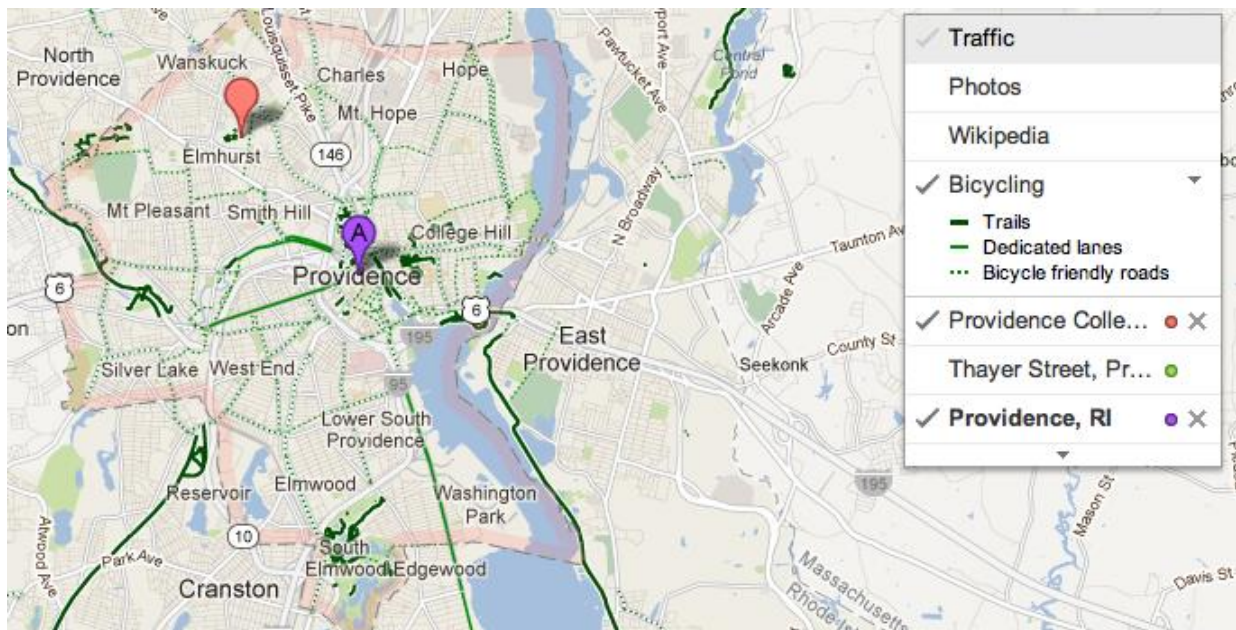


Figure 5: Providence Trails, Dedicated Lanes, and Bicycle Friendly Roads

Other trails include those in the city parks, and the Providence River Greenway in downtown Providence. Most of the major city streets are signed, indicating bike friendly

roads, and there are dedicated lanes along Broadway, Providence Place, and Promenade Street.

Figures 6 and 7 also outline new paths that already have funding and are being constructed, or paths that still need to be built and when they will be completed.



Figure 6: Current Providence Bicycle Plan (Vanasse, 2012)

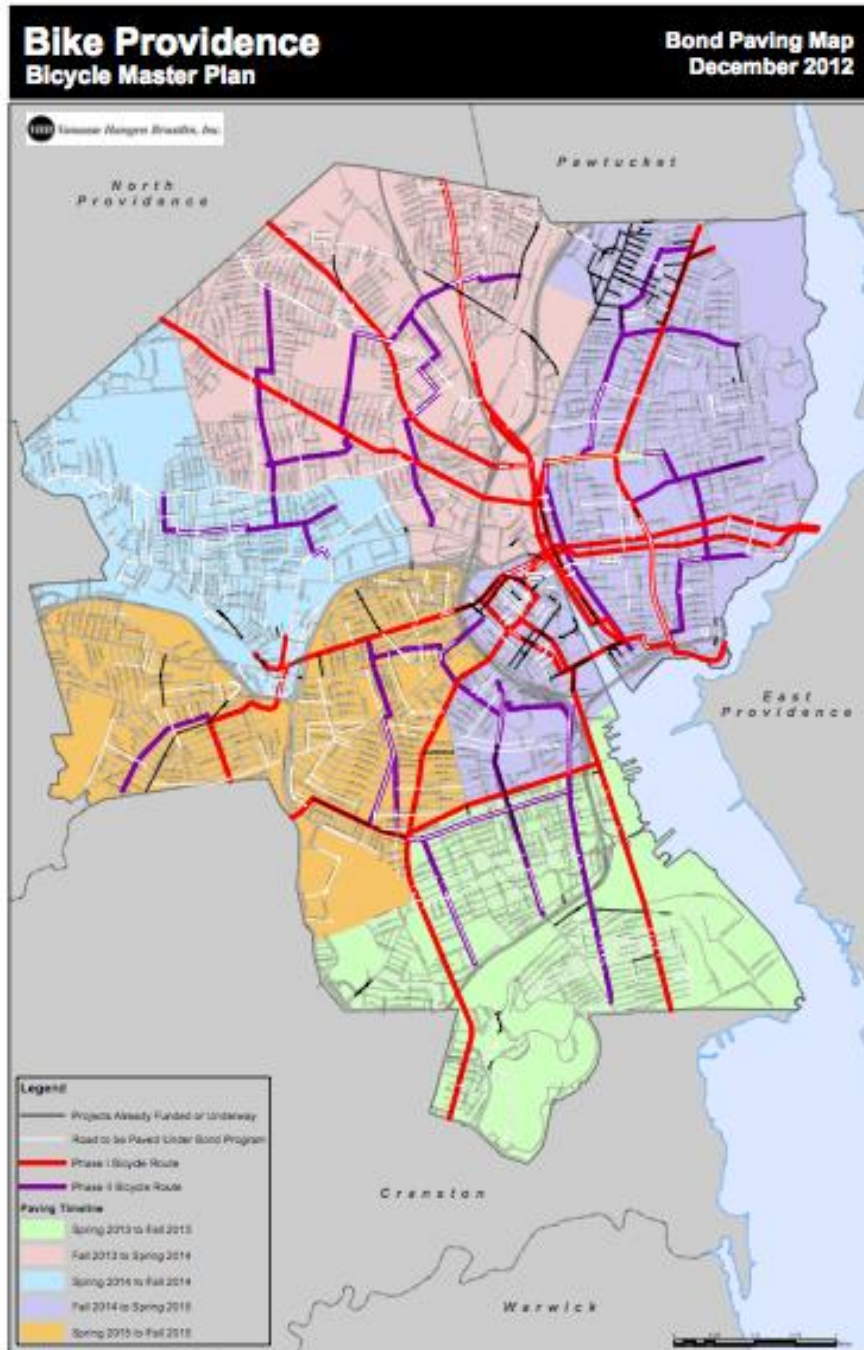


Figure 7: Providence Bicycle Plan Route Paving Timeline (Vannasse, 2012)

Funding for the paths comes from the RIDOT and the Rhode Island Division of Planning Challenge Grant (Vannasse, 2012).

With the movement toward creating more dedicated and signed paths within the city, there are also safety concerns that go along with this. Bike Providence hosted a workshop to review the plans and the foreseen problems. The major safety issue with the paths that were originally planned was the amount of car travel on these roads. The plan that will start being implemented in the spring will try to avoid these busy streets and implement paths on roads with lighter traffic. City planner David Everett is assisting with the new planning and other sustainability efforts within the city (Detz, 2012).

City bike groups, like Bike Providence, the RIDOT, and city officials in Providence are all working toward creating more bike paths within the city to allow for easier transportation. The East Bay Bike Path and the Washington Secondary path that runs through Cranston are gateways for people outside of Providence to easily ride into the city. They are already well on their way to create an extensive bike network to connect all major attractions and places of interest.

Something as simple as George Redman's petition started this movement, and with funding seemingly taken care of, all that is left is planning where the new paths will go. The Providence case study is a good example of where to start when implementing paths, and who is needed for support.

2.1.3 Old Factory and Mill Cities Outside of New England

Pittsburgh, PA as well as the Twin Cities (St. Paul/Minneapolis, MN) have to be the most similar case studies to Worcester, with both boasting success stories that have a very happy and continuously successful outcome in transforming from a once prosperous steel and agricultural industry during the 1800-1900's, to an ugly, dead end era with high crime rates. Now both cities are recognized for renowned research universities, engineering technology companies that thrive, national leading medical industries as well as retaining its young professional workforce by meeting the populations' demands of sustainable living and focus for greener, healthier options.

Both Cities have started implementing bike paths in the past decade to meet the demand for more sustainable, healthy modes of transportation, while fitting the economically suitable substitute instead of driving.

1. Twin Cities of Minnesota Bicycle Implementation: Twin Cities Bike Share Project

Technology was greatly utilized in Minnesota's biggest cities when it came down to bicycle implementation. Greatly funded urban development as well as the use of social networking via the Internet can be seen when researching the various outlets to get the word across about biking around the state of Minnesota. For example, through the state, Minnesota has various social networks and websites, like Cyclopath, to interact with fellow bicyclists through the Twin Cities Metro area and document proven paths and develop a center of shared information like road construction, heavy traffic, and snow plow conditions.

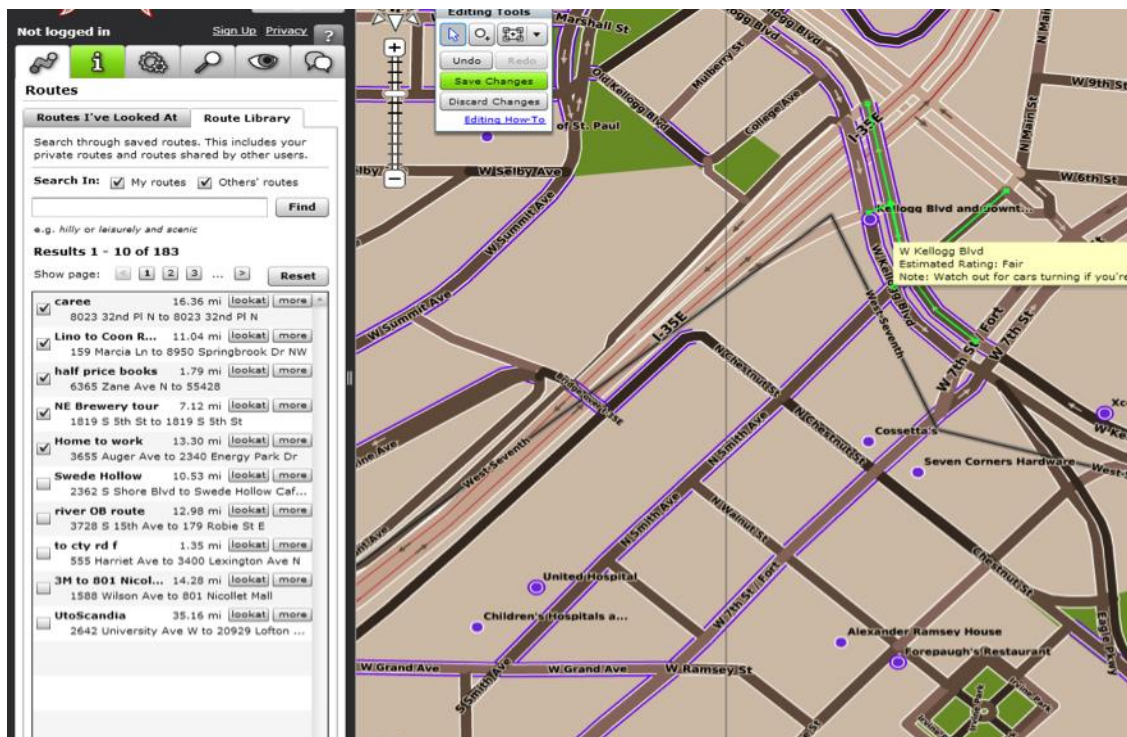


Figure 8: Cyclopath Interactive Biking Network Website (Cyclopath, 2013)

According to the state's transportation authority for biking, Nice Ride, Minnesota is a state, not citywide initiative using funding from the Federal Highway Administration for all of its financial support (Nice Ride Minnesota, 2012).

This bike sharing program's purpose is not only to create a cleaner, healthier, and vibrant city like it boasts on the website, nicerridemn.org, but to achieve a state-wide goal of being a working example to the nation of how a state can implement working and sustainable city bicycle programs that meet the public goals of its ever-growing

urban professional populations. The promise of greener transportation as an alternative to driving a car to one's job, social scene, and place of residence is becoming obsolete as an issue of accommodation in regards to sharing the road throughout the state.



Figure 9: Nice Ride Minnesota Map

Like Worcester, the Twin Cities was once predominantly a working class population due to the Industrial Revolution, with focus on factory and manual labor to drive the city's economy with a decent amount of educational institutions within the city, with focus of study primarily on technological advancements. However, due to the location of the state (US Midwest similar to that of Chicago, IL) and the demographic makeup of a mostly white population (U.S. Census Bureau, 2013), unlike Worcester, the Twin Cities had a different approach to the fall of the industrial decline, making an impressive transition from a once blue-collar make up to a technological, economical, and medical advancement center for the nation (National Geographic, 1980) (Adams, J 2006)(Borcher, J 1987). This case study should primarily be looked at and utilized for its development of recent bike path implementations within the last few years.

2. Pittsburgh, Pennsylvania Bicycle Implementation

Pittsburgh has been known for its natural resource industries in producing more than half of the nation's steel and coal-mining businesses near the West Virginia border (Britannica "Pittsburgh", 2013). The city developed quickly during the 20th Century due

to these resources and its particular location on the eastern side of the US, as well as being close to the major economic routes in the Midwest. In comparison to the City of Worcester with Worcester Polytechnic Institute, the city has major educational institutions, like University of Pittsburgh and Carnegie Mellon University (CMU) to help advance America's transition from the manual labor workforce, to a more pronounced, technical population that had greatly contributed to the technology advancements from these diverse factory and industrial focused cities.

However during the 1970's and up to the 1990's, the majority of manual labor businesses that once made the cities thrive was now on a major decline, with the economy strictly relying on the educational intuitions within each city (Birnbaum "Where We Live: Worcester", 2011). Both Worcester and Pittsburgh alike were unable to keep the freshly graduated and highly educated pupils in the city to boost the dying economy, changing political climate and culture within the city limits, mostly because of the increasing the poverty level and crime rates developed due to various reasons like unskilled jobs, mixed demographics and particular drug popularity. (Blumstien, 2006). More on the status of Worcester can be seen in Section 2.3 of this chapter.

In order to answer the overwhelming impoverished population while trying to accommodate the college students that would study in Pittsburgh, the city came up with a few urban renewal projects to get more technical businesses to establish themselves near one of the best engineering schools in the country. With help from the federal government, University of Pittsburgh Center of Biotechnology and Bioengineering and Carnegie Mellon's Research Institute as well as CMU's National Robotics Engineering Center (NREC) greatly impacted the much needed urban change, upgrading the city's reputation and overall physical image from its prior old industrial appearance (Smith "Pittsburgh: City of Renewal, 2009). With successful ratings in some lifestyle themed magazines and blog articles, Pittsburgh developed a name for itself as one of the best, most livable cities to live in the U.S. (Economist Intelligence Unit "Livability Ranking and Overview", 2011). With the new technology research coming to Pittsburgh rather than being outside of the city, this met the goal of keeping a sustainable young professional population growth, with new demands and lifestyle expectation. Pittsburgh had started

to gain a steady income from the taxpayer dollars of the working white collar professionals in the vicinity along with federal aid, and started to develop accommodations to the demands by this newly established young professional population in order to decrease the growing traffic to and from downtown venues, work, and place of residence.



Figure 10: Pittsburgh's Lawrenceville Biking Trail along the Allegheny River (Pedal PGH, 2013)

With federal funding for improved infrastructure, just like Minneapolis, Pittsburgh started to work with various local bicycle advocate groups and the various medical businesses within the city. With the goal to be primarily a biking city, Pittsburgh locals and various companies worked with urban planners, city officials and marketing groups to create bike systems for commuters, families, recreation, and even winter routes (Pedal PGH, 2012).



Figure 11: Pittsburgh's Car Free Friday's Weekly Biking Culture Building Event (Pedal PGH, 2012)

Local non-profit groups were developed to manage the sustainability of the bike networks that the city strived for along with strong-knit biking communities that grew strong on university campuses, neighborhoods and even within the low-income and blue collar working class families that still reside in Pittsburgh.



Figure 12: The Bicycle Cafe, a bike friendly coffee shop and bar located in the newly redeveloped South Flats Area

As the biking culture grew, biking oriented days, festivals and local business developed and became a part of the city of Pittsburgh (Bike PGH, 2012). According to Pedal Pittsburgh, Fridays are known as “Car-Free “days of the week, where local residences are encouraged to take public transportation, walk and most importantly bike to school, commute to work and leisurely cycle to entertainment venues, primarily sponsored by Whole Foods, a natural supermarket chain store and HighMark, an insurance health care provider in Pittsburgh metro area (Pedal PGH, 2012).

Worcester could model Pittsburgh’s planning strategies and encourage local businesses that employ the majority of people within the Worcester Metro Area. Both cities have had their economic woes and were both at one point, ahead of the game in the industrial boom that literally took up the nation, the creation of major cities. These cities were left to hang when the need for natural resources was cut when more advance and digital technologies took place, leaving only the great educational establishments in their wake. Pittsburgh is an excellent model and “go-to” example of how biking culture and urban renewal projects can, in parallel, be created together without major interference and could be done successfully with help from local companies, non-profits, and community outreach coordination.

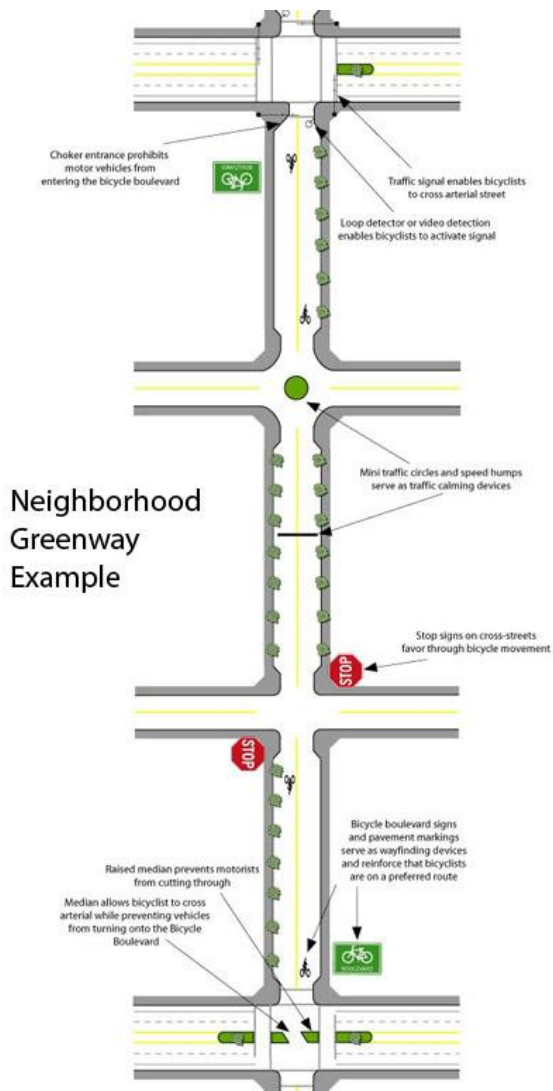
2.2 Developed Urban Cities Incorporation of Bicycle Implementations

2.2.1 Chicago, Illinois

The most common theme in regards to identifying potential issues in all the case studies that were researched was the neighborhood involvement and cultural acceptance of cycling, or the lack thereof, as a safe and reliable means of transportation. According to the Chicago's Department of Transportation and their current cycling project of 2010-2011, as well as the Bike 2015 Plan (CDOT Bike Program, 2013), the biggest concern for potential and interested cyclists is not the winter weather or neighborhood crime rates, but road safety from traffic motorists and the lack of an efficient, identifiable working bike network.

This did not stop Chicago from moving forward with a bike network. Committees were created to work on these issues and to raise awareness at public council meetings. The Chicago Traffic and Pedestrian Safety committee was developed parallel to its bikeway system. A conclusion can be drawn here that both need to coincide to have an overall approval rating and support for the bike system to be appreciated and used to its fullest while achieving the more environmentally friendly transportation goal. (CDOT Bike Program, 2013)

Chicago broke down their citywide Bike 2015 Plan project by implementing various neighborhood projects called Neighborhood Greenways, a Chicago Bicycle Program, and utilizing technologically advanced bike implementations to support all modes of transportation in order to specifically address all safety and traffic needs (CDOT Bike Program-Neighborhood Green Ways, 2012). According to the City of Chicago Department of Transportation (CDOT), each neighborhood continued to breakdown projects to specific streets and proposals to use road treatments and markings to accommodate the type of traffic typical for neighborhood streets and its residing residents, as can be seen in Figure 13.



Below: Curb Cuts



Below: Chicane



Figure 13: CDOT's Neighborhood Greenway Example of Implementing Bike Paths (CDOT Bike Program, 2012)

Chicago, unlike the city of Worcester, was primarily used as a trading center for the United States because of the Great Lakes and the Mississippi River and the development of the railway networks across the nation in the early 1800's (City of Chicago, 2013). However, comparable to Worcester, the city of Chicago at one point struggled with a dying working class and manual labor business-oriented population when trying to meet the demands of the ever-growing intellectual and professional populations that accompanied the technology booms through the past century.

By adding non-profit groups as well as different various city government programs to help the city answer to the alarming growth of low-income population and crime

throughout the city, Chicago has made definite improvements and is on its way to not only becoming a technology and financial trading hub, but allowed changes and business deals selective to those who promise greener, more sustainable endeavors and urban development (World Business Chicago, 2013) (Chicago Housing Authority, 2012).

2.2.2 New York City, NY

The past IQP group did significant contributions to putting together data in regards to the largest city in the United States, New York City (N.Y.C). New York City has faced an uphill battle in regards to the implementation of their bicycle networks, which have been recently installed within the past few years (Capizzio et al., 2012), which without a doubt Worcester will most likely go through to some extents. From financial woes in regards to fare hikes and taxpayer dollars to pay for the projects across the massive, highly dense city neighborhoods (Metropolitan Transportation Authority, 2011), to the preservation of the cities bicycle programs, N.Y.C. needed a lot of support from outside organizations as well as the urban development groups going to city officials to make the implementation of bikeways more than just words. With lots of support, physical, and mental work, N.Y.C. has successfully, if not inevitably achieved its goals in regards to urban sustainability to meet the demands of the population within the city (Capizzio et al., 2012).

For further research on New York City and its bicycle projects, please refer to the 2012 IQP Group report, “A Bikeway Network for the City of Worcester” to see this case study in more detail, along with Copenhagen, Denmark and other global and national cities. Worcester is not the size of New York City by any means; however the struggle for the urban population acceptance and its financial troubles could be greatly similar, if not identical and should be something to consider when creating outreaching bicycle or bike share programs to gain city involvement with the newly implemented biking network.

2.3 The City of Worcester: Current Social, Economic, and Urban Establishment

This chapter subsection will first identify factual data that gives a demographic overview of the people of Worcester, followed by the key problems that could hinder funding and cooperation from community and city officials, stalling any progress on actual implementation. With help from the previous sections which presented the case studies that Worcester was compared to, key issues were constructed then analyzed independently within the subsections to give possible clues on how to solve potential roadblocks, develop proficient arguments to city officials, and build implementation goals to incorporate these issues efficiently and successfully.

2.3.1 Brief Overview of the Demographics of the City of Worcester

The general makeup of the people in the City of Worcester, according to the U.S. Census Bureau, is of mixed ethnicity and social economic statuses. With an estimated population of 181,000, this makes Worcester the second largest city in the state of Massachusetts (Boston is the largest city in Massachusetts). The city of Worcester is comprised of a population of 69% White, 12% African-American (black), 6.1% Asian, and 21% Latino. Rough estimates of the non-white population are growing at a constant rate of 12% per decade [U.S Bureau, 2011]. Worcester has a poverty level of 10.8%, one of the largest poverty rates for a city in the state of Massachusetts. The average medium salary is roughly \$61,500. This is well above the national average of \$31,000 (Massachusetts Office of Labor and Workforce Development, 2010). Understanding the people who compose the culture, drive the political decisions and whose taxpayer dollars pay for the city expenses are a key factor in planning a strategy.

2.3.2 Identifying Key Issues: Areas of Focus

Currently, the city of Worcester is struggling to clean up its downtown region and better its economy and living standards to keep young professionals from leaving the city to escape to the suburbs or out of the region completely. One of the most concerning issues that the city is trying to overcome is the crime rate in Worcester, which is a known growing concern and problem. This problem can be addressed with simple, easier modes of transportation, especially near most of the 8 Colleges/Universities that reside within the city limits.

Due to the recent renewal action taken against Worcester, improvement can be seen. According to an article written by Shaun Sutner of the Worcester Telegram and Gazette, in 2010, there were 35.6 percent fewer property crimes in Worcester, such as burglary, larceny, theft, shoplifting and vandalism, than there were in 1995. However only a very small 2.1 percent fewer violent crimes such as murders, assaults and robberies, according to the bureau's report, "Benchmarking Public Safety in Worcester: 2012" (U.S. Census Bureau, 2012).

As WPI students can attest, this is completely evident if you have been a victim of a violent crime around the campus or have read one of the numerous school emails in regards to personal theft of property, been held up by gun point, or been in the middle of gang violence. The bureau's report, which consists mainly of charts and short explanations of the statistics, is the eighth such public safety benchmarking report that has been issued by the bureau, which is an independent nonprofit organization funded by corporations, foundations, universities and individuals that track the city's finances and administration and the factors that can affect the city.

2.4 Establishing Bicycle Culture within Worcester's Urban Population

The complexity of any city and the neighborhoods that create the very foundation of culture of the urban life, directly impacts the quality of life of the individual living in it, regardless of the singular person's profession, age, sex or ethnical background. Each city's characteristics are based on the people of the city, which give the city a uniqueness of its own ("The Death and Life of Great American Cities", Jacobs 1961).

Each city is different from any other city in the USA. It has its own character defined by its people who work, live, and play within the limits on which they call home. Many factors can be identified as to what creates the character of the city and by character, the very culture, behavior of the population and even the way buildings are designed or maintained is an impression of a city's residents (Jacobs, 1961). The two are dependent variables. The city defines its people and the people define its city. But that being said, how can one truly implement a change to refresh its status if less desirable attributes are defined? What happens to its population, its people? By looking into these factors, a

conclusion will be formed to help broaden our argument and support our case of having an implemented bike path in Worcester.

2.4.1 How Biking Interests Began in Worcester

In 1994, communities and neighborhoods of Worcester began to approach the city wanting the repair and creation of bicycle paths within the city. In meeting this demand, the Worcester Planning Department began a coalition of bike minded people, which included community leaders, government officials, and planners from neighboring communities, such as that of Leicester and Holden. With the help of the ISTEA Bill, a federal transportation-funding bill, the expansion of bicycle development began throughout the city. This coalition of bicycle planning in Worcester remained active up until 2001.

2.4.2 What Happened to Biking in Worcester

After 2001, many of the original government employees who were the main supporters of biking development began to either retire or move on to jobs and departments elsewhere. The progression of biking also began to slow as political entities and interests began to slowly move funds elsewhere and altogether removed the Planning Department, combining its members with existing departments within Worcester's government.

2.4.3 How We Can Help Re-establish a Pro Biking Culture in Worcester

If the IQP group is able to re-establish a pro biking culture in Worcester, we need to become the new Planning Department of Worcester, uniting the different departments involved with bike planning and development. We must collectively bring together Companies, Government, and City Institutions to have an actively equal public-private partnership in proposed biking endeavors, and have Worcester communities actively involved in biking projects and interests. We need to show them how biking can improve their lives as well as their communities.

2.4.4 Current Bicycle Culture on Worcester, Massachusetts Campuses

The various college campuses throughout the city of Worcester have established separate isolated bicycle cultures of their own, for example Clark University's Cycles of Change is a student-run dedicated bicycling organization that promotes sustainability

within the community and a hopeful healthy, active lifestyle to improve Worcester bike-ability.



Figure 14: Clark University's Promotional Phrase for an enthusiastic, "bike-able" Worcester

Our very own WPI campus community also has a developing bicycle program since 1999, with more recent active involvement within the past 3 years. WPI's involvement with sustainability is of great importance to the mission of the campus, the students, the faculty, staff, and Alumni.



Figure 15: "Ride the Goat", WPI Cycle Community biking for competitive sport, leisure and travel.

2.4.5 Psychology of Urban Dwellers

Each individual that lives in any city has developed a specific reaction or lifestyle unique to a city's current cultural setting. The city affects the behaviors, personality, relationships and values of each individual residing in it. The urban environment is more obvious and more distinct than those found in suburbs, where each individual is more family oriented and tend to vary depending on the neighborhood programs, community outreach, and distance between homes (Psychology Today 2012).

That being stated, for the majority of the workforce that does not live in the city of Worcester, the quality of living for those individuals will reside where they live, and not necessarily where they work. This can be a potential problem in regards to trying to get the city support, funding (taxes), and more professional focused urban psychology like other major cities, including San Francisco, Chicago, or Minneapolis, who have more professional city cultures by giving healthier life choices to those who care about their life and the city's future as a whole.

Pittsburgh, Pa. is better comparison because it is a city of industrial roots, such as Worcester, and a professionally driven city, such as Minneapolis. The current reconstruction of urban life and the planning of this change give Worcester huge potential for healthier living styles. Implementing a bike path could help give a way to connect the suburbs and colleges or develop a more active life style and overall improve Worcester as a city.

2.4.6 Low Income Populations

The biggest struggle for any city with an varied social demographic of a mixed of a low-income population greater than the higher-income populations is incorporating healthy and active living choices that are affordable and functional (McDonald et al., 2010). Implementing a bike path system could incorporate both well-being options, would give Worcester residents a cheaper way of commuting to their jobs, use as recreation, and travel to shops. It is not just reliant on private and public transportation. A biking network could also possibly help in reducing obesity rates that are often commonly associated with low-income households due to lack of notorious food options (Larson et al., 2009).

A possible plan to incorporate those from more needy situations would be planning the bike path such that it hits the more low-income housing in Worcester. This includes the Worcester Housing Authority apartment complexes, and with access to popular destinations such as shopping locations to create healthier alternatives to convenience stores, quick food locations, improved recreation sites, they will be able to fully access the community buildings in a sensible, safe fashion. Low-income families who have access to feasible transportation options can have better opportunities than to the current selections that create health problems, obesity, and lack of physical activity. Most low-income neighborhoods do not have the much-needed access to greener, sustainable facilities, like proper bike paths and parks, limiting the actual physical activity and overall active life styles (Estabrooks et al., 2003; Moore et al., 2008; Powell et al., 2004).

According to RITA (Research and Innovation Technology Administration-Department of Transportation Unit) right now, most of the housing for low-income and welfare families are in areas where biking and even walking to high-demand areas is unthinkable. This leaves most of the low-income populations heavily dependent on transportation that is either locally funded through Worcester taxpayer dollars or motor vehicles in which most are not properly insured, registered, or in fit condition for public roads, which increase safety hazards to the public.

By implementing part of the proposed bike path in these areas, you can solve many of these issues at once and have proper and safe access to ride a bike to and from your job or even just for fun, creating a healthier, meaningful life for those who have very little. According to the Australian Institute of Criminology, it is alluded that youths are less likely to be involved in gang related activity, and pursue education and/or more professional careers than those who have a less active and constrained lifestyle (Cameron et al., 200). Job conflict issues could drop if people are less dependent on walking or public transportation. Due to the extensive research of physical activity decreasing most health and mental problems by a noticeable margin, there is no debate that biking is a huge advantage to those less fortunate in the City of Worcester.

2.5 The Funding for Bike Projects

Overall, there are many different possible sources for the funding of bike paths. Federal funding through certain bills that specifically provide for alternative methods of transportation, such as the ISTEA bill that the previous IQP group had identified, is one possible source. The bill has been extended through this year, and there will continue to be funding for this bill until 2014. This would be the best possible source of government funding if needed for a future path. The Blackstone River Valley path was created using these funds, along with help from the Massachusetts Highway Department and then the Massachusetts Department of Conservation and Recreation. These organizations may also help to obtain proper funding. Typically, applying for federal grants is the most popular route for cities trying to refresh its urban culture. The amounts vary from city to city and the funds are made possible by the US government DOT and various urban planning committees.

2.5.1 Prior Sources of Funding

In previous years, funding for bicycle projects has been tapped from federal funds. Bills such as ISTEA and MAP-21 provide funds specifically for alternative transportation. In the Massachusetts state legislature, chapter 90E states that whenever an alteration is made to a road that includes reconstruction or repaving, a provision must be made for bicycles. This includes implementing “share the road” signs when the street is wide enough to support both bike and car traffic to the national standard. Salisbury Street in Worcester has these signs, and also bike logos at intersections to change the lights. These funds come from the Federal Highway Construction Program Fund. For 2012, Worcester received \$4,118,971 from MassDOT for their Chapter 90 allotment (MassDOT, 2012).

Figure 9C-7. Example of Bicycle Detector Pavement Marking

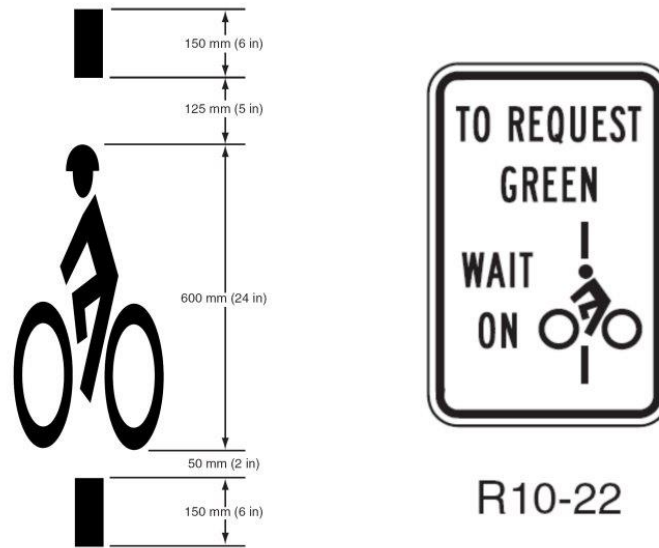


Figure 16: Worcester Bicycle Signage at an Intersection (phred.org)

The Federal Highway Administration (FHWA), part of the US DOT, has provided for a “Bicycle and Pedestrian Coordinator in its State Department of Transportation” (United States Department of Transportation, 2012). This individually helps to increase the projects completed that benefit alternative transportation. The FHWA also provides the history of past funding to each state, indicating that Massachusetts has received \$144,522,553 in federal funding since 1999. The FHWA clearly promotes itself as a resource when it comes to completing bicycle projects, not only by providing the coordinator for each state, but also identifying other federal funds that can be used with what existing legislation there is. This can either help or deter a successful bike path implementation, while providing additional guidance when it comes to designing a new path (United States Department of Transportation, 2012).

2.5.2 Sources for Local Funding and Case Study Examples

After meeting with Suzanne LePage, she had suggested that the best chance for getting funding was by applying for grants. There were several federal grants, including those for the Recreational Trails Program and for the Rivers, Trails and Conservation Assistance. There were a few other non-federal grants, but the issue with applying for them is that there needs to be a large amount of matching. There are certain

requirements for those who are going to apply for them, and also how much the grant is going to be covering for the project. In addition, some grants were researched from the EPA and the NIH, as recommended by Melissa Lucas. It seems that if this project were marketed correctly, the idea of implementing bike paths in a city where obesity is a problem would be very attractive to these organizations.

Since the planned bike path purpose is to connect community schools and college campuses alike in Worcester, it may be feasible to ask for funding from each school that would be connected, i.e. adopt-a-bikeway like those seen in California bike paths, similar to adopt-a-highway programs seen nationwide. Getting the sustainability and green locally or statewide groups on board would also help promote this idea.

Neighborhood homeowners, (who primarily act as landlords if near any college community in Worcester), whose property is near the paths may also want to contribute or provide some sort of activity duty in signing a petition for federal funding to keep the community safer and push crime away. Uniting the local community, officials from the schools and leaders of the sustainability groups will be key in getting the project moving forward. They will not only help with petitioning the city council, but any funding that may not be provided federally might be able to come from these sources.

At first, the grants appeared tedious to apply for and unfeasible to obtain, but they would be very beneficial if the “Worcester Bike Work Group” provides enough documentation and research to support its declared needs. There are many restrictions when it comes to applying for the funding, and spending on this may cut other funds, which the city may think to be more important than the path.

In detailing costs associated with different path designs, separate paths for cyclists costs about \$2,000,000 per mile, an on-road path between sidewalks and parking is about \$120,000 per mile, and a painted lane that’s closer to traffic is between \$25,000-\$50,000 per mile (Capizzio et al., 2011). At the Focus Group, Nicole Freedman mentioned the route Boston took to integrate bike paths into the city. Starting with the roads already suitable that met the lane requirements. Painted lanes should be put on these roads for the first few years. The money set aside for paving the streets and

highways can be used for the paint that would be used to implement the path, or the signs that would indicate a shared lane. As more funding is identified and more people begin using the paths, the network can expand. In the later years, cycle tracks and road alterations to accommodate for bicycle lanes may be more feasible.

A bike path, which has already been planned to connect Union Station to the new City Square Project starts as a key point for this project and can help save funds needed elsewhere. Since work is being done on the roads by this area, some sort of bikeway/alternative transportation allocation needed to be made to the new roads. This may be feasible to look at other roads in Worcester that are undergoing construction and see if these roads can possibly support a path. The funding used to repave the road can be used make the new changes.

2.5.3 Overview of Worcester's funding for 2013 Budget Fiscal Year

According to the City of Worcester 's Fiscal Year 2013 Revenue and Expenditure Overview Report, the majority of the city's revenue is from property taxes followed by State Aid and grants for New Construction Growth Project(s). In the city report, there is a section on Urban Renewal, which discusses the state aid called "Cherry Sheet," which is given to Worcester for the Worcester's Medical Complex or Medical city project. This will bring in more students and young professionals as well as businesses to the city (City of Worcester Fiscal Overview, pg. 6, 2013). This could lead to heavier traffic in these locations, resulting in a need for alternative, more sustainable travel options, like bicycling.

From the 2013 Worcester City Budget, the funding has been cut by 32%, greatly affecting sustainability projects. Health care has been the biggest money sink, with a growing population of retirees, welfare, and other health services. Only \$2.7 million has been allocated to costs in the municipal budget, like pensions, departmental service, snow removal, and other operation services. Currently the city is going to cut city clerks for works and operations. The Cherry Sheet aid, for The Urban Renewal project (Worcester's Medical Complex) is going from \$2.4 million to < \$1million by 2014 and State allotment share is to pay for half of net costs for Urban renewal (6).

Special assessments for the City of Worcester from land owners for street betterments is a rate set by the city council for project value of \$.37 million (12). Currently, the DPW Engineering funds from off street parking, parking meters, city ticket processing is roughly \$100,000 (13). The City currently borrows for infrastructure improvements to city buildings, sidewalks, construction, and rehabilitation of community buildings at roughly \$64.5 million, with reappointment through enterprise funds and grant programs (16).

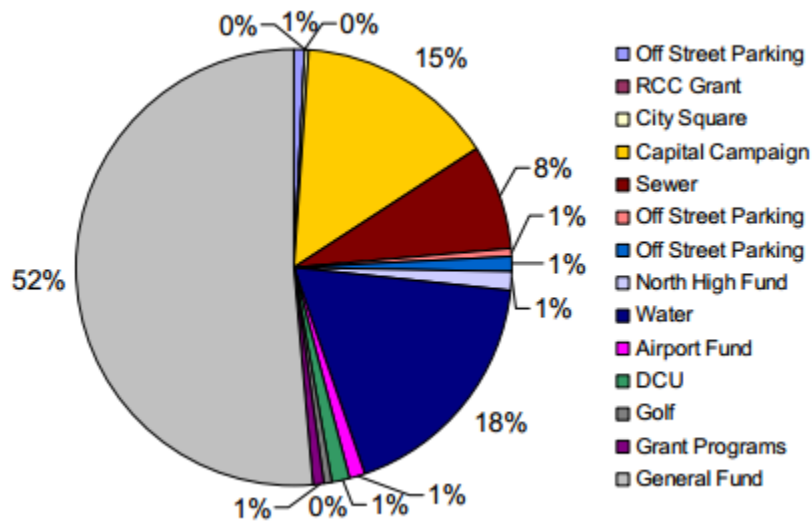


Figure 17: Intergovernmental Charges, like RTA, RMV fees for mass regional planning commission is projected to be \$3.5 Million.

Operational Expenditures

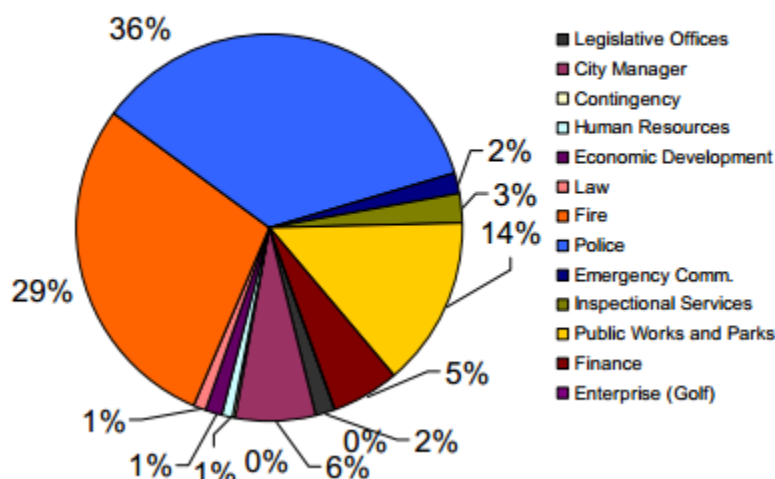


Figure 18: Operation Expenditures

Since November 2006, the city sought out ways to increase financial, long-term stability with a creation of short term and long-term goals (p. 25).

Income from Grants

MassHighway currently is given \$257K since 1991 (however this is not mentioned in the 2012 Worcester Budget!). Other than the bikeways, for 2013, MassDot has set aside \$430 million for statewide bike and pedestrian projects, shared with Department of Conservation and Recreation for the next 10 years. This could mean anywhere from \$100- \$200 in gas savings for locals.

Current fines:

Increase police tickets prices: Laws right now for any biking violation is \$20.00. Fines for parking are roughly \$20-200 (p 10). This does not include booting, court fees, late fees, or other motor vehicle or heal violations. 2012 Revenue (projected costs for 2013) are \$2.9 million.

Solutions to budget problems

Mass Highway's support for regional programs and local initiatives to improve bicycle parking, bike racks near all MBTA Stations, including Union Station.

2.6 Chapter Summary

In performing the research found in section 2 of the report, the group was able to establish a firm foundation in which to use as a guideline in the creation of a biking focus group. Through the research performed, the biking focus group will serve as a launching point in which during the meeting the issues and obstacles found within the expansion of biking throughout the City of Worcester can be addressed and discussed.

After the meeting with Robert Moylan, a conclusion was developed on the topic of funding and it appears that, finding acceptable solutions on obtaining funding will not be an issue at hand for this project. The research will be used to steer any potential argument, in regards to funding, made against the implementation of a bike path in Worcester. With this research, clever counter arguments can be made before they begin. Understanding all sides of a problem is key to winning the audience and proving knowledge of subject matter.

Through the use of this information, the group believes a well-defined plan can be created and presented to the invitees of the focus group and viable solutions can be formed and implemented in the near future.

One of the common themes seen in both case studies performed in the above sections is the understanding and cooperation between both government officials and residents, on how the expansion of biking can help to create not only a healthier sustainable community but also produce economic gains through reducing city and state-wide insurance costs. Through the examples shown in the case studies of Fall River and Providence of both government and community residents working together for a common biking goal, allowing for each to have collective ownership in how the city moves forward with its biking endeavors, allow for a great beginning blueprint on how the City of Worcester itself can follow suit.

3 Key Stakeholders in Worcester's Bike Path Development

3.1 Introduction

In order to address the issues and obstacles which are faced throughout any city trying to create a foundation for biking endeavors well into its future, the group interviewed key figures from Worcester's biking past and present, which helped to provide firsthand insight on how to shape a future biking culture for the city of Worcester.

Those interviewed were Alan Gordon, who was a city planner for Worcester during Worcester's short biking renaissance from 1992 to 2000, Linda Looft, who is the Assistant Vice President for Government and Community Relations at Worcester Polytechnic Institute, Professor Suzanne LePage, who is a civil engineering professor at WPI and was a civil engineer during Worcester's biking implementation throughout the 90's, Robert Moylan, who is currently the Commissioner of Worcester's DPW, and Melissa Lucas, who is the Sustainability and Energy Manager from UMass Medical School.

3.2 Meeting with Alan Gordon

On September 20, 2012, we met with Alan Gordon, who is the Town Planner for the town of Charlton, Mass. and who used to be the Planning Coordinator for the City of Worcester's former Office of Planning & Community Development (OPCD), spanning from the early 1990's to the beginning of 2000. In the meeting with Alan Gordon, we were able to obtain invaluable firsthand information, which included the beginnings of biking development in Worcester, the lapse of biking, and how we as a group can help to revitalize biking in Worcester, through the help of Worcester's government and its residents. The following paragraphs outline some of the key points portrayed to us by Alan Gordon during our meeting with him.

After 2001, many of the original government employees who were the main supporters of biking development began to either retire or move on to jobs and departments elsewhere. The progression of biking also began to slow as political

entities and interests began to slowly move funds elsewhere and altogether removed the Planning Department, combining its members with existing departments within Worcester's government.

Mr. Gordon emphasized that if the IQP group is to re-establish a pro biking culture in Worcester, we need to become the new Planning Department of Worcester between all the different departments involved with bike planning and development, collectively bring together Companies, Government, and City Institutions to have an actively equal public-private partnership in proposed biking endeavors, and have Worcester communities actively involved in biking projects and interests. We need to show them how biking can improve their lives as well as their communities.

3.3 Meeting with Linda Looft

On September 28, 2012 the IQP group met with Linda Looft. Linda Looft is the Assistant Vice President for Government and Community Relations at Worcester Polytechnic Institute. She currently sits at the Mayor's Task Force for Elm Park and a wide range of organizations, which range from the Tri Council Committee to many town meetings. She has extensive experience working with city officials and is more than willing to help the IQP team connect to the right resources. Meeting with Mrs. Looft helped provide a clear sense of direction needed in order to approach and ultimately accomplish the IQP's biking goals. During the meeting, she emphasized many key points that will assist in the implementation of a bike path in the city of Worcester.

The Mayor's Task Force for Elm Park, which is overseen by Robert Moylan, who is the Commissioner of Worcester's DPW, is currently discussing possible locations in which biking routes may be implemented. This provides the team a unique opportunity, in which not only can political relationships be formed with such political figures as the Mayor and Robert Moylan but as these possible biking routes show little political motivation behind them, they provide a great situation in which the goals of the IQP and the goals of the Elm Park Committee can be formed as one, in order to further biking infrastructure and implementation within Worcester. In creating this link, the first person in which Mrs. Looft directed the group to meet with was Robert Moylan. Meeting with Mr. Moylan, allows for the creation of a relationship with a key political figure, with who

is also an advocate of biking in Worcester. Mr. Moylan can help the group to navigate the political waters and will give the group creditability when it comes to raising the issues of furthering Worcester's biking infrastructure to the city council.

In the meeting, Mrs. Looft expressed the idea of looking into Main St. as a possible location for a bicycle route. Presently, downtown Worcester is an area of economic and constructional development. Union Station has been reconstructed and revitalized, the City Square Project, which will include the construction of St. Vincent's cancer center, Hanover Insurance Center, and residential housing, is replacing the remains of the Worcester Common Outlets. Furthermore, Quinsigamond Community College has proposed to build a satellite campus on Main St., and Massachusetts College of Pharmacy has announced that their student body will be doubling within the following years. This presents a perfect opportunity in which a bicycle route through Main St. could be included with the revitalization of downtown, as well as serve students and residents alike, a healthier, greener, and faster means of travel throughout this area.

Mrs. Looft also suggested beginning with WPI as the first step in the implementation of biking infrastructure and culture. This includes the creation of more bike racks within the campus, as well as the formation of connecting bike routes that will run throughout the campus. In starting with WPI, allows for WPI to show its own commitment towards furthering biking and will give the IQP creditability in showing outwardly that WPI believes in and stands behind biking. In order to accomplish this goal, Mrs. Looft suggested that the group propose this topic at the President's Task Force of Sustainability, another committee that Mrs. Looft sits on. Using biking as an alternative means of transportation is a viable sustainability issue, and presently WPI's SynergE includes a group of students, professors, and companies, which may be interested in creating a bicycling implementation plan for WPI, that will serve as a greener and healthier mode of transportation for all of WPI's personnel to enjoy.

In the meeting Mrs. Looft also suggested other people and organizations that should be met with to discuss different issues and also get their opinions in the use of bicycling as a possible answer to sustainability. At Clark there is Ms. Jenny Islar and Jack Foley, Elizabeth Tomaszewski at WPI, John Orr, who is leading the President's Task Force of

Sustainability at WPI, and Lea Lupkin, who is the student representative on the SynergE group. Another individual of interest is Professor Rob Krueger, who is the director of the Worcester Project Center. He knows anyone and everyone in the city, and can easily be reached in IGSD. He may also be helpful when it comes to getting city officials involved.

In presenting the idea of the IQP team forming a biking focus group in order to bring key figures together to discuss and move forward with bicycling endeavors throughout the city of Worcester, Mrs. Looft thought that this was a great idea and should be held either at the end of B-Term or the beginning of C-Term. In bringing key figures together for a one day biking focus group will allow those that are invited to feel that they have a voice, making it more likely that they will feel inclined to participate in the focus group and adopt the goals of the IQP team as their own.

3.4 Meeting with Suzanne LePage

On September 12, 2012 the IQP group met with Suzanne LePage. Suzanne LePage emphasized that first we should start by figuring out who we are going to propose to. If it's the city council, they are going to like to know that we have talked to Worcester's DPW and that Worcester's DPW has reviewed and approved plans for implementing a bicycle route, in the location that the IQP group has decided upon. Worcester's City Council will want to know why we chose the location we chose, what it would cost and what the physical impact would be. They might also want to know if the bike path would be implemented using some roadway space, or if the road would have to be widened in order to accommodate the bike lanes. Other things to consider would be the impact on traffic and what the City Traffic Engineer has to say about the roads we are proposing to implement the path.

She also mentioned in the meeting that when Alan Gordon was working for the Worcester Public Planning Commission, there were roads that were built to be more accommodating for bike lanes in the past. She also mentions that another thing that we should look at is the Massachusetts Department of Transportation. They have a Massachusetts project development design book that outlines the rules for design of roadways. Another thing they tried to set up is called a context-sensitive design. Context-sensitive design is two things; it incorporates what the neighborhoods want so

that there is not a design conflict, which negatively effects travel through that region, and in high-density travel regions there is more accommodation for all modes of transportation. That guidebook also has a chapter about bicycle and pedestrian facility's.

One of the issues in Worcester, and for the rest of New England for not having bike lanes is because many of their roads were designed and built prior to the governing of constructional road regulations. This is especially true for the city of Worcester. Before 1925, anyone owning property in Worcester could record a plan dividing their property into new lots and proposed streets. No prior review or approval was required, nor was there any requirement to guarantee that the proposed streets would, in fact, be constructed, let alone properly engineered. The enactment of the Sub-division Control Law, in conjunction with city regulations, have effectively eliminated the creation of substandard, oftentimes dirt private streets that were commonplace years ago.

Gradually, these streets were turned into automobile centric roadways and now we have a higher density development compared to other locations. This results in lots of traffic, and even less space to accommodate for bicycles. It is hard to justify taking away road space for cars, creating more traffic, more delay, an increase in travel time, and an increase in air pollution, which is worse at lower speeds when cars are in traffic. She pointed out clearly that if there are too many citywide transportation projects that are occurring at the same time, this will worsen air quality and federal funding towards these bicycling projects could possibly be cut off. It is hard to accommodate space for bike paths. Concerning the culture of Worcester, she mentioned that it is hard to say even if the public transit system is highly utilized. Other issues include the small size of the roads in Worcester, and the New England climate that deters bikers during the winter months.

In the meeting, she mentioned that first we would want to talk to the City Traffic Engineer because he would ultimately figure out how the bicycles will be part of the transportation in a safe and efficient way in partnership with the cars. When meeting with Robert Moylan, she suggested that we should have a route in mind to get down to specifics of that particular road and what is and isn't going to work when it comes to

putting a bike path there. Robert Moylan and the City Traffic Engineer, Joe Borbone, will know each road specifically, and they will be able to indicate each problem that we will run into with a particular path.

When we asked Professor LePage what she thought about connecting the schools with a bike path, she thought it was a great idea for many reasons, not just the benefits that it would give to WPI. If more racks were built, parking on campus would be less of an issue if people rode their bikes. This seems to be a problem on other campuses also, and Professor LePage thought this was a great solution.

3.5 Meeting with Robert Moylan

On October 11, 2012, the group met with Robert Moylan, who is the commissioner for the Public Works and Parks Department for the city of Worcester. During the meeting Mr. Moylan was a great help in outlining the steps that should be taken in order to best meet the IQP group's goals of implementing a bikeway that connects the colleges of Worcester and also expressed his interest in attending a biking Focus Group, which will be hosted at WPI by the IQP group. These steps included creating a coordinated map of possible streets that would connect the colleges, creating a resolution document to be presented to the Mayor of Worcester, and the personnel and groups who should be present during the hosting of a biking workshop.

In mapping out all streets that will be used in order to connect the colleges of Worcester, the streets chosen will be ordered from easiest to implement biking infrastructure to hardest. The easiest roads to implement will be chosen due to the dimensions of the road, in which 14ft on either side of each lane allows for a shared route between bicycles and cars to be created, and 18ft on either side of each lane allows for a painted thermoplastic bicycle lane to be created. In mapping out the chosen routes and grading them by easiest to hardest to implement, it will allow for a clear and concise conceptual design to be created and understood when presented to the various members during the biking workshop. It will also allow for the implementation of these routes to be broken down into different phases, which can be discussed also during the workshop.

In all reality, as Robert Moylan mentioned, there is only about a month left in which thermoplastic bicycle lines can be laid, as the winter does not allow for a suitable road surface for the thermoplastic paint.

Robert Moylan also suggested that a resolution document be created in which all deans and presidents of the schools that will be connected through the bikeway sign. The resolution will specify that they would like to see the city make a conscious effort to further advance and implement biking infrastructure whenever road repairs or development is taking place within the city. This document will be submitted to the Mayor of Worcester and then presented to the city council. This document will give further incentive and encouragement to Worcester's government to bring biking advancement to the forefront when working on future road endeavors.

When mentioning the idea of hosting a biking workshop at WPI, Robert Moylan thought the workshop would be a great idea and said he would be happy to attend or at the very least would have his traffic engineers and or other pertinent staff come if he could not make it. With the workshop, Robert Moylan did mention that along with having the various schools and sustainability groups present, a component of the Worcester biking community should be invited also to get further insight of what the community would like to see out of the creation of the school bikeway network.

3.5.1 Post Focus Group Meeting with Robert Moylan and WPI

Further discussed in Future Works chapter of this report, a meeting was held on April 1, 2013, with Robert Moylan, the IQP Advisers, and members of this IQP team, to review the agreed "moving forward" action plans in regards to the actual implementation process of the next steps with Worcester's DPW and WPI.

Susan LePage was also at the meeting along with her future MQP students, who are going to take the IQP Project and transition the goals into a Civil Engineering MQP (further discussion in Future Works chapter). The following Main Topics for the Working Group (WPI-DWP Connection, IQP-MQP Transition) were as follows:

- Working Group: WPI's 1st IQP-MQP for implementing bike paths in Worcester.
- Robert Moylan expressed thoughts:

- “Low Hanging Fruit” and master plan possibly should come from WPI’s end.
- Connecting campus with key locations for possible implemented pathway.
- Advocate for local biking groups and re-establish existing groups if necessary.
- Be able to “Understand it’s not about sufficient geometry” it is a balance between sidewalk, road, and bike shared roadways.
- Who is going to launch the working group? Undetermined as of late. WPI must be the staple in order to ensure progression and success of bicycle network implementation.
- Professor LePage responds to Mr. Moylan’s question:
 - Undetermined as of late.
 - Activities could run during the summer, but worst and least case scenario: Mid-late August for 2013-2014 WPI school year students at senior level for A, B, C terms.
- DPW’s Expectations of the biking network “Worcester Bike Working Group”:
 - WPI will come up with meeting minutes, contacts, and first steps planning.
 - Identifying a Chair (Driving Force) point of contact. Linda Looft, Professor Wyglinski, and Susan LePage were up for position.
 - Create an overall WPI-end goal of outcomes and long-term timeline
 - Central point of contact email: transfer bike@wpi.edu to Susan Lepage.
 - Beware of all opportunities for additional funding (i.e. MassTrans, MassDOT etc.).
 - Give a copy of the list of people from WPI’s end who will be on the “Worcester Bike Work Group”
 - Have weekly contact with Mr. Moylan to give project timeline, current issues/accomplishments.
 - Update WPI IQP biking website.

3.6 Meeting with Melissa Lucas

On November 20, 2012, Melissa Lucas, the Sustainability and Energy Manager from UMass Medical School met briefly with the group. Already interested in the project, she was informed of the workshop that was going to take place and what the major goals were. She was very willing to come to the workshop, and gave the group several

contacts and her own input into path ideas to connect WPI to UMass. The path outlined in the next chapter reflects some of these ideas.

Melissa Lucas offered to help advertise the path and get more enthusiasts. By focusing on the health benefits of biking in addition to the sustainability factor, she said that this would be the best way to gain the most support. In addition, she suggested a possible implementation of a bicycle hub program on campus; one similar to the program Clark University has now.

In regards to funding, Melissa mentioned that it would be a good idea to look into the EPA's Environmental Education (EE) grants. Federal funding, she mentioned, isn't looking like a favorable option due to cuts. Also, the National Institute of Health (NIH) offers several sources of funding and grants if the project can be spun from a health angle. In this case, talking to the business department or marketing on campus and getting them on board would definitely be helpful if funding needs to be obtained in this way.

Overall, Melissa Lucas was very enthusiastic to help out on the project and was willing to give us names of others who would also be as interested in helping with the project as she was, including John Odell, Michael Colin, and even actor Dennis Leary. The support from the rest of the participants of the workshop will hopefully be similar to the support that she has shown.

3.7 Building a Network of Key Stakeholders for the Focus Group

Interviewing each individual allowed a unique perspective and angle to be utilized in order to move forward with building a plan for a biking network for the City of Worcester. As valuable as the information documented throughout these interviews to the overall success of the IQP, so too were the interconnecting relationships being made in order to build a network that could help to build a biking design for Worcester during the Focus Group. In creating the invitee list for the Focus Group, it was vital to bring like-minded individuals together, each with their own expertise and experience in their work fields, in order to bring a wide spectrum of ideas and solutions to the table in creating of a city wide biking network. Through interviewing sustainability representatives that are

involved throughout the communities of Worcester, as well as Worcester's DPW Commissioner and past Worcester planning officials, not only was pertinent information able to be gathered but a network of experienced individuals were able to be established which would be capable of helping to create realistic solutions for the future success of biking in Worcester.

3.8 Chapter Summary

In performing the interviews and research found in section 3 of the report, the group was able to establish connections and relationships with some of the key figures needed in order to deploy bicycling infrastructure within the city of Worcester. The biking focus group will serve as a needed launching point in which during the meeting the issues and obstacles found within the expansion of biking throughout the City of Worcester can be addressed and discussed. Through the use of and participation of those interviewed being present during the focus group, the group believes a well-defined plan can be created and seeable progress can be made into implementing bicycle routes in the near future.

4 Proposed Approach to Bikeway Implementation

With Worcester being a college town and with the current student body of Worcester reaching 30,000 students, we proposed a bike path network shown in Figure 19. Since many students do not own a vehicle and are on a financial budget, bike paths connecting local businesses, shops, and different attractions, that the City of Worcester has to offer, would be an affordable way of transportation for students and young professionals that live in Worcester. With the City Square Project being developed in Downtown, which is envisioned to consist of newly constructed areas for office, residential, retail, entertainment, and hotel opportunities, we believe that this path leading to Downtown would be beneficial for students, resident, and visitors to the City. In creating this network, we used a Worcester roadway feasibility map that was created in the early 1990's, which identifies those streets that are feasible to support the implementation of bicycling infrastructure. This map is shown in Figure 30. In this chapter, each path is broken down in detail to explain the reasoning behind the chosen roads to be implemented by the City of Worcester.

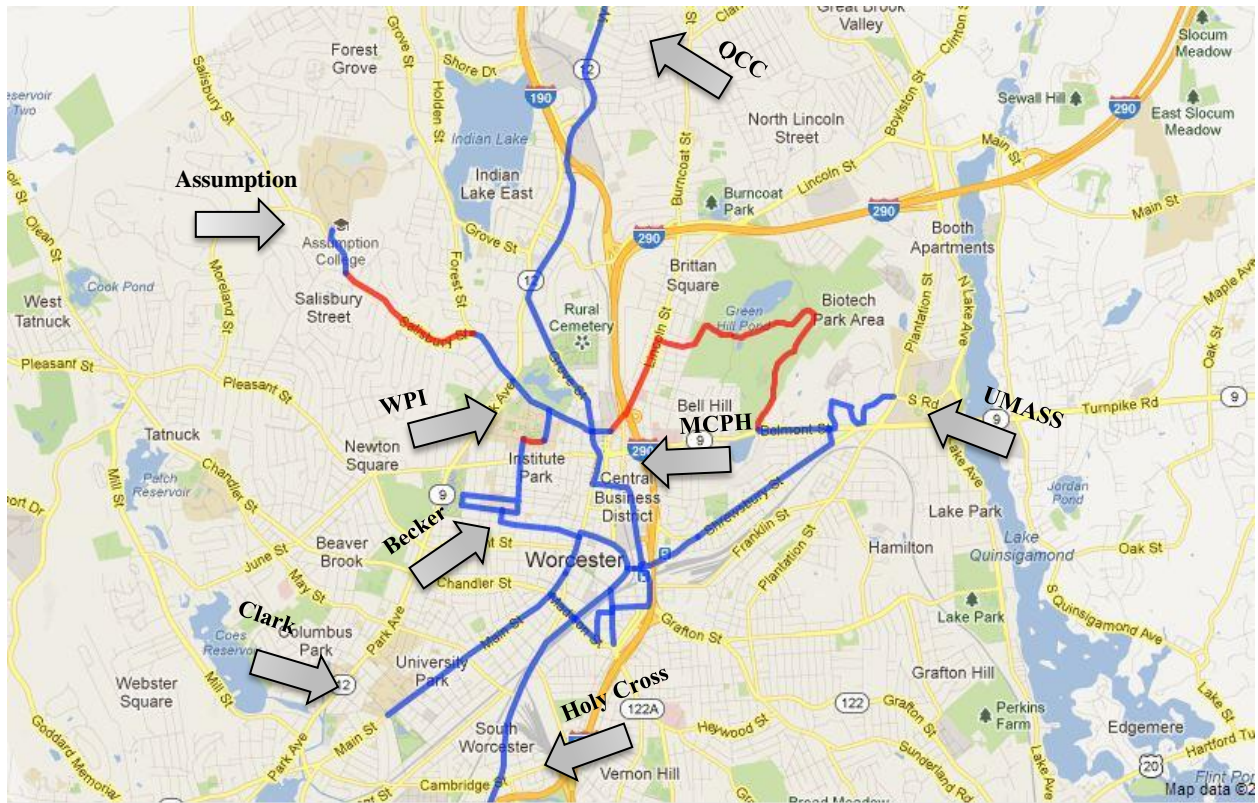


Figure 19: Proposed Bike Path Network Interconnecting Eight Major Universities with Worcester's Downtown Area

The proposed bike path network is divided into ten different regions based on the designated districts of the City in which the bike path travels through as shown in Table 1. Through meeting with Erin Williams, the Cultural Development Officer for the City of Worcester, she emphasized dividing the bicycle paths into different sections based on the Worcester Way-Finding Project. The Way-Finding Project is being created by the City of Worcester in order to develop designated districts of Worcester, which will include signage, destination identifiers, and information kiosks capable of guiding visitors through Worcester. Incorporating our biking network into the Way-Finding Project would be a great way in order to establish signed color-coded bicycle paths that are easily distinguishable and easy to follow and access. The red and blue lines shown on Figure 19 are the proposed bicycle paths, with red being the shared bike lanes due to the narrow road width, and blue the dedicated bike lanes where the road width meets the specification for having a dedicated bike lane.

Table 1: Different Regions Based on the Way Finding Project, Including the Institutions and the Distance to the Downtown Area

Path Sections	College Connections	Distance to Downtown (mi.)
1. Downtown District Bike Path	--	--
2. Salisbury Way Bike Path	WPI and Assumption	2.9
3. Salisbury District Bike Path	WPI, Assumption, Becker	1.2
4. Elm Park District Bike Path	WPI and Becker	1.2
5. Lincoln Way Bike Path	WPI and UMASS	2.5
6. Shrewsbury St. District Bike Path	UMASS Medical	2.5
7. Canal District Bike Path	--	--
8. Main South District Bike Path	Clark	1.6
9. West Boylston Way Bike Path	QCC and Assumption	4.0
10. Blackstone Way Bike Path	Holy Cross	2.9

In one of our early meetings with Mr. Robert Moylan, one key issue that he mentioned when selecting a particular roadway for bicycle path implementation is that the roadway needs to be 31 feet in order for the DPW to consider a dedicated bike lane. The roadways we chose are the most feasible bike paths that could be considered in Worcester. In selecting these routes for biking we took in consideration the road width, the flux of traffic on that particular road, and most importantly points of concerns that the particular road encounters such as: uphill or downhill, intersections that do not have signage or set of lights, parking, and blind curves.

4.1 Downtown District Bicycle Path

The proposed path for the Downtown District in Figure 20 is where all major University's interconnect. The bicycle path goes by the heart of downtown including the City Square Project, Union Station, Saint Vincent Hospital, Worcester Public Library, and Massachusetts College of Pharmacy.

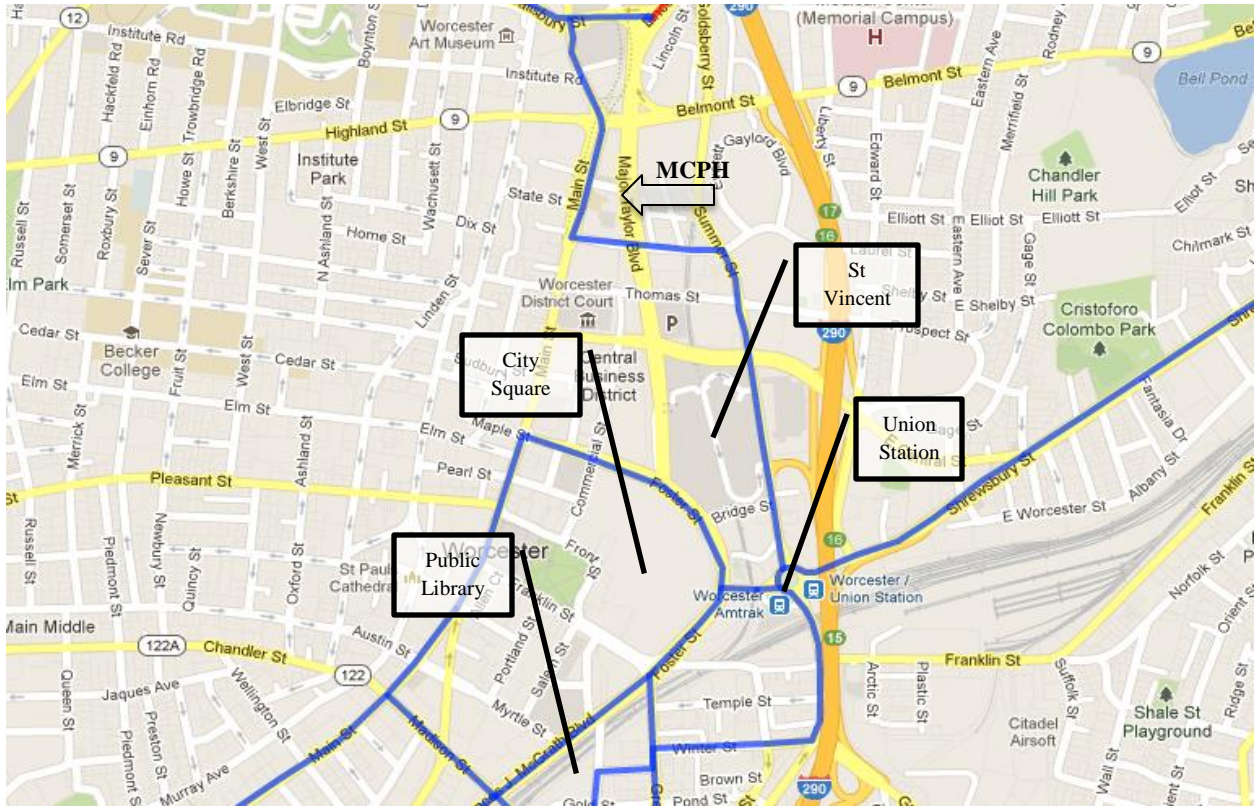


Figure 20: Proposed Bike Path for the Downtown District

Table 2: Detailed Roadway Information for the Downtown District

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Main St.	Varies	<ul style="list-style-type: none"> Shared/ Dedicated 	<ul style="list-style-type: none"> Parking in some areas. 	<ul style="list-style-type: none"> MCPHS Worcester District Courthouse
School St.	Varies	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> No issues 	
Summer St.	55'	<ul style="list-style-type: none"> Shared/ Dedicated 	<ul style="list-style-type: none"> Width to accommodate two lanes of traffic and bike path 	<ul style="list-style-type: none"> Worcester Housing Authority St. Vincent Hospital Worcester PD
Foster St.	60'	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> No issues 	<ul style="list-style-type: none"> City Square Mass College of Pharmacy
Front St.	55'/65'	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> No issues 	<ul style="list-style-type: none"> Central Mass Korean War Memorial Worcester Amtrak Union Station
Francis J. McGrath Blvd	Varies	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> No Issues 	<ul style="list-style-type: none"> Worcester Public Library YWCA

Table 2 is the detailed information for each road used to create the pathway in that district. It displays the street name that the path travels, includes the street right of way dimensions (R.O.W), the supported lanes on that particular street, as well as some of the concerns and attractions. In the Downtown district, the supported lanes for the bicycle path can accommodate dedicated lanes. Some issues with this bike lane would be Main St., since in different areas the road width varies, as well as the on street parking in some areas in Main St.

4.2 Salisbury Way Bicycle Path

The proposed path for the Salisbury District in Figure 21 connects Assumption College with Worcester Polytechnic Institute, which then leads to Downtown. This path faces many challenges in implementing a bike lane due to the road width as shown in the map with the red line. We found the road width is very narrow and there are many blind curves which makes it difficult and dangerous for cyclists. Another key issue with this particular bicycle lane is at the fork intersection of Grove St. and Salisbury St. However, one advantage that this bicycle lane possesses is the short distance connecting Assumption with WPI and then to the Downtown area. In the Focus Group meeting, Suzanne LePage, who was a former professional planner for the City of Worcester and currently a professor at Worcester Polytechnic Institute, teaching classes in urban and environmental planning, pointed out another great route that could be considered connecting Assumption with WPI. She suggested that instead of using Salisbury St. to connect Assumption into WPI and the Downtown area, as this roadway has many blind spots with high vehicle speeds which make it challenging for the cyclists, we should look into considering a route from Pleasant St. The alternative bicycle path avoiding Salisbury St. is shown in Figure 22. We decided to have the bike path going through Highland St., which is parallel to Pleasant St. The reason we chose the bike path to run through Highland St. is that it also connects with Doherty Memorial High School which is located on Highland St. Having a bike path going through a high school is an advantage in comparison to Pleasant St., which later in the Focus Group was emphasized that having a bike lane go by a high school would be a great idea, since most of the teenagers do not have a driver's license and a bicycle lane going by a high school would be very beneficial to community.

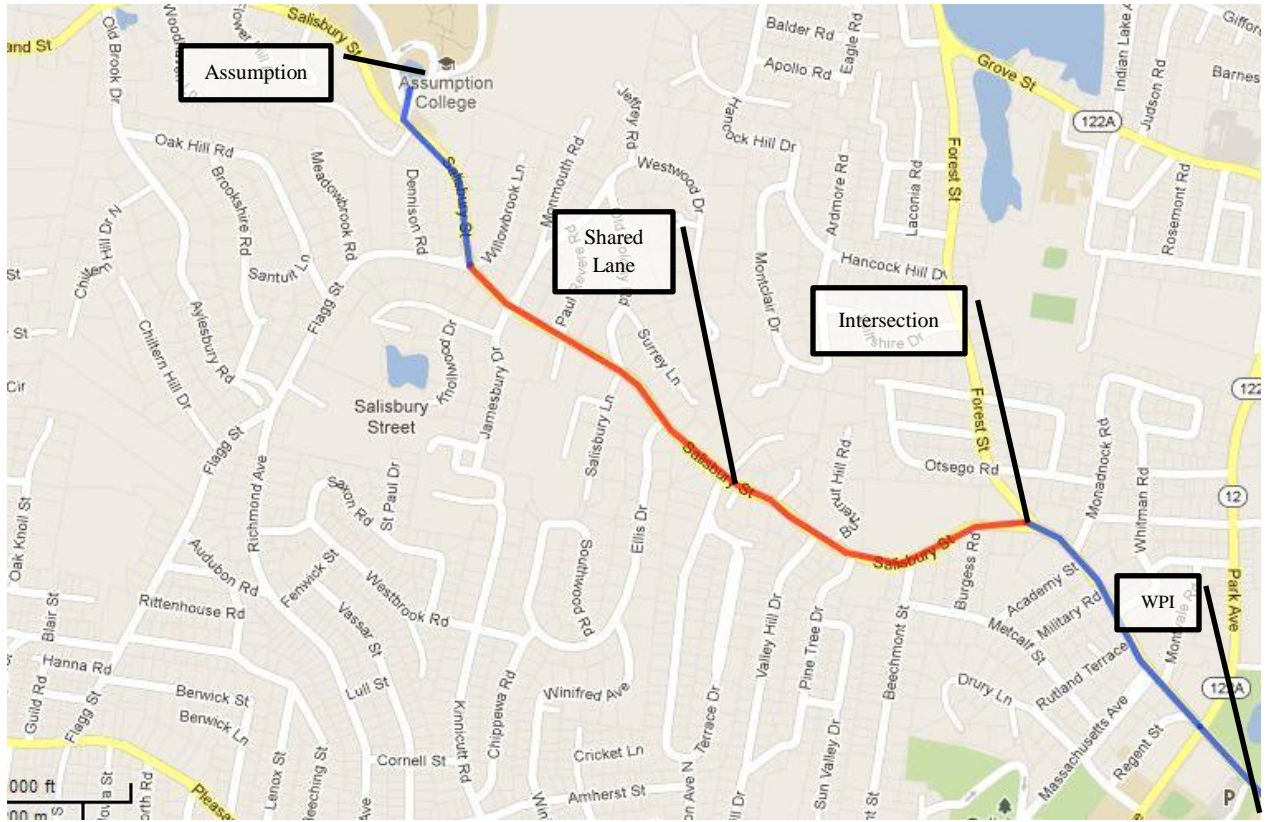


Figure 21: Proposed Bike Path for Salisbury Way

Table 3: Detailed Roadway Information for Salisbury Way

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Salisbury St.	Varies	<ul style="list-style-type: none"> • Shared • Dedicated/Designated 	<ul style="list-style-type: none"> • Fork at Forest St. and Salisbury St. 	Assumption College

4.3 Salisbury District Bicycle Path

The Salisbury District bicycle path connects WPI with Downtown. The road widths in this district are feasible for a dedicated bicycle lane. One of the concerns with this bicycle path would be the parking on both side of the streets on Boynton St, Institute Rd., and Salisbury St. Some of the attractions that are found in this district are: Institute Park, Worcester Art Museum, and WPI Life and Science building. The map on Figure 23 shows Institute Rd. (marked with a red line) which in this case a shared bicycle lane needs to be considered due to the road width.

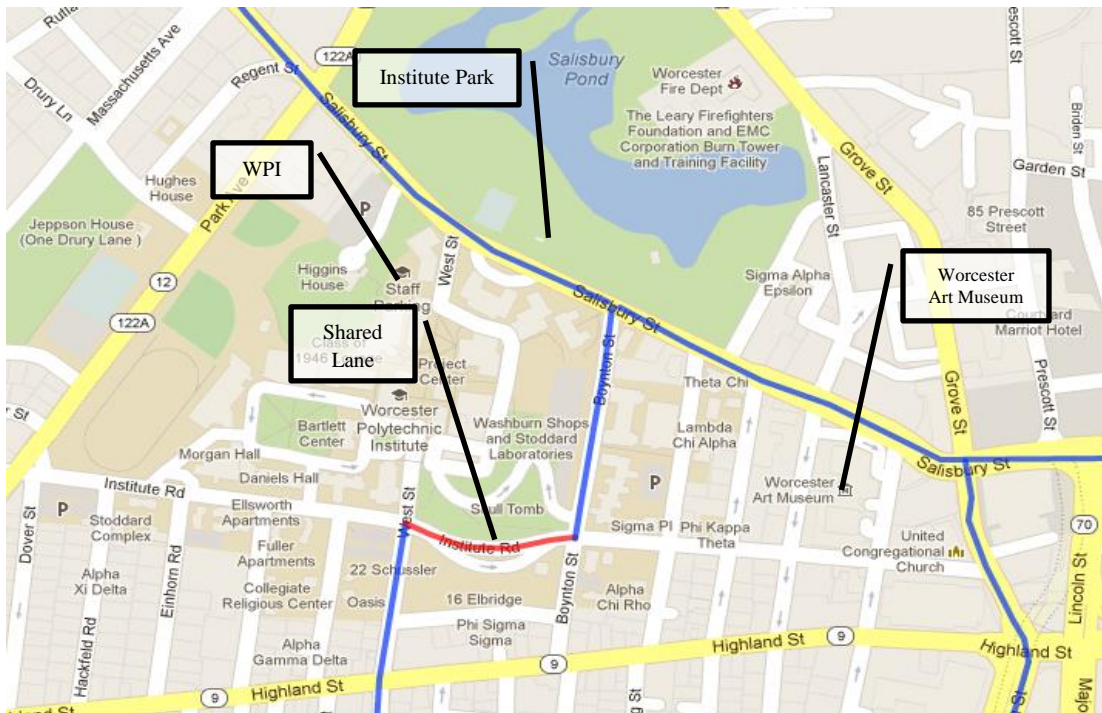


Figure 23: Proposed Bicycle Path for the Salisbury District

Table 4: Detailed Roadway Information for the Salisbury District

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Salisbury St.	Varies	<ul style="list-style-type: none"> Dedicated/ Designated 	<ul style="list-style-type: none"> Parking 	<ul style="list-style-type: none"> Institute Park Worcester Art Museum WPI Life Science Building
Boynton St.	50'	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> Parking 	
Institute Rd.	50'	<ul style="list-style-type: none"> Shared 	<ul style="list-style-type: none"> Parking 	<ul style="list-style-type: none"> WPI

4.4 Elm Park District Bicycle Path

The Elm Park district bicycle path connects WPI with Becker College, which then through Elm St., will connect to the center of Downtown. In this District one major concern would be the parking on both sides of the chosen streets. When the parking issues were examined in this area at the Focus Group, Jacob Sanders, who is the Community Relations Representative at Becker College, stated that the parking in this area is key, since the students at Becker College heavily rely on the on street parking. This means giving up parking would be a challenge and alternative solutions for on street side parking would have to be researched. In this district the road widths meet the criteria for a dedicated bicycle lane and with William St. and Cedar St. being one-way streets traveling in opposite directions, we thought that having one bicycle lane going one way on William St. and the other bicycle lane traveling the other direction on Cedar St. would allow students and residents the ability to still park on one side of the street.

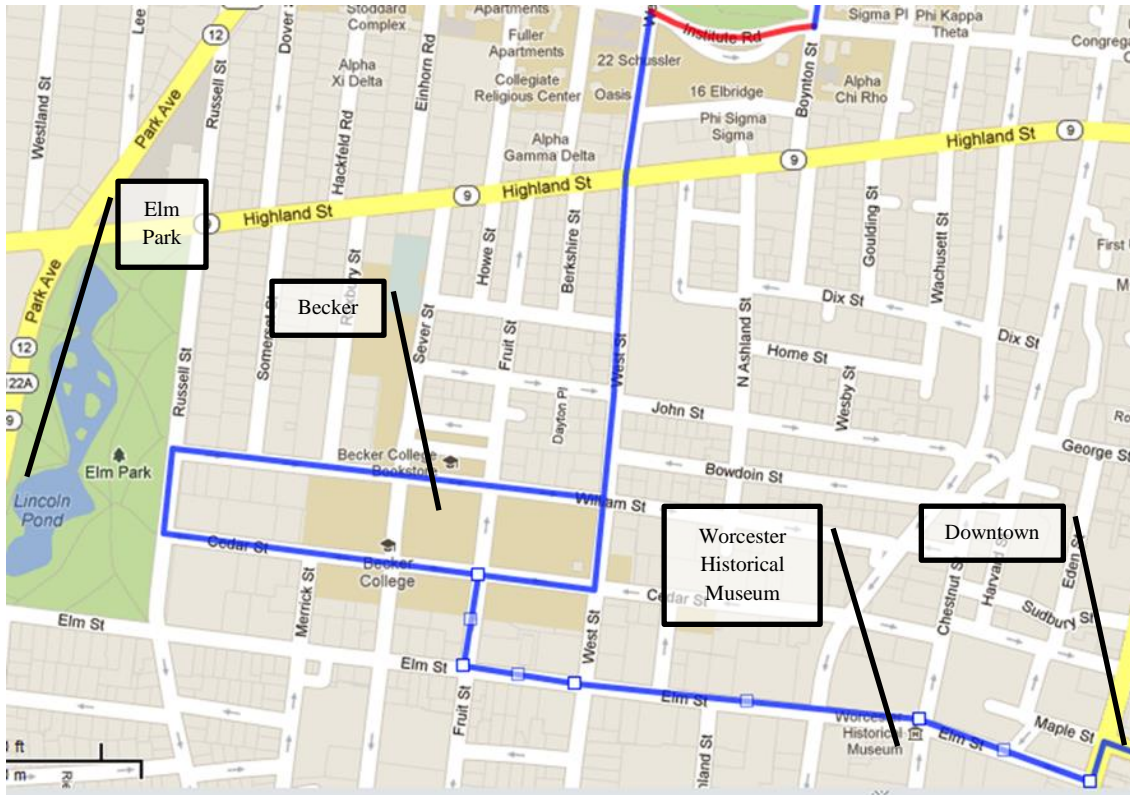


Figure 24: Proposed Bicycle Path Connecting Becker College with WPI and the Downtown Area

Details of the streets are listed on Table 5, with some of the major attractions being: Elm Park, Worcester Historical Museum, and Elm Park School. With our proposed districts for a bicycle lane we found that Elm Park Districts bicycle path would be the easiest to implement, with no major concerns other than parking. As mentioned in the Focus Group, this bicycle path would be considered “low hanging fruit.”

Table 5: Detailed Roadway Information for the Elm Park District

Roadway	R.O.W. Width	Supported Lanes	Concerns	Attractions
West St.	50'	<ul style="list-style-type: none"> • Shared • Designated/Dedicated 	<ul style="list-style-type: none"> • Parking 	<ul style="list-style-type: none"> • WPI
Williams St.	40'-60'	<ul style="list-style-type: none"> • Shared • Designated/Dedicated 	<ul style="list-style-type: none"> • Parking on one side 	
Cedar St.	40'	<ul style="list-style-type: none"> • Shared • Designated/Dedicated 	<ul style="list-style-type: none"> • Parking on one side 	<ul style="list-style-type: none"> • Becker College
Russell St.	40'-80'	<ul style="list-style-type: none"> • Shared • Designated/Dedicated 	<ul style="list-style-type: none"> • No issues 	<ul style="list-style-type: none"> • Elm Park
Elm St.	40'-50'	<ul style="list-style-type: none"> • Shared • Designated/Dedicated 	<ul style="list-style-type: none"> • Parking 	<ul style="list-style-type: none"> • Worcester Historical Museum • Elm Park School

4.5 Lincoln Bikeway

The Lincoln bikeway is another great bicycle path that not only connects to University of Massachusetts Medical School (UMass), but also goes through Green Hill Park, which is one of Worcester's largest city parks. The bikeway borders UMass-Medical Center to the east, Route 9, and Worcester State Hospital to the south with Lincoln St. on the backside. In one of our earlier meetings with Robert Moylan, he mentioned that the City is working on having a bike lane going through Green Hill Park and it is planned to start sometime in 2014. With this being said we decided to have the bike path run through Green Hill Park not only because the city has plans on implementing bike lanes in Green Hill Park, but also because it will make a safer route for cyclists to travel through avoiding the flux of vehicles on Belmont St, and the steep hills heading east on Route 9. There are no significant issues with on street parking and the road widths are applicable for dedicated bike lanes.

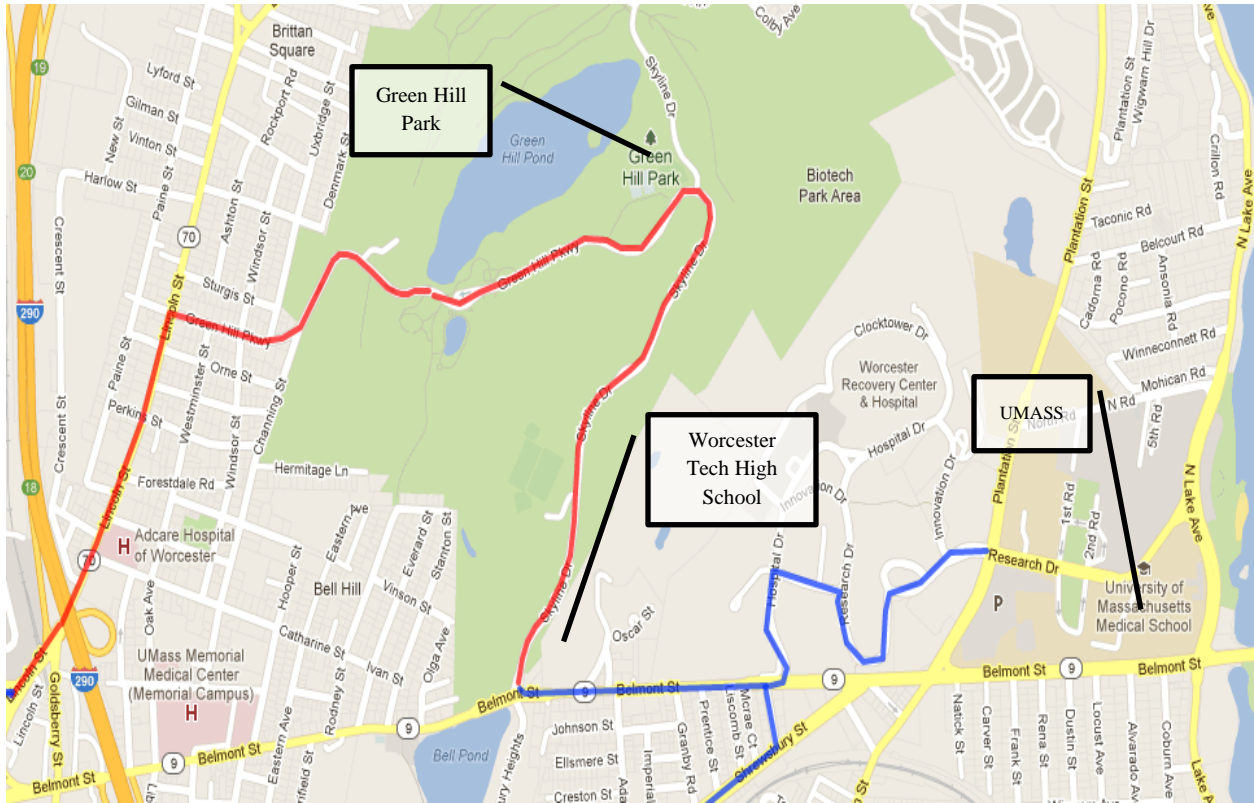


Figure 25: Proposed Lincoln Bikeway that Connects UMass Medical School with the Downtown Area

Table 6: Detailed Roadway Information for the Lincoln Bikeway

Roadway	R.O.W Width	Supported Lanes	Concerns	Attractions
Lincoln St.	Varies	<ul style="list-style-type: none"> Shared/Dedicated 	<ul style="list-style-type: none"> Parking Width in some areas 	<ul style="list-style-type: none"> Adcare Hospital of Worcester
Green Hill Pkwy		<ul style="list-style-type: none"> Shared 	<ul style="list-style-type: none"> No issues 	<ul style="list-style-type: none"> Barn Yard Zoo Green Hill Golf Course Worcester Technical High School
Skyline Dr.		<ul style="list-style-type: none"> Shared 	<ul style="list-style-type: none"> No issues 	
Belmont St.	Varies	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> Traffic 	
Hospital Dr.	Varies	<ul style="list-style-type: none"> Shared 	<ul style="list-style-type: none"> No issues 	<ul style="list-style-type: none"> Worcester State Hospital Abbott Bioresearch Center Worcester Recovery Center & Hospital
Research Dr.	50' & Varies	<ul style="list-style-type: none"> Shared 	<ul style="list-style-type: none"> No issues 	<ul style="list-style-type: none"> UMass Medical School

4.6 Shrewsbury Street District Bikeway

The Shrewsbury Street District bikeway is the most exciting bikeway that we proposed. With 40 fabulous eateries serving up a globe-spanning array of delectable edibles, famous restaurants, and a diversity of different cuisines, Shrewsbury St. also offers access to many retail stores, local bars, and coffee shops. We wanted the Worcester residents and young professionals to be able to bike to their favorite restaurant or even their favorite coffee shop that Shrewsbury St. has to offer. This bicycle path would also be necessary to young professionals that work or study at UMass Medical School, giving them other means of transportation from Union Station, or other parts of Worcester. One concern of this bikeway would be the parking on both

sides of the street. As Jerry Powers mentioned in the Focus Group, the City of Worcester is married to its parking which means that many shops heavily rely on on-street parking. However, Shrewsbury Street is quite large and could support dedicated bike lanes with on street parking parallel to the bike lane, like some of the bike lanes that are seen on Green Street and Water Street.

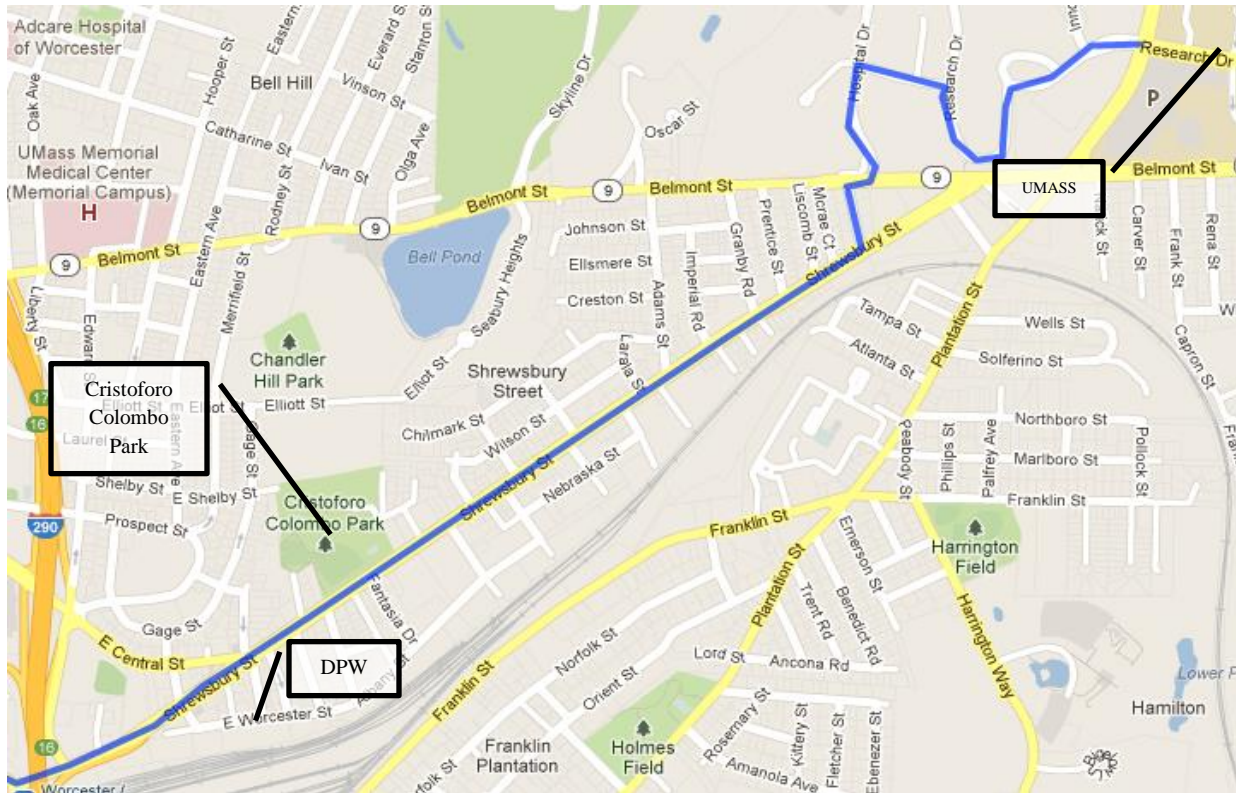


Figure 26: Proposed Shrewsbury St. District Bikeway Connecting UMass Medical School with the Downtown Area through Shrewsbury St.

Table 7: Detailed Roadway Information for the Shrewsbury St. District Bikeway

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Research Dr.	50' & Varies	<ul style="list-style-type: none"> • Shared 	<ul style="list-style-type: none"> • No issues 	<ul style="list-style-type: none"> • UMass Medical School
Hospital Dr.	Varies	<ul style="list-style-type: none"> • Shared 	<ul style="list-style-type: none"> • No issues 	<ul style="list-style-type: none"> • Worcester State Hospital • Abbott Bioresearch Center • Worcester Recovery Center & Hospital
Daniels St.	50'	<ul style="list-style-type: none"> • Shared 	<ul style="list-style-type: none"> • No issues 	
Shrewsbury St.	Varies	<ul style="list-style-type: none"> • Dedicated 	<ul style="list-style-type: none"> • No issues 	<ul style="list-style-type: none"> • Retail • Restaurants • Bars/Pubs • Parks & Recreation

4.7 Canal District Bikeway

Canal District is another exiting part of Worcester that is frequented by many young college students and Worcester residents for hosting diverse pubs, bars, and entertainment. Proposing a bicycle path on Canal District would be simple and feasible, or as often mentioned in the Focus Group a “low hanging fruit”, because it already offers existing bicycle lanes that are on Green Street and on Water Street. This District could support dedicated bicycle lanes because the road widths are wide enough and it can also accommodate on street parking parallel to the bicycle lanes.

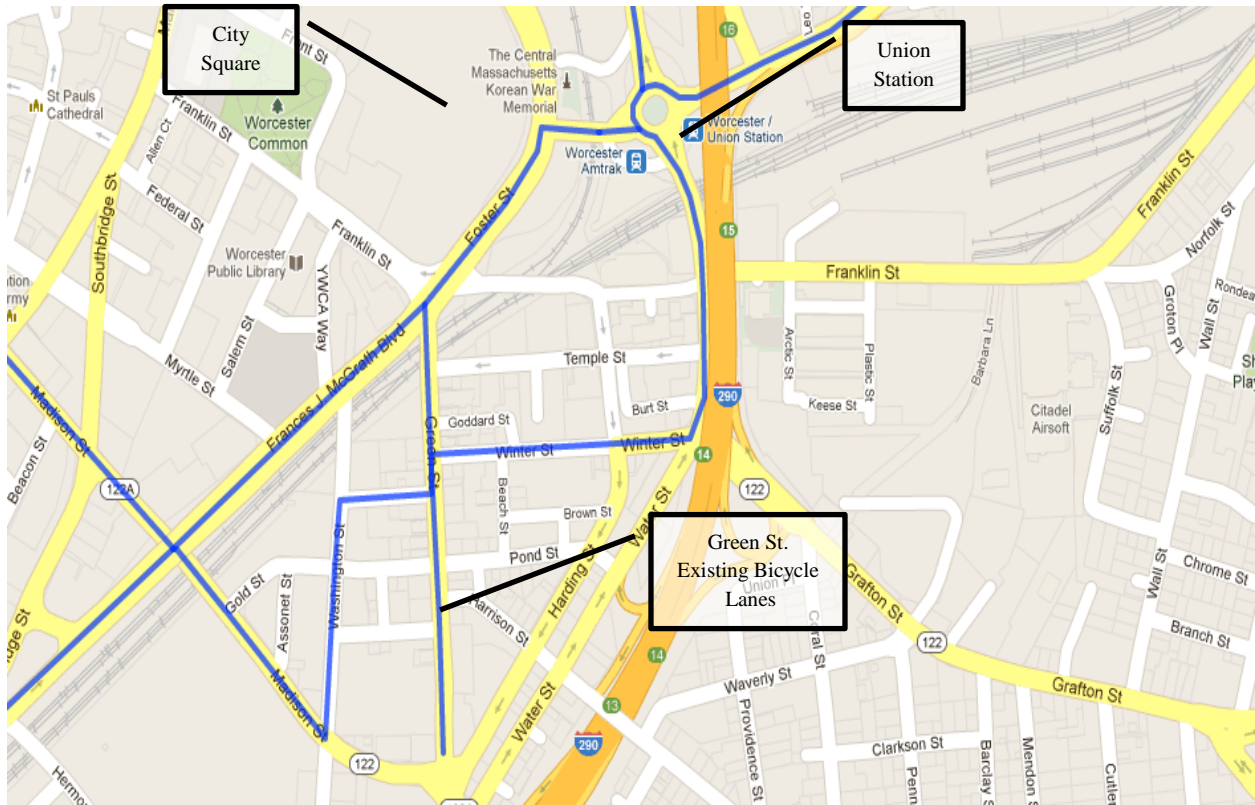


Figure 27: Proposed Bicycle Path for the Canal District Including the Existing Dedicated Bicycle Lanes on Green St. and Water St.

Table 8: Detailed Roadway Information for the Canal District Bikeway

Roadway	R.O.W Width	Supported Lanes	Concerns	Attractions
Grafton St.	Varies	• Shared/Dedicated	• No issues	
Winter St.	Varies	• Dedicated	• No issues	• Restaurants • Bars/Pubs
Green St.	Varies	• Existing	• No issues	• Restaurants • Bars/Pubs
Plymouth St.	34'	• Shared	• Parking	
Washington St.	40'	• Shared	• Parking	

4.8 Main South District Bikeway

The Main South District Bikeway connects Clark University with Downtown. It is a feasible bicycle path with no major concerns. It runs through Main Street, which in

different parts on-street parking is permitted. In order to overcome the parking concern in those areas, a shared bicycle lane could be implemented to meet the residents demand and feasibility of bicycle lanes.

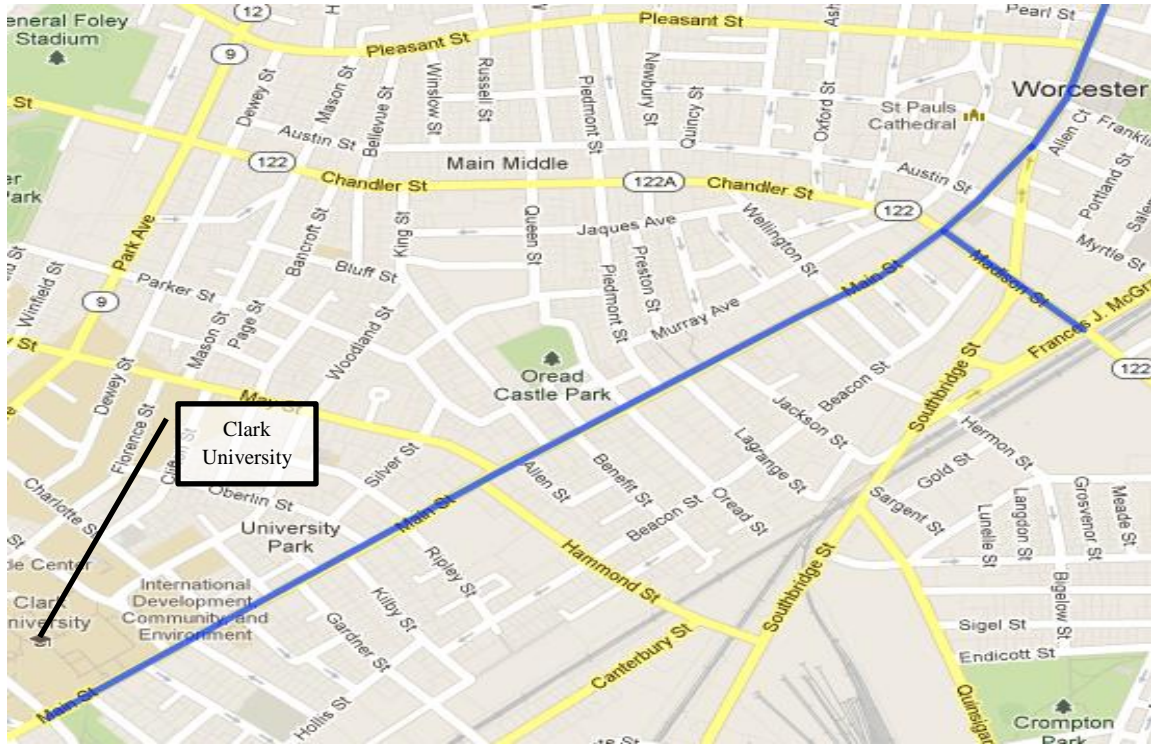


Figure 28: Proposed Bicycle Path for the Main South District Connecting Clark University with the Downtown Area

Table 9: Detailed Roadway Information for the Main South District Bikeway

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Main St.	Varies	<ul style="list-style-type: none"> Shared/ Dedicated 	<ul style="list-style-type: none"> Parking in some areas. 	<ul style="list-style-type: none"> Clark University Oread Castle Park
Madison St.	Varies	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> No issues 	<ul style="list-style-type: none"> Salvation Army

4.9 West Boylston Bikeway

The West Boylston Bikeway adjoins Quinsigamond Community College (QCC) with Downtown. When looking into choosing a path for connecting QCC with Downtown, we decided to use Grove Street and Gold Star Blvd, which then turns into West Boylston Street. Although this particular path bears many challenges, the short distance and the

significance of the road width made it essential for having a dedicated bike lane that would connect QCC with Main Street. Nevertheless the Greendale Mall is also located on Gold Star Blvd., which is frequented, by thousands of visitors each day, and with bicycle lanes going by the Mall it presents a great way of visiting the Mall.

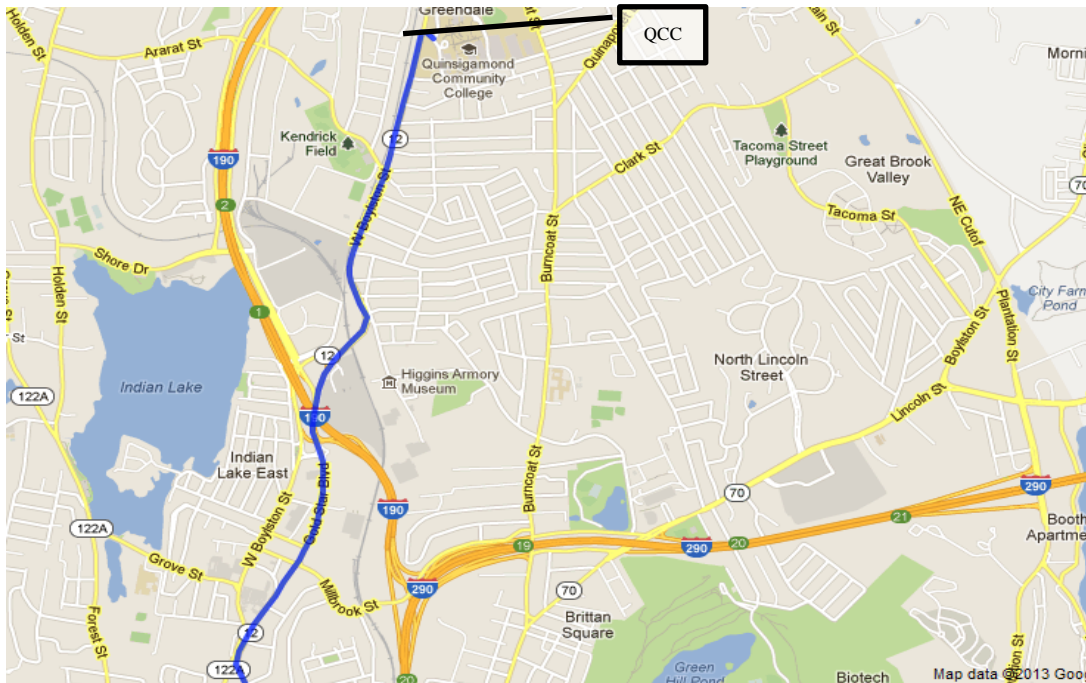


Figure 29: Proposed Bicycle Path for the West Boylston Bikeway Connecting QCC with the Downtown Area

Some of the concerns associated with this path would be the high volume of vehicle traffic on Gold Star Blvd., along with some major intersections on Grove St. and Gold Star Blvd. In overcoming these concerns, another bicycle path was suggested at the Focus Group meeting, with another potential path, which would connect QCC with Downtown from Grove Street to Forest Street and then Shore Dr. This route follows the same case study for potential bike lanes that the City of Worcester worked on in the early 1990's. With Grove St. and Forrest St. well over 50 feet, this alternative route is a great path for dedicated bike lanes.

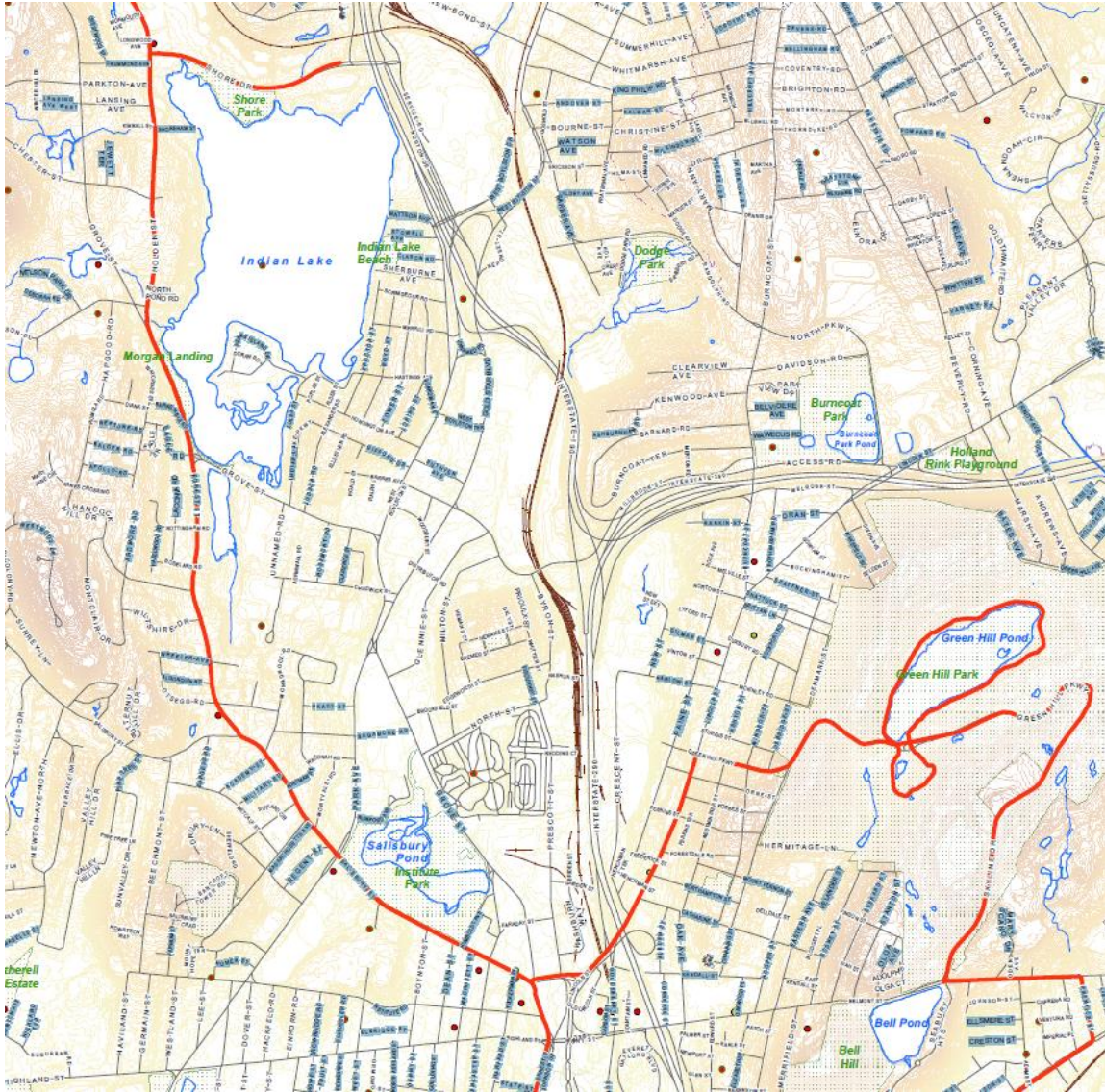


Figure 30: A Close-up Look at the Alternative Route Connecting QCC with the Downtown Area (Topography and Potential Bike Lanes per 1900s Study of City Streets)

Table 10: Detailed Roadway Information for the West Boylston Bikeway

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Grove St.	65'	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> No issues 	
Gold Star Blvd.	80'	<ul style="list-style-type: none"> Dedicated 	<ul style="list-style-type: none"> Traffic 	<ul style="list-style-type: none"> Home Depot Green Dale Mall
W Boylston St.	80'	<ul style="list-style-type: none"> Shared/Dedicated 	<ul style="list-style-type: none"> Traffic Width 	<ul style="list-style-type: none"> QCC Saint-Gobain Kendrick Field Retail Shops

4.10 Blackstone Bikeway

The Blackstone Bikeway is the last bike path that would connect South Worcester and the College of Holy Cross with Downtown and would complete our proposed biking network for the City of Worcester. The Blackstone Bikeway also connects to one of the most exciting projects in the Heritage Corridor, the Blackstone River Bikeway. When completed, this bikeway will extend forty-eight miles from downtown Worcester, MA to India Point Park in Providence, RI. From there it connects with the existing East Bay Bike path and continues on to Bristol, RI. The bikeway will serve as an alternate mode of transportation for commuters as well as the region's premiere recreational bicycle facility, connecting New England's second and third largest cities serving a population of more than 1 million.

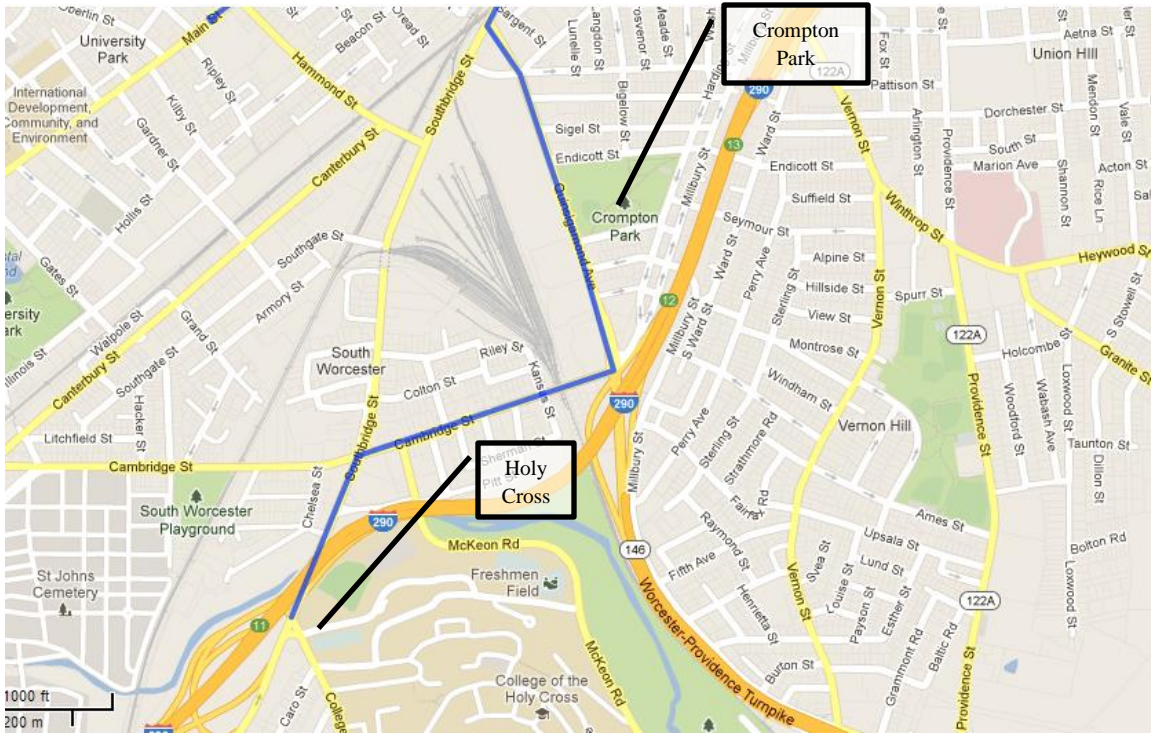


Figure 31: Proposed Bicycle Path for the Blackstone Bikeway Connecting South Worcester, Holy Cross and the Blackstone River Bikeway with the Downtown Area

Table 11: Detailed Roadway Information for the Blackstone Bikeway

Roadway	R.O.W. Widths	Supported Lanes	Concerns	Attractions
Quinsigamond Ave	60'	• Dedicated	• No issues	• Crompton Park • Blackstone River Bikeway
Cambridge St.	40' - 60'	• Shared/ Dedicated	• No issues	• Family Dollar
Southbridge St.	Varies	• Dedicated	• Traffic	• Holy Cross

4.11 Chapter Summary

The proposed bicycle paths, execute a complete linked network between the Universities of Worcester as well as Downtown, providing a healthier alternative form of transportation to the community and students to bike to their favorite shops, businesses, work, or school. The bicycle paths were selected based on the width to meet the

requirement for dedicated bicycle lanes, with minimal concerns; both for implementation, and cyclists safety. Through creating the proposed biking network we hope to start the process of creating a future bicycling city, changing the culture from that of motor vehicles to a pro-bicycling mindset.

5 Holding a Discussion Group: Development of an IQP Focus Group

In this section, a proposed method of group discussion was researched to get much needed answers from the city officials of Worcester, as well as bring biking to the attention of high profiled individuals, bicycle activists, WPI sustainability faculty, and students. A Focus Group was used in order to help bring all key people together to agree on a common goal: implementing a bike path system in the city of Worcester. In this chapter, a section devoted to communication techniques is discussed in order to get the most out of our interviews and data collection.

After interviewing several important people in the city of Worcester and utilizing those of the past IQP group's contacts, a list of roughly 15 individuals was developed to communicate and eventually agree upon an overall city bike path system. Through having the correct balance of key people in Worcester and WPI all under one roof for discussion seemed appropriate and beneficial to our cause.

Lastly, correct forms of analysis and evaluation were looked into in order to properly come up with well-organized and meaningful outcomes and valuable data gathering. A summary of reflections and evaluation, while comparing them back to all research and report findings, is crucial in this particular project. If anything is to be implemented in the City of Worcester, logical proof of concept and understanding of all potential issues will make a credible case with the hopeful outcome of the actual implementation and beginning of the bike path system in Worcester.

5.1 Importance of Focus Groups

Communication is the utmost important aspect of any type of discussion group in order to achieve any goal or address any problems at hand. Having well thought out guided communication tools, for example, power-point presentation, to help influence discussion, raise all general concerns, and get positive collaborated ideas will help achieve our realistic goals and will start the actual implementation process of the first part of the bikeway system in order to be implemented.

A list of goals and hopeful outcomes will also be discussed with research and reason to all points and arguments made. Time will be a valuable resource here and should not be wasted, therefore scheduling will be a tool used to help meet necessary deadlines. Another aspect of analyzing goals will be used to help define and shape the actual Focus Group and to create clear, defined communication with all people who will either greatly impact or help actually solve the almost nonexistent bike routing system in Worcester. A mentor will be utilized to gain insightful realistic expectations for implementation of a safe and efficient bike path system.

Holding a formalized discussion group will reduce most forms of miscommunication and potential wasted time from going back and forth between the key figures. This discussion group will be useful to help raise general awareness and potentially get everyone on board for the actual progress of this IQP.

Since we need full cooperation from the main group that was separately interviewed, focus on professional communication aspects will create the perfect atmosphere to help address all of the groups concerns in order to show the benefits of having a bike path in Worcester, as well as give possible solutions with facts, possibilities, or difficulties.

5.2 Discussion Points

The following bullet points are the key reasons why hosting a Focus Group at WPI is essential for our IQP project and for the future of implementing a bike path in Worcester:

- To collect the qualitative data that will bring all-important figures together to collaborate on bike path implementation.
- Understand all parties' feelings and perceptions in regards to presented implemented bike path. To get input on these inputs in order to agree on a proposed network.
- To simulate interaction within the chosen professionals and gain perspective and insight into problems and focus on coming up with solutions without miscommunication.
- Focus will be on the specific plan for a possible, feasible bike path. Our IQP will provide the possible routes, the facts on why they are functional, and possible problems that may arise.

- This particular Focus Group will include talks about all issues in regards to implementation in general, safety concerns, limitations, and neighborhood cooperation.

5.3 Focus Group Pre-Mentoring

Linda Looft, whom is the Assistant VP for Government and Community Relations at Worcester Polytechnic Institute, has been a supporter to this IQP project while also being a most generous mentor. It is because of her familiarity of talking in a public setting to city and political officials, and learning how to speak to them to get the most out of any discussion, focus group, or brainstorming session. Mrs. Looft's major contributions according to the Institute of Energy and Sustainability:

“...as senior liaison to federal, state, and local officials for the university's academic and research communities. In this capacity, she works closely with government agencies to obtain research funding in areas of strategic importance to WPI. Over the past five years, she has brought in more than \$15 million in grants to the university. Most recently, she helped secure an additional \$1 million in federal funding for the Center for Untethered Healthcare, part of the WPI Bioengineering Institute (BEI). She also manages advocacy for the Massachusetts Academy of Mathematics and Science at WPI and oversees many of WPI's high-profile events, including major conferences, VIP visits, and international events-on and off campus.

In addition, she has helped secure federal, state, and local funding for the WPI Life Sciences and Bioengineering Center, a state-of-the-art research facility under construction in Worcester's Gateway Park, as well as the Precision Indoor Personnel Location System and transportation research.”(WPI, 2006)

Having someone who can greatly impact and benefit the implementation with her knowledge of how policies are placed, how to gain concern in difficult areas, like financial issues, and introduce us to any unfamiliar procedures of going about this Focus Group, is key to the success of our proposal.

Mrs. Looft's experience in holding workshops, focus groups, and meetings in regards to Worcester City renewal projects, city ordinances, and WPI policies as well as the prior professional knowledge of the majority of the people identified that have already been interviewed was one of the best utilized resources for this IQP Project. She holds influence with many Worcester urban renewable projects and committees, and has worked with the past IQP group, so she is completely familiar with this year's project goals and potential outcomes.

Mrs. Looft was really supportive of the idea of a Focus Group, and suggested that we focus on having an effective meeting by not only planning out our discussions during the Focus Group but monitoring and mediating the conversations as well. Mrs. Looft gave advice on who should attend and how to invite each individual to the Focus Group as well as discussion duration. Because of her love for this project, a strategy Mrs. Looft gave the group this year was to "use her name" in order to gain more support from WPI and city officials, and to strengthen this IQP project in its entirety.

With all the mentorship and excellent resources Mrs. Looft pointed us to, the IQP Focus Group will be our main focus for this project as well as one of the largest factors in deciding the outcome of this project. With Mrs. Looft on our side and considering all of the planning on the group's end, the Focus Group is foreseen to be a huge success.

5.4 Focus Group Content

The Focus Group discussion should amount to 1.5-2.5 hours long (taking Linda Looft's suggested times) and be completely guided with no dead end talks, negative outcomes, or off-topic conversations. The proposed Focus Group breakdown is as follows (order may be changed):

- 1.) Why have a bike path in Worcester (Introduction)
- 2.) Outcomes and Goals for Project
- 3.) Possible plans for bike path
- 4.) Examples and Case Studies
- 5.) Issues and limitations (Current/Future)
- 6.) What needs to be done

- 7.) Developing an appropriate timeline (our ideal timeline will be provided)
- 8.) Guarantees (Factors, Funding, Support, etc.)
- 9.) Limitations
- 10.) Conclusions

The above list will be broken down into mini discussions, as if it were a debate. Both positives and negatives will be analyzed to have the most logical, feasible outcome. Examples will be provided for reference to help get the mindset and focus on track for the Focus Group conversation. Promoting the conversations will be backed up with optimistic and motivational attitudes.

5.4.1 Planning the Focus Group to Applicable Identified Issues

Possible issues have been identified that may arise during the Focus Group discussions. Non-engaged audiences may be a factor from poor planning, not having enough conversation questions, or audience attendance. We understand that some of the information may be sensitive to the various parties present. Therefore, a “feedback sandwich” communication approach is necessary to avoid negative, dead end conversations that lead to nothing but hurt feelings and non-working attitudes.

When bringing in the colleges around Worcester, a deep understanding of their needs in having a bike path are addressed to not only help this group’s cause but help the neighborhood and build that college town vibe the city of Worcester would really like to have as well as solve the problem of Worcester’s huge college population, but lack of that college town feel.

Even though the group knows of the districts that are a work in progress and ones that are off limits due to road measurement, restrictions, and limitations in length and width, as well as parking and traffic. Our group should be completely knowledgeable in these issues as well as finding possible loopholes where we can implement a bike path or unofficial bike path.

5.4.2 Focus Group Professionalism and Tools for Information Gathering

In general, our group needs to be professionally prepared, concise, fully educated and truthful in regards to information presented and messages that the group will try to convey during the IQP Focus Group. That being said, possible issues that could arise if not conducting the meeting as described above could result in loss of support from both WPI and the City of Worcester as well as loss in credibility and integrity to both our school, advisors, and ourselves.

To eliminate any possibility of negative feedback; planned and directed questions will be created on a basis of our expertise in this field as well as utilizing our guests, i.e. directing certain questions towards Robert Moylan in regards to backing up a claim in road restrictions to gain insight of an issue in order to produce a positive outcome that will work for the greater good of not only our project, but our community. Therefore all questions for conversation engagement as well as topics will be formed prior to the meeting. Any questions that do arise during the Focus Group can be asked because they are from already planned discussions and questions that were developed by our IQP group.

Visuals will be needed that include data gathered from case studies, Worcester statistics, and other facts to support our cause and to provide a clear understanding of a problem to help guide the discussion for a conceptual, positive solution.

5.5 Focus Group Strategy

In order to have a successful workshop with meaningful outcomes and workable solutions to the problems this project faces, the Focus Group held in C-term must run as smoothly as possible. Understanding of communication techniques and roles to be played must be professional and alert in developing a series of conversations to be had to drive the focus of “cannot do’s” to positive “can do’s”. This can all be done with training and efficient knowledge of how a Focus Group is actually implemented.

Some documentation was gathered and evaluated in order to be familiar on how to run a professional Focus Group. One source that was used was the teachings of Virginia Tech’s Academic Assessment Professor, Dr. Steven Culver, whose primary

focus is in developing useful research tools and means of communication in Educational Research and Evaluation. Dr. Culver's work as well as Mr. Mohammad Douglah, an Evaluation and PE Communication expert at University of Wisconsin-Madison, was the main focus of research analysis for conducting a Focus Group fit for government officials as well as other people of high importance.

5.5.1 Invitees

Any focus group will consist of at least 12 important figures that bring needed knowledge to our goals of implementing a biking network in Worcester (Culvier, 2009). Most, if not all of the invitees to the Focus Group have been interviewed at some point of the IQP's duration and will be asked before, during, and after the Focus Group for their expertise and professional opinion in the matter.

Invitees were chosen from various professional backgrounds with particular interest to our project. Most invitees were government officials and politically active individuals in the City of Worcester. The invitee list can be seen in the Appendix 7.4 and were rated based on level of importance to our project, to the City of Worcester, to WPI, and to biking in general. The rating was from 1 (Not Essential) to 5 (Essential for Project) and were evaluated on professional background, political influence within the City of Worcester, directly applicable professional position, and professional expertise. A careful mixing of educational levels, authority, and political persuasiveness was the objective of the invitee list as was careful evaluation amongst the students within this IQP group, the advisors to this project, Linda Looft, and helpful recommendations from those interviewed.

After a formalized draft of Invitees were developed, target questions that needed direct answers to draw conclusions from were developed and brainstormed in advance, weeks before the WPI Bike Focus Group. As the term progressed and more details of the actual availability of certain invitees become known, timing of when to ask these directed questions, and how to gain the most insightful, valuable information within a finite window of time, was essential for this particular Focus Group. Caitlin Dragan, who was in charge of asking, directing, and forming questions as the discussion continued,

had a general itinerary of the kind of questions to be addressed, prior to the focus group date. The invitee attendee list for the Focus Group can be found in Appendices 7.5.

5.6 WPI's Focus Group Anticipated Outcomes

The following were the projected outcomes for the Focus Group are as follows:

- A more clear, concise, and unbiased understanding of the formation and definite restrictions in regards to implementing an appropriate pathway for bikes.
- Setting limitations and defining goals by understanding restrictions, while shaping realistic future goals and needs for the remaining duration of this IQP, as well as setting guidelines for future groups.
- Have an actual route for the path itself as well as a few back-up alternatives set by the Focus Group discussion.
- Finalize all details for the Focus Group with the help and guidance of Linda Looft.
- Obtain the support needed by our guests as well as future supporters from WPI and the City of Worcester.
- Dissect and analyze the information gathered from the workshop, and compile it into a useful summary that will hopefully detail how exactly a path can be approved with the steps this group has taken.
- Have a projection of costs that may accrue for the final implementation.
- Create a stronger support system and attain professional contacts that are reliable and believe in this project's cause.
- Make sure there is a clear understanding and good communication between all parties so there is no misunderstanding to our motives, as well as more dedicated support. This is the most critical aspect, for it will truly define the project and will create a more motivational, timely completion of bike path implementation in the City of Worcester.
- To come to an agreement on at least 4-5 bike path choices so that a logical, intelligent and innovative solution can be made.

The Focus Group will hopefully help this IQP group gain insight into a better understanding where everyone is coming from, and a more definitive path and place to move from. The Focus Group should be precisely organized, well executed, and professional. The discussions need to be monitored so that the main goals of the Focus Group will be met that day. These goals are to agree on a proposed bicycling network for the City of Worcester. If this can be done, future groups participating in this IQP will have connections when it comes to implementing more paths in the future. Selling the need for this unity between the colleges and how it will benefit Worcester will be a main priority.

5.7 WPI Bike Implementation Focus Group Project Scheduling

5.7.1 Task Management and Scheduling

For the WPI Bike Implementation Focus Group and for the last remainder of the project, a Gantt Chart created by Jordyn Rombola was created in great detail to keep track of progress up until the Focus Group. Although Gantt Charts are more commonly used in technical design projects, having the make-up of this IQP group entirely consisting of Electrical and Computer Engineers, a detailed organized scheduling was used to make sense of critical deadlines as well as track current projects. The IQP project goals were divided up into tasks that needed to be completed before and after the WPI Bike Implementation Focus Group. Different project members were assigned appropriate tasks, which were based on tasks of interest to that the individual as well as expertise, abilities, and personal schedules that were taken into consideration and then added to the Gantt Chart with the appropriate dates and group leaders associated with each. The milestones and deadlines were also labeled for each task.

5.7.2 Task Details and Time Management

Scheduling for any big, productive event is a very critical factor for success. When running a focus group as this IQP group has done, one must consider all logistical factors, plan accordingly, and must stick to strict schedules to ensure a successful event. Since any student of the campus is representing WPI, proper consideration must be made to ensure institute image, integrity, and values are maintained and held to

the highest of standards. There are a lot of small but important details that need to be completed in order for the entire event to come together.

Linda Looft helped tremendously with assisting the group with many of the details on WPI's end, including the marketing and giving advice in regards to the content of the Focus Group. Mrs. Looft also helped during the WPI Bike Implementation Focus Group, assisting Caitlin Dragun, who was in charge of mediating the conversation during the Focus Group conversation. Mrs. Looft helped with the flow of the conversation as well as making sure additional questions were asked. Because of her expertise and government background knowledge as well as a key member for the Elm Park Committee for the City of Worcester, Mrs. Looft proves herself time and time again as a priceless resource for this IQP group as well as future works in the implementation of bike paths in Worcester.

5.7.3 Focus Group Invitations and Finalization of Content to be presented

The invitations for the event were sent out roughly three weeks prior to the WPI Bike Implementation Focus Group. Linda Looft reviewed them before they were sent out to ensure that each invitation was at WPI professional standards, since the students in this IQP directly reflect the school. Both Linda Looft and the WPI Marketing on campus finalized the content before the event one week before the Focus Group in order to ensure WPI's image. Once the content was finalized and most of the guests were confirmed, the major milestones were completed.

All that was left for the Focus Group was the last minute details, changes, and/or modifications to the presentation. All presentational slides were created with the WPI logo, to create the feel that WPI truly believes in this IQP's mission and future in sustainability

5.8 Focus Group Outcomes

Through holding the Focus Group we were able to create a "Worcester Bike Work Group," which was proposed by Worcester's DPW Commissioner, Robert Moylan. With the guidance of Robert Moylan and the IQP team, the City will initiate a "Worcester Bike Working Group" with the essential personnel needed to start the process of creating a

Worcester Biking Network. The WPI Student IQP Bike team, along with future IQP Bike teams, will help facilitate and obtain the information needed in order to help the City of Worcester in implementing future bikeways. In doing so, the group will identify a leader, otherwise known as a Bike Czar, as seen in Boston with Nicole Freedman. Having an appointed Bike Czar, who only focuses on the issue of extending biking throughout the City, will allow for biking to stay in the forefront as a key initiative. Other key stakeholders will also need to be identified with vested interests in the network, such as city officials from Worcester's government, representatives from public and private businesses, collegiate and sustainability representatives, and community and local leaders.

In order to make progress for bicycling projects in Worcester, the City will use the "Worcester Bike Work Group" in order to identify "low hanging fruit," or those roads that can have paths implemented in the very near future to begin the first phase of network implementation. The group will also identify roadways which can be connected with already existing bike paths or trails that are set to be created or finished in the near future, set achievable goals each year in determining to create possibly 4 – 5 miles of bicycle paths and trails each year, and target 4-5 of the proposed roadways that are most feasible to have bicycle infrastructure implemented upon them.

The "low hanging fruit" roadways are those paths that would be in the highest demand and most useful currently to the community. A "Bicycle Path Deployment Plan" will be used in order to select roadways based upon the criteria of what communities, universities, public schools, and businesses will be effected and connected by each bikeway, what attractions or areas of interest each bikeway will create a connection to, and what are the safest and most efficient routes to travel to and from by bike.

The working group will also be used to identify funding for these projects, in which connecting into existing bikeways may allow for funding sources to be used in creating extensions to the already existing bicycle lanes seen in the City. The group will also identify those individuals or demographics which each bike path will best serve and upon doing so, will present this information to the City Council to be approved into an actual motion.

In order to gain community awareness in attaining support for a Worcester Biking Network, the City would benefit from hosting a “Bike Day” or biking event to show the City’s support and bring the community together. The possible creation of a “Worcester Bike Path or Trail Map” on the city governmental website should also be established, as well as contacting Worcester bicycle groups, such as that of “The Seven Hills Wheelmen” and Worcester bicycle shops to help in extending bicycle developments and awareness (i.e. Coincide with Georges St. race in July).

Additionally we were able to establish a working relationship and dialogue between the City of Worcester and Bike Boston as well as creating a major push for bike paths in Worcester to become better known and gain real significant traction. Community groups are also looking to get involved with the project and include such groups as the Elm Park Committee. One of the most important additional outcomes of the Focus Group was the creation of a civil engineering MQP team, which will work along-side the “Worcester Bike Work Group” and will help to physically start the planning and constructing of the proposed biking network over the course of this year and into the following year.

Beginning in the start of May, the IQP team will begin the process of working alongside Worcester’s DPW in order to begin the formation of the Working Group. We believe that by the middle of the summer we can truly have a bike minded committee completely shaped that will help turn the proposal of a Worcester Biking Network into a concrete reality for the future of Worcester.

5.9 Outline of Focus Group Outcomes

Creating a “Bike Worcester Working Group”

- Proposed by Worcester’s DPW Commissioner Robert Moylan
- With Robert Moylan’s guidance, the city will initiate a “Bike Worcester Working Group” with the essential personnel needed to start the process of creating a Worcester Biking Network
- The WPI Student IQP Bike team along with future IQP Bike teams will help facilitate and obtain the information needed in order to help the City of Worcester in implementing future bikeways

- **Action Items:**
- Identify a leader for this group (Bike Tsar)
- Identify other members with vested interest. These may include:
 - City Officials from various departments
 - DPW
 - Traffic Engineers
 - City Council Members
 - Representative from WPD
 - Representatives from Worcester Housing Authority
 - Planning
 - Economic Development
 - Department of Public Health
 - Superintendent of Worcester Public School System
 - Policy and Decision Makers
 - Representatives from private businesses
 - Hanover
 - Unum
 - St. Gobain
 - St. Vincent's
 - UMass
 - DCU Federal Credit Union
 - Opus Investments
 - Leggat McCall Properties
 - Collegiate/Sustainability representatives
 - Assumption
 - Worcester Public Schools
 - Central Office
 - Elm Park School
 - Worcester Technical High School
 - UMass Medical School
 - MCPHS

- Becker
- Clark University
- College of the Holy Cross
- Worcester State University
- QCC
- WPI
- Community and local representatives
 - 7 Hills Wheelmen
 - Greener U/SynergE Worcester
 - Walk/Bike Worcester
 - Bicycle Store Owners
 - School Districts
 - Housing Authority
 - Plant Services and Facilities
- Get permission to make these ideas more public
 - Possibly get an article in the Telegram and Gazette
 - Present ideas to City Council

In order to make progress for bicycling projects in Worcester, the city will use the “Bike Worcester Working Group” to:

- Identify “low hanging fruit” – the roads that can have paths implemented in the very near future -- to begin the first phase of path implementation
- Identify roadways which can be connected with already existing bike paths or trails that are set to be created or finished in the near future
- Set achievable goals each year in determining to create possibly 4 – 5 miles of bicycle paths and trails each year
- Target 4-5 roadways of these that are most feasible
 - These paths would be in the highest demand and most useful currently to the community
 - In selecting feasible roadways create a “Bicycle Path Deployment Plan”

- What communities, Universities/Public Schools, Businesses will be effected/connected by each bikeway?
 - What attractions/areas of interest will bikeway create connection to?
 - What are the safest/most efficient routes to travel to and from by bike?
- Identity funding for these projects
 - Connecting into existing bikeways may allow for funding sources used in creating those bikeways to be extended
- Identify who would use these paths
- Present this information to the City Council/Mayor
 - Appropriate Departments/Government Officials which have the authority to authorize such projects
- Host a “Bike Day” or biking event to show the City’s support and bring the community together
 - Possible creation of “Worcester Bike Path/Trail Map” on city governmental website
 - Possibly organize with Seven Hills Wheelmen and Worcester bicycle shops to schedule bicycle awareness (i.e. Coincide with Georges St. race in July)

Additional Outcomes:

- Established a working relationship and dialogue between the City of Worcester and Bike Boston
- The push for bike paths in Worcester is becoming more well known
- Community groups are looking to get involved
- A civil engineering planning MQP may be in the works for next year
- A follow-up IQP project may delve deeper into the social impact and health benefits of bicycle paths
- The Focus Group brought together two groups that care about planning in the city: DPW and the IQP Project group

- This is providing a voice for others in the city who want this to happen
- Work being done around Elm Park may be including dedicated bike lanes
- Some challenges may need to be identified that could result in a standstill in the project
 - A possible solution would be to outline what is going to happen throughout the summer months while there is no project team

5.10 Focus Group Minutes

Date: February 21, 2013

Focus Group Moderators:

Caitlin Dragan
 Jordyn Rombola
 Leonard Shollo
 Daniel Lent

Attendees:

Robert Moylan – DPW Commissioner, City of Worcester
 Joe Borbone – Traffic Engineer, City of Worcester
 Nicole Freedman – Bicycle Tsar of Boston, MA
 Nick Jackson – Toole Design Group
 Alex Davis – GreenerU
 Jacob Sanders – Community and Government Relations, Becker College
 Suzanne LePage – Civil Engineering Professor, WPI
 John Orr – Chair of President’s Task Force for Sustainability, WPI
 Linda Looft – Member of Worcester Mayor’s Elm Park Committee
 Elizabeth Tomaszewski – Sustainability Coordinator, WPI
 Moses Dixon – Legislative aide to State Rep. Mary Keefe
 Jeff Powers: Worcester Healthy Living, Walk/Bike Worcester

Topic of Discussion: Implementation Strategies for Bicycle Paths in Worcester

- Jeff Powers: The issue of parking
- slows traffic
 - protects pedestrians
 - Worcester is married to its parking (going to be very hard to remove)
 - Streets with two lane traffic can be made into one way streets

Nicole Freedman: In Boston laid out a 10-year plan for implementing bicycle paths and in the beginning

- Tackled the low hanging fruit
(wide enough streets that could support bike paths right away)

Year 1: Simple path with ribbon cutting event to increase visibility and awareness to paths and city bicycling projects

Year 2: Move to implementation stage on identified low-hanging fruit paths

Year 3: Wrap up low-hanging fruit

Years 4 – 7: Begin implementation of more difficult path types (i.e. cycle tracks and off street paths)

Years 8-10: Complete new city connecting bike paths

Start with several simple paths near Campus in order to show portrait of concept, visibility, and to gain public support

Jacob Sanders: Is it possible to have shared paths used for both bicycling and walking

- Currently illegal to bike on city sidewalks

Nick Jackson: Streets that have been redesigned for bicycles have increased safety benefits

2 Proposed Approaches

- Revamp major streets and build new curbside resources
- Resurfacing minor streets to incorporate bike paths

Bicyclists' comfort

- Don't want pedestrians and bikers to mix
- Cycle track- separate from road and sidewalk

Speed differential with motor vehicles

- Uphill bikers need more room as biking uphill becomes more difficult and bikers tend to wobble back and forth (need bike paths)
- Downhill the bikes approach vehicle speed (shared bike path)

Suzanne LePage: Instead of using Salisbury St. to connect Assumption into WPI and the downtown area as this roadway has blind spots with high vehicle speeds, tries using Pleasant St. as even though Newton Square may be difficult to bike through, it is being reconstructed

Nicole Freedman: Boston and Philadelphia require 10 ft. travel lanes while MassDOT involves 12 ft. travel lane, allowing a few ft. to be shaved off for a bike lane

Nick Jackson: Cycle tracks are very attractive for separating bicyclists from pedestrians and motorists

Caitlin Dragan: Drivers seem to be a problem since they threaten and endanger cyclists

Jeff Powers: "Complete Streets Concept"

- Designed to slow down traffic, pedestrians and cyclists feel safe and are accommodated

Note: John Odell, Robert Moylan, and Joe Borbone have arrived at Focus Group

John Orr: What is the overall bicycle environment in Worcester?

- What are the metrics for success? (need to be defined)
- Need to prove that these stages need to be built upon the previous step

Liz Tomaszewski: This should not only be built for the student only but for the community in General

Suzanne LePage: High Schools should also be included

Nick Jackson: “The 5 E’s”

- Engineering/Enforcement/Encouraging/Evaluation/Equity
- Building momentum for bicycles will help desensitize the motorists to taxes and presence

Jacob Sanders: Prime biking season is when the schools are out and when the students come back to school its primarily during the summer months

Robert Moylan: Advocate more bike lanes where feasible and where possible

- Most bike lanes chosen for network seem possible and feasible except for Salisbury St.
- Use Federal/State funding to create a dedicated or shared bike lane (by law)
- Example: Canal District is due to Federal funding

- Example: Lincoln St. project is due to State funding (bike lane planned here)
- When City funding is involved, such as for low-volume roads, they try to implement bike lanes as there is no Federal/State funding requirement
- Pedestrians, bicyclists, businesses (parking), and motorists all need to be included in the equation

Nicole Freedman: In 2007, Mayor of Boston, Mayor Menino, decided to take the arguably the worst network of city roadways and implement 60 miles of bicycling lanes

(mostly low hanging fruit)

- Started with bike lanes and moved to cycle tracks
- The only non-low-hanging fruit was the segment of Mass. Ave., in which 70 parking spots were removed to accommodate cyclists
(this occurred later in Year 4 when biking was well politically motivated and supported)

Linda Looff: So these are the issues for the next ten years, what are the next steps?

Robert Moylan: Several paths the city is looking at:

- Blackstone River Path
 - From 146 to Crompton Park (dedicated)
 - Southbridge Street to Union Station
 - The Goal would be to connect Union station (intermodal hub) and with Blackstone Valley (connects with Providence)
- Linear park

- From Lincoln Square/Route 12 to Route 9 and Lake Park.
 - First 1/3 of the work will be done this year

Nicole Freedman: North Station and South Station are critical bicycle destinations

- Intermodal transport

John Odell: Did they review the widths of the streets? Is there room for the paths?

Alex Davis: A group should sit down with each other with the city and have a highlighter in hand and define what streets could be retrofitted with bike paths.

John Orr: Several things to consider when determining paths

- Feasibility
- Traffic for bike paths (young professionals)
- Motivations for specific destinations

Suzanne LePage: Take away: All Federal/State projects must have bike infrastructure included

- These projects are on public record: help identify possible low-hanging fruit
- Use buses with bike racks to fill-in the breaks in the bike path networks.

Robert Moylan: Set up a working group with the city to identify bike path routes

- Signage + paint with low-hanging fruit
- DPW + other city departments to identify low-hanging fruit

Alex Wyglinski: Use counters on bike paths to quantify usage.

Jerry Powers: Department of Public Health is very supportive of anything that can help combat the obesity epidemic in Worcester.

John Odell: Need an event to increase visibility
(in addition to identifying low-hanging fruit)
A working group with no access to money won't work for long.

Nicole Freedman: CMAC is a possible funding source: short funding \$20,000
Hospitals are not good bicycle feeders but schools are.

Nick Jackson: Use Google maps and track cyclists to check their routes out:
Survey

Jacob Sanders: Offered to be the POC for Becker with respect to the bike routes/paths.

John Odell: Selected by the working group, tasked with

- Identify 4-5 low-hanging fruit paths
- Identify partners/community players (UNUM, St. Vincent's Hospital, Worcester Business Development Corporation, City School department, traffic division, police department, economic health, climate action plan)
- Point person for CitySquare
 - Tischman
 - Hanover (main lead)
 - Insurance

Suzanne LePage: Get also someone from the school department, traffic department of the Worcester Police Department.

John Odell: Planning Department and Health Department should also be

brought in

- Open space plan
- Elm Park plan
- And other plans and existing projects could be leveraged
- Schools
 - Leverage after school programs
 - Main school programs are dominated by MCASTs
 - Nationally it is the “Safe Routes to Schools Program”

Suzanne LePage: Create a 5-10 minutes video about what we are doing with bike paths and put it on YouTube

Liz Tomaszewski: April 10th there is a Sustainability Competition on WPI Campus

Linda Looff: Give a shortened version of the presentation. Who takes ownership?

- Students who graduate
- John Odell says since Bob Moylan stated he supported this, DPW should be the lead

John Odell: One of the key tasks is how to for the working group, who should be on it, and what should be the balance of it (industry, academic, city)

Suzanne LePage: Leverage WPI alumni connection with City of Worcester

John Odell: “George Street Race” is significant visibility

- Last Sunday in July
- 7 Hills Wheelmen and Barney’s Cycle Shop
- Possible involvement

Peder Pedersen: The team should determine how the underlying support network to an activity/working group of this bike path rollout

Key Point: Target, Funding, Working Group

- Suzanne: Very interested in forming an MQP design team
- Peder: this should migrate from IQP to an MQP

6 Next Steps

The main focus of outcomes for this Interactive Qualifying Project was to implement bicycle paths around the City of Worcester. Generous support from Worcester Polytechnic Institute (WPI) is greatly needed, if not an essential for the survival of active biking involvement in Worcester. The project at hand would be a lot easier to put these proposed plans to action if WPI can guarantee brilliant students to continue to work alongside City Officials during the implementation process of bike paths. The WPI sustainability groups and the green team on campus would help start a stronger student and Faculty biking community around campus, and potentially help to connect with the other college campuses 'sustainability groups, which would hopefully exponentially grow into a thriving Worcester City biking culture, similar to that of Boston or any other case study mentioned in this report or the previous IQP years. The following are arguments needed and work to be done to keep the ball rolling in regards to the feasibility of actual bike path implementation.

6.1 IQP Involvement with the Working Group

The Working Group that was suggested by Robert Moylan at the Focus Group will have representatives from the colleges, several city officials, representatives from organizations such as GreenerU and SynergE, and possibly local bike group members. For any future IQPs, it would be very beneficial for the IQP group to attend these Working Group meetings, and see what they can do or what information they could find to help the progress of bike path implementation. Additional information about health benefits and other economic benefits may be helpful to the Working Group when it comes to obtaining funding from grants.

6.1.1 Possible Partnership with MassDot

According to Massachusetts Department of Transportation, statewide bike paths have been installed starting around the late 1990's, to focus on a bicycle transportation plan that would be fully utilized by a not so distant future date. With goals of bicycle planning like this, active volunteering organizations or institutions can contribute to the ideals of a Massachusetts Biking transportation system (MASSDOT, 2012).

Currently, Worcester has more requests for WRTA renewal on public transportation throughout the city, especially trying to accommodate more resources to transport bicycles. One of the main drives, however for this revision of the current WRTA system is to help those in more need, especially since the argument is to recognize the need for transportation to access health care, housing, and community resources for hopeful upturn in the City's economic development (WRTA, 2013).

MASSDOT would be willing to work with any able and active members residing, especially professional and student engineers, city planners, and education programs that enthusiastically seek out and present plans of improving, implementing, and revamping the biking culture in Massachusetts. WPI could take advantage of this opportunity by connecting to MASSDOT directly or coming up with a potential business plan to unite the initiative for sustainability in Worcester and surrounding metro areas.

Possibly, various internship opportunities can come forward, even if there is not a partnership with MASSDOT. WPI MQP students focusing in Urban Development and/or a Civil Engineering concentration could possibly do an off-site based project in similar fashion to those students who do their MQPs at the MITRE project center or Lincoln Labs project centers, located in Bedford and Lexington. WPI could have its own "renewal" in regards to developing various opportunities for students to get hands on expertise working in Boston, MA while developing healthier, sustainable futures for all of Massachusetts through biking.

6.2 Worcester Bike Day

Suggested by Jerry Powers at the Focus Group, a Bike Day in the City of Worcester that involves city officials, like the mayor, would be very beneficial to the publicity of the bike network plan, and it would help gather community support for the project. A route could be chosen through the city, with the mayor leading the way, and for each stretch of path, a company or a school could "sponsor" that leg and show their support for bike paths in the City of Worcester. Local bike shops and the 7 Hills Wheelmen should be involved with this event, and may even help put it together. The goal of this bike day would be to get people excited about the prospect of having bike paths in the city, and to give them a glimpse of what the City with the paths would look like.

6.3 Public Awareness & Publicity

One of the key elements in moving forward with the implementation of a biking network for the City of Worcester will be promoting community awareness and involvement in the design process as well as relaying up to date notifications on developments and achievements to the public. In order for any bicycle path to become a success it will need to be utilized and supported by the community it envelopes or else there is no need for a path in the first place. This shows why public awareness will be such a key aspect in a successful implantation plan. One of the first steps that should be taken is obtaining support and assistance from advocates throughout the City that have a vested interest in the project. The interest groups that should be contacted are local bicycle shops, bicycling clubs or groups, such as the Seven Hills Wheelmen, and public schools and institutions. Through bringing these groups together to work collectively on the implementation process will allow a greater spectrum of concerns and issues to be addressed and rectified, as well as creating a working relationship between the two levels of government and community involvement in the project. Allowing each entity to have a vested interest and say in the design process will allow for greater success and utilization once the paths have been developed. Also addressing and identifying the social effects that each bike path will produce in its surrounding community will prove essential in moving forward with the information needed to adapt each plan to the respective community.

Another key aspect will be updating the City's residents on the development of each path as well as providing information regarding the locations and points of interest provided by the existing network. In keeping the public educated on the development of each path, the outlets of social and conventional media should be sought as a relevant possibility. Through the use of the Telegram & Gazette, Facebook, and the City of Worcester's website, the most current information can be provided allowing a number of avenues for the public to be updated on current changes or expansions to the bicycling network. There also needs to be readily available information regarding what points of interest each pathway will serve to connect as well as the districts each path will link together. Currently one of the biggest problems is that although at this time certain paths due exist within the City of Worcester, there is not map or current information

provided detailing where these paths are located or what attractions exist on each path. Through providing present news and information to be available to the public will help create a greater interest and excitement into utilizing the biking network on a greater scale.

6.4 Development of a Civil Engineering Biking MQP

One of the outcomes that came from the holding of the Focus Group was the creation of a WPI civil engineering MQP group that would be formed in order to work alongside the “Worcester Bike Work Group” in helping them plan and implement further bicycle path infrastructure. The creation of this MQP will be supervised by WPI professor Susan LePage and will work alongside Worcester’s traffic engineers and the Working Group in helping to identifying and develop a implementation plan for paths over the course of the following school year. The formation of this MQP will serve to fill the void or lapse in the development of biking, which may otherwise occur, and will also serve to create a stronger relationship between WPI and the City of Worcester in creating a physical bicycling network for Worcester’s future. Through an active participation between the MQP group and the City, biking will be able to remain as a pertinent objective in the City’s future.

6.5 WPI Support

Overall, there are several concerns that need to be kept in mind when trying to implement bike paths in new locations. As with any large project, there are lots of details that need to be thought out in order for everything to come together seamlessly. This chapter will identify some concerns and obstacles that come to mind that need to be reviewed before the upcoming workshop. Having the support from WPI would make it much easier for this group’s ideas to be put to action. Some of the things that will be required from WPI are club support, increasing the number of bicycle racks, providing for more bicycle safety measures, and making an effort to make the campus more biker friendly.

One of the groups this project is aiming to get support from is the Campus Sustainability group. Right now they are currently drafting their plan for sustainability at WPI, and their support would definitely increase the impact of this project. If they like

the ideas and goals of this IQP, it is very likely that this will result in a future partnership with subsequent IQP groups, and they may help push through plans for change on campus. Several meetings have taken place in C-Term with Professor John Orr to help determine the atmosphere for this group.

To help visualize how the roadway would be transformed is to set up a “trial path.” A section of road along the proposed path could be blocked off for a day or two in order for the community and possibly other biking advocates to get a sense of what the actual path could look like when it’s implemented. Since one goal is implementing the path connecting WPI and Becker, it may be feasible to contact the campus police and ban parking on one of the streets for one or two days to see the usage of the path. A test path connecting WPI with Price Chopper may have the best outcome for a trial path since many students travel that way daily. The elimination of parking on the West Street extensions has opened up another possibility of a test path location.

If WPI is going to be more biker friendly, more steps need to be taken into installing more bicycle racks around campus. Right now, there aren’t enough places to store bicycles. Students tie them to trees or bike racks are overflowing. Some racks are even in the mud and are not kept in good condition, like the bicycle rack in front of Atwater Kent. With the new parking garage opening up, it may be possible to add racks there.

Last term, there was several Safety Notification emails sent out about bike thefts on and around campus. Adding more storage in well-lit areas with cameras may help to decrease the crime and also encourage people to ride their bikes. Bringing this issue up with the sustainability groups and the biking community who use these facilities will help rally support and encourage change. If we can’t build a culture within our own campus, we won’t be able to build one anywhere else. If a path is implemented, more of the emergency blue beacons could ideally be installed along the path and even extend slightly further towards Highland Street.

Implementing a bike path and a more bicycle-oriented community will have to eventually come with police support. In a city like Worcester, the police force is

constantly busy. Starting with the WPI police, they will be assisting in the implementation of a test path if it goes through, so their support would be huge when it comes to connecting with Becker College. Some of WPI's officers do patrol their area now, so the unity of the two campuses may come with little resistance.

Creating a biker friendly campus starting from scratch will be a long, evolutionary process. Things need to be taken one step at a time, but with advocates like the Campus Sustainability group, or even the green team, these steps might get larger as there is more support. Right now, the number of bike racks and the campus safety is not attracting many people to ride their bicycles. Those that do ride already will have even more of a reason to continue to if actions are taken to eliminate bicycle thefts on campus and to provide for better facilities to house bicycles. Eventually, when a more bicycle-centered community is developed, bike and helmet rental programs could be started to encourage riding even further. Overall, WPI needs to support the efforts of this IQP in order for the City of Worcester to support them too.

6.6 Formation of “Worcester Bike Work Group”

On behalf of the Worcester DPW, the IQP team has been asked to create a list of recommended candidates for the formation of the “Worcester Bike Work Group”. In doing so, the IQP group will seek to find motivated candidates, who have a vested, dedicated interest in establishing a biking network for Worcester. The primary task of the “Worcester Bike Work Group,” will be assisting the DPW in identifying roadways that will not only have the possibility for immediate implementation but will also serve to connect surrounding communities to viable points of interest. The list of possible candidates that may possibly make up this group, as well as the reasons they were selected, are shown in 7.6 of the Appendices. Many of the members selected were either present during the Focus Group or have been interviewed and worked with over the course of this year. In the following months these selectees will be notified and invited to be a part in the formation of this group. Primarily we would like the group to include approximately 6-10 individuals from this list. As not all who are selected may be able to make the commitment, we will seek to ask members from varying organizations, such as that of the Worcester biking club, “The Seven Hills Wheelmen,” local

businesses like Hanover Insurance and St. Gobain, and also local bike shop owners such as that of “Barney’s Bicycle.” A list has also been provided in 7.6 of the Appendices, showing possible alternative members in order to make up the group. We hope that by the end of May, 2013, we will have a “Worcester Bike Work Group” fully formed and along with an appointed member by the Worcester DPW, they may begin their work in establishing the beginnings of a biking network for the City of Worcester.

6.7 Conclusion

As a direct result of the Focus Group, the stage was set for further action on implementing a bikeway in the City of Worcester. The formation of the Working Group is essential for following through with these action items, and will be the key to keeping these efforts alive and successful. After identifying the roads which are best suited to sustain a bicycle path at this time, the Working Group should plan ways to make bicycling in the City more attractive to Worcester’s residents and start a campaign to make drivers aware of the changes. The support from the City will help get this project underway, and hopefully in future years biking will become a major attraction of the City of Worcester.

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7 Appendices

7.1 Bikeways and Paths

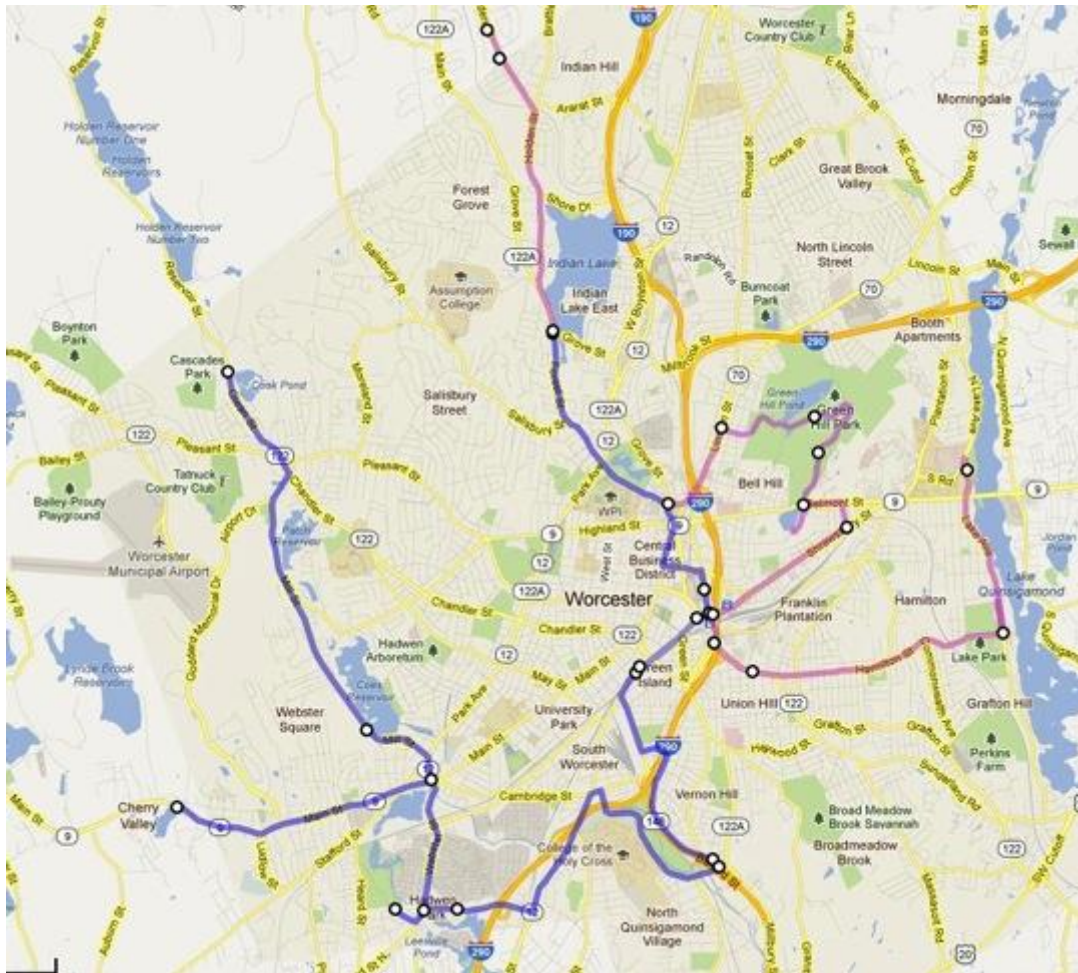


Figure 32: 1998 Worcester Bikeway System constructed (blue) and planned (purple) (Capizzio et al., 2012)

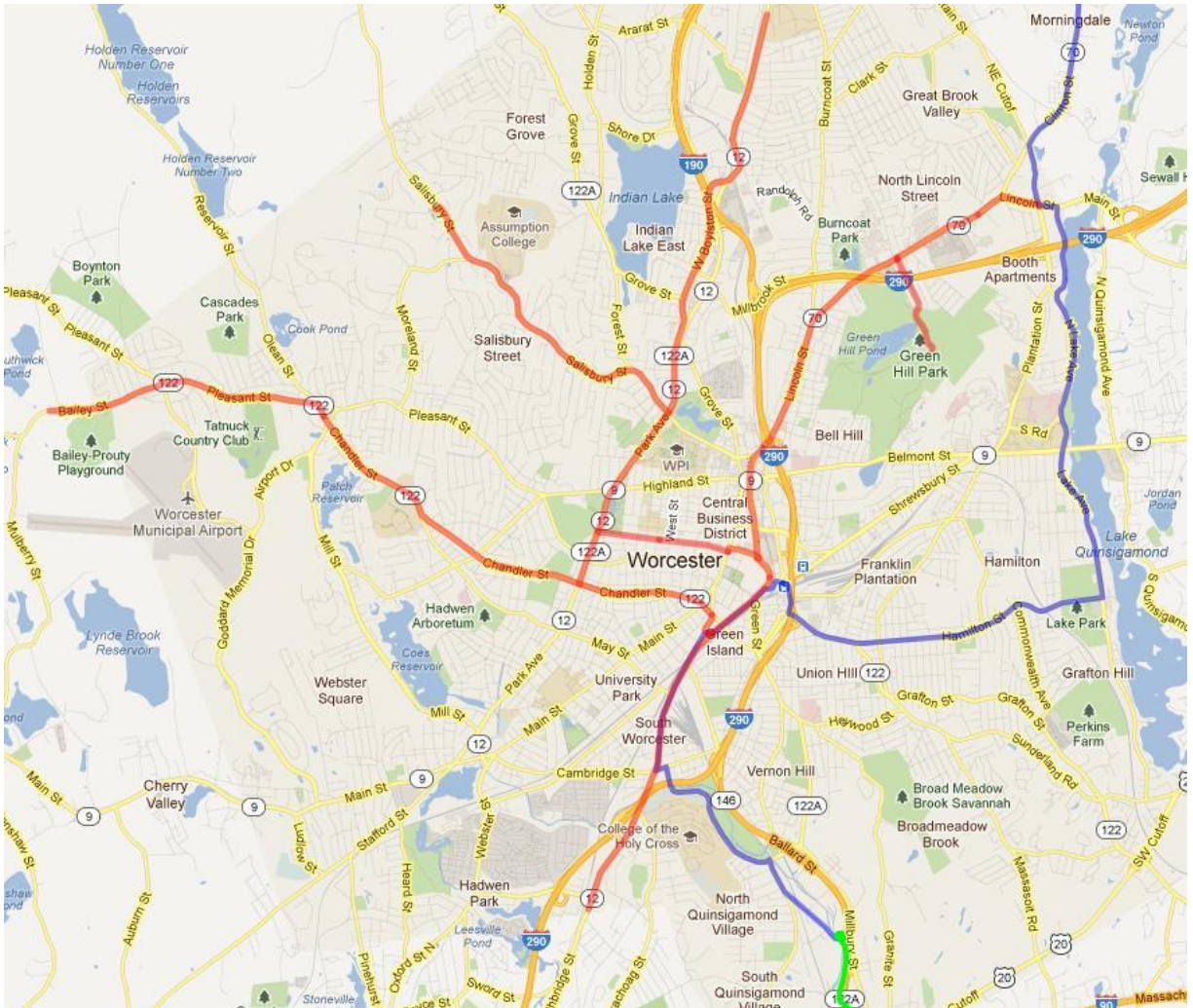


Figure 33: Ideal Path (red) with East Coast Greenway (blue) (Capizzio et al., 2012)

7.2 Workshop Set-Up Logistics

Parking: The parking for the workshop event was set up through the WPI Police Department. For major events, parking needs to be reserved and the staff at the events office provided the contact at the Police Department. Lieutenant Michael Ellsworth was contacted via email and has reserved the Higgins Lot for the guests. The parking passes sent by Lt. Ellsworth will need to be distributed to the guests prior to the event. Knowing the date, time, guest count, and location of the event on campus prior to reserving parking with Lt. Ellsworth would make this process very easy and quick.

Location: The location of the workshop needs to be in a room that has computer and projector access, in addition to being very professional looking. The scheduling website for WPI was going to be used to book the room, but the Hagglund Room, which originally was the ideal location for the workshop, was booked. Getting in contact with the WPI Events Office, the other way to book a room on campus, they asked for the time of the event, what other provisions that the room needed, and the number of guests that would be attending. Initially, the Forkey meeting room in Harrington Auditorium was booked for the event through the Event Office staff member James Kenary. Due to a misunderstanding of what the workshop actually entailed, this room booking was changed to the Higgins House Great Hall and the Higgins House Library through Cathy Battelle.

Time: The rooms are booked from 8 A.M. until 5 P.M. to leave time for set-up and cleanup. Linda Looft suggested that the workshop should be around 2 to 3 hours, so the event will probably start around 9:30 A.M. and wrap up around 12:30 P.M.

Marketing: Due to the special guests that will be attending the workshop, Linda Looft has offered to have her marketing assistant help set up the event. This will entail special tablecloths, flowers, and other décor to be added to the rooms.

Food: Brunch will be served at the workshop, provided by Chartwells. They will need a WPI account number to purchase the food and the online form filled out as to what kind of food will be delivered. Calling the Chartwells office directly also works.

7.3 Biking Benefits Infographic

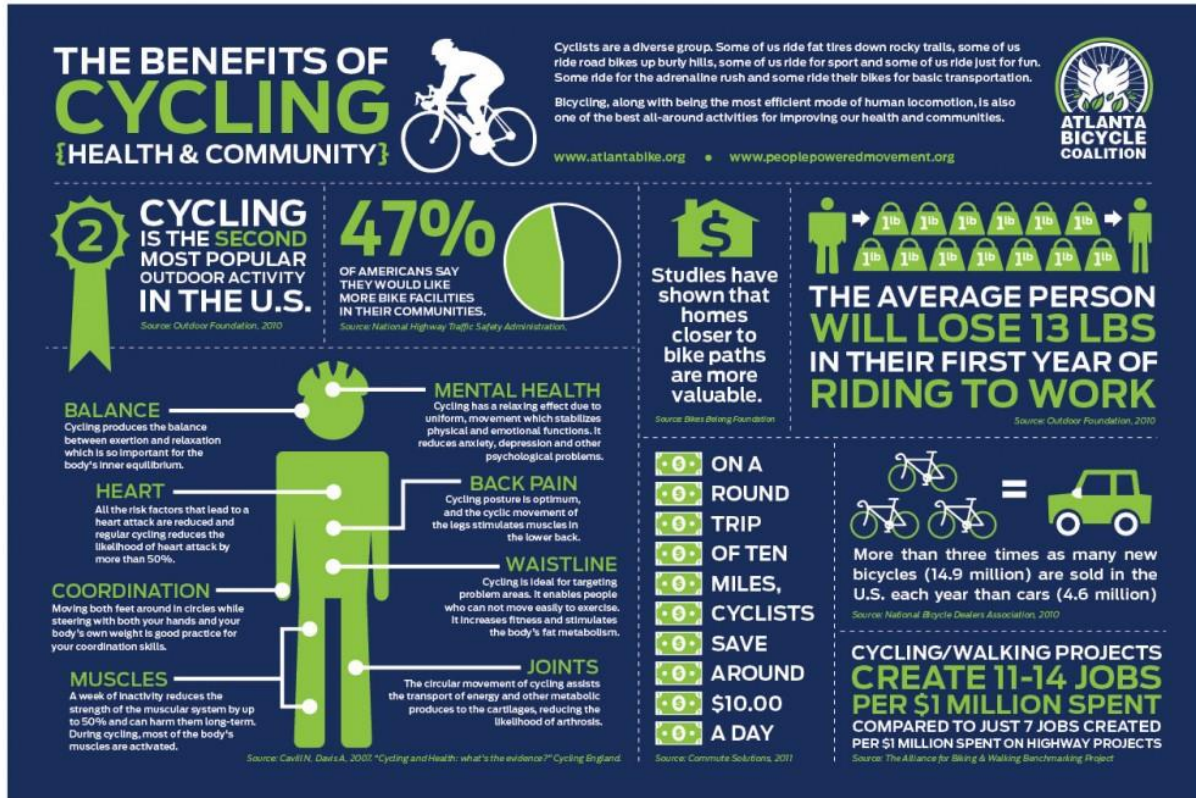


Figure 34: The Benefits of Biking Infographic (mrplatts.com)

7.4 Focus Group Invitee List

Table 12: Focus Group Invitee List

#	Name	Profession	Reason of Invite
1	Linda Looft	WPI Gov.' Relations	Influence /WPI
2	Robert Moylan	Dept.Parks and Public works http://www.worcesterma.gov/dpw	DPW Commissioner
3	Alan Gordon	City Planner http://www.linkedin.com/pub/alan-gordon/3a/b79/24	City planner of Worcester, city influence
4	Suzanne LePage	WPI Civil Eng Professor	
5	Mary Keith		
6	Melissa Lucas	UMASS Med. Greener You Proj. Manager http://www.umassmed.edu/grovinggreen/index.aspx	Umass connection /area of bike path focus

7	John O'Dell	Energy Plan for the City of Worcester. http://www.worcesterenergy.org/about-us	Currently advising downtown green sustainability for Worcester
8	Karen Mason	Director of Student Affairs, ALANA http://www.cowc.org/about-us/committees	Colleges of Worcester Consortium
9	Erin Williams	Cultural Development Officer http://www.worcestermass.org/city-initiatives/wayfinding http://www.worcestermass.org/uploads/3a/7c/3a7ca164c76d4567d2c5244840121e98/Wayfinding-Community-Presentation.pdf	In charge of Worcester way finding: visitors and community kiosks, identifiers
10	Jack Donahue	Chair of WORCESTER Redevelopment Authority http://www.worcestermass.org/land-development-in-worcester/worcester-redevelopment-authority	Key to Urban Renewal Projects in Worcester
11	Timothy McGourthy	Gateway Cities Urban Initiative	Passionate about tools for the betterment of Worcester (ease of access to jobs and community)
12	Liz Tomaszewski	Facilities System Manager	WPI side of things
13	Jacob Sanders	Becker College Community Relations	Enthusiastic about the creation of a bicycle route connecting WPI to Becker Creates the link to Becker for the Focus Group
14	John Orr	WPI GreenerU	Chairs the President's Task Force on Sustainability at WPI

7.5 Focus Group Attendees

Table 13: Focus Group Attendee List

Robert Moylan	DPW Commissioner for City of Worcester DPW	(508) 929-1300	MarzilliS@worcesterma.gov
Linda Looft	University Advancement at Worcester Polytechnic Institute	1 508-831-5570	lclooft@wpi.edu

Suzanne LePage	Instructor, Civil and Environmental Engineering at Worcester Polytechnic Institute	1 508-831-5598	slepage@wpi.edu
John O'Dell	Energy Efficiency and Conservation Manager at the Division of Planning & Regulatory Services	508-799-1400 ext. 269	Odellj@worcesterma.gov
Joe Borbone	City Traffic Engineer		
Liz Tomaszewski	Facilities Systems Manager/Sustainability Coordinator at Worcester Polytechnic Institute	508-831-5454	ltomasz@wpi.edu
Jacob Sanders	Advancement Associate at Becker College	508.373.9717	jacob.sanders@becker.edu
John Orr	Professor of Electrical and Computer Engineering at Worcester Polytechnic Institute	1 508-831-5273	orr@wpi.edu
Alex Davis	Sustainability Programs Analyst at GreenerU	614-353-6036	alex.d@GreenerU.com
Nick Jackson		617-619-9910 ext. 200	njackson@tooledesign.com
Nicole Freedman	Director of Boston Bikes	617-918-4456	Nicole.Freedman.BRA@cityofboston.gov
Jerry Powers	Director of Walk and Bike Worcester		
Rob Capizzio	WPI Student: Previous Bike IQP member		rcapizzio@wpi.edu
Alex Wyglinski	WPI Professor and Advisor		alexw@wpi.edu
Peder Pedersen	WPI Professor and Advisor		pedersen@wpi.edu

7.6 Worcester Bike Work Group Candidates

Table 14: Candidates for "Worcester Bike Work Group"

Linda Looft	University Advancement at Worcester Polytechnic Institute	1 508-831-5570	lclooft@wpi.edu	<ul style="list-style-type: none"> • Connections between University and Government Officials • Service on Elm Park Committee
Alan Gordon	Economic Development Director at the Economic Development Commission	508-248-2237	N/A	<ul style="list-style-type: none"> • Served as Planner to Worcester during
Suzanne LePage	Instructor, Civil and Environmental Engineering at Worcester Polytechnic Institute	1 508-831-5598	slepage@wpi.edu	<ul style="list-style-type: none"> • Worked as a Civil Engineer for the City of Worcester
John O'Dell	Energy Efficiency and Conservation Manager at the Division of Planning & Regulatory Services	508-799-1400 ext. 269	Odellj@worcesterma.gov	<ul style="list-style-type: none"> • Enthusiasm towards Project/Idea of Biking
Liz Tomaszewski	Facilities Systems Manager/Sustainability Coordinator at Worcester Polytechnic Institute	508-831-5454	ltomasz@wpi.edu	<ul style="list-style-type: none"> • Serves on WPI Sustainability Group
Jacob Sanders	Advancement Associate at Becker College	508.373.9717	jacob.sanders@becker.edu	<ul style="list-style-type: none"> • Connections between University and Government Officials
John Orr	Professor of Electrical and Computer Engineering at Worcester Polytechnic Institute	1 508-831-5273	orr@wpi.edu	<ul style="list-style-type: none"> • Head of WPI Sustainability Group • Active Participation in SynergE Worcester
Nicole Freedman	Director of Boston Bikes	617-918-4456	Nicole.Freedman.BRA@cityofboston.gov	<ul style="list-style-type: none"> • Expertise, Experience, Knowledge, and Enthusiasm towards Project
Jerry Powers	Director of Walk and Bike Worcester			<ul style="list-style-type: none"> • Enthusiasm towards Project/Idea of Biking
Melissa Lucas	Sustainability and Energy Manager at UMASS Medical	1 508-856-6324	melissa.lucas@umassmed.edu	<ul style="list-style-type: none"> • Serves on Greener U • Connection with U-Mass Medical School

Table 15: Alternative Candidates for "Worcester Bike Work Group"

Seven Hills Wheelmen	Worcester Bike Club		www.sevenhillswheelmen.org	<ul style="list-style-type: none"> • Vested Interest
Barney's Bicycle	Worcester Bicycle Shop	(508) 799-2453	www.barneys.com	<ul style="list-style-type: none"> • Vested Interest
Hanover Insurance Group	Worcester Business	(508) 855-1000	www.hanover.com	<ul style="list-style-type: none"> • Strengthen Project/Funding
St. Gobain	Worcester Business	(508) 795-5174	www.saint-gobain-northamerica.com	<ul style="list-style-type: none"> • Strengthen Project/Funding
Alex Davis	Sustainability Programs Analyst at GreenerU	614-353-6036	alex.d@GreenerU.com	<ul style="list-style-type: none"> • Serves on GreenerU/Connection with Assumption College