

Mohawk Bicycle and Pedestrian Path: A Roadway Feasibility Study

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ENVI 302

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I. Planning Problem:

Our project was undertaken within the context of the larger plan of connecting Williamstown and North Adams with a recreational bicycle and pedestrian path. This bike path will be designed to be accessible to people of all abilities and largely serve as a safe and scenic transit route between the two towns. Within this larger goal, our project will specifically focus on evaluating the road routes between the two towns to determine the levels of feasibility and desirability for constructing a bike path adjacent to different sections.

II. Vision

The vision for the North Adams to Williamstown path—officially the “Mohawk Bicycle and Pedestrian Path”—mainly includes the purpose of recreation. For this reason, all attempts possible are being made to stay away from roadways, as they create dangerous situations for pedestrian or bicycle traffic, and do not provide as many scenic and recreational opportunities as other off-road alternatives. On-road options must be considered, however, because there exists a perception that bike trail construction could be easier and cheaper in these areas of existing infrastructure. In the end, though, to best serve the goals of this project, the Mohawk Bike Path must be a predominantly off-road facility. Before such a route can be proposed, however, there must be an in depth investigation of the possible bike routes along the side of the road. Part of the purpose of this investigation is to show which sections of roads are not feasible for a bike path. This will ultimately allow the Berkshire Regional Planning Commission (Henceforth,

BRPC) to prove that the trail must necessarily travel away from unsafe and ugly roadways. In other areas, a roadside path may be absolutely necessary. In these cases, we evaluated current safety, feasibility and conflicts, and made recommendations about what would have to be done to make these sections acceptable.

It is particularly important to keep in mind the project vision as a recreational opportunity available to all. Our planning evaluations and eventual recommendations are therefore made to suit a “family of four,” as a sort of safety and feasibility standard. For this reason, our vision for a roadside bike path is that of one separated from the road with ample space or a physical barrier. The current condition of Massachusetts roads allows for biking on all roads, thus making travel between North Adams and Williamstown by bike theoretically possible. This trip would obviously not be safe, however, especially not for children. An improvement to a bike lane on Route 2 or Massachusetts Ave. would appropriately serve the purpose of a commuting route, but again would not be safe enough to meet the recreation standards of a family of four.

III. Project Importance

The need for a bike trail connecting North Adams and Williamstown is great for many reasons. First, though the towns are a mere five miles apart, many people commute between them by car. Commuting occurs regularly for workers of both towns, but also for the students of Williams College, who drive to North Adams frequently for commercial and social reasons. A bike trail would reduce car use, thereby improving the beauty of the Berkshire area and also reducing environmental impact through reduction of green house gas emissions. These issues are now increasingly important, as climate change has become a clear and visible problem, and Williamstown has recently joined the *Cities for Climate Protection Campaign* and set emission reduction goals.

A second reason justifying the construction of a bike trail connecting North Adams and Williamstown is the opportunity for recreation. The recently constructed Ashuwillticook Trail connecting Adams and Pittsfield has been tremendously popular in the community for its recreation value, and this interest in bike routes further validates the need for an additional trail connecting North Adams and Williamstown. Public support for the project was recorded officially through public forums held in June, 2007 by the Mohawk Bicycle/Pedestrian Trail Advisory. Ninety eight percent of respondents were in support of a bike trail connecting North Adams and Williamstown; though the group was probably self selected towards people with an already high interest in bike routes (92% had used the Ashuwillticook Trail).¹ Still, between the evidence of the public forum and the high use of the already existing Ashuwillticook Trail it is clear that a bike route from North Adams to Williamstown would be popular and used frequently.

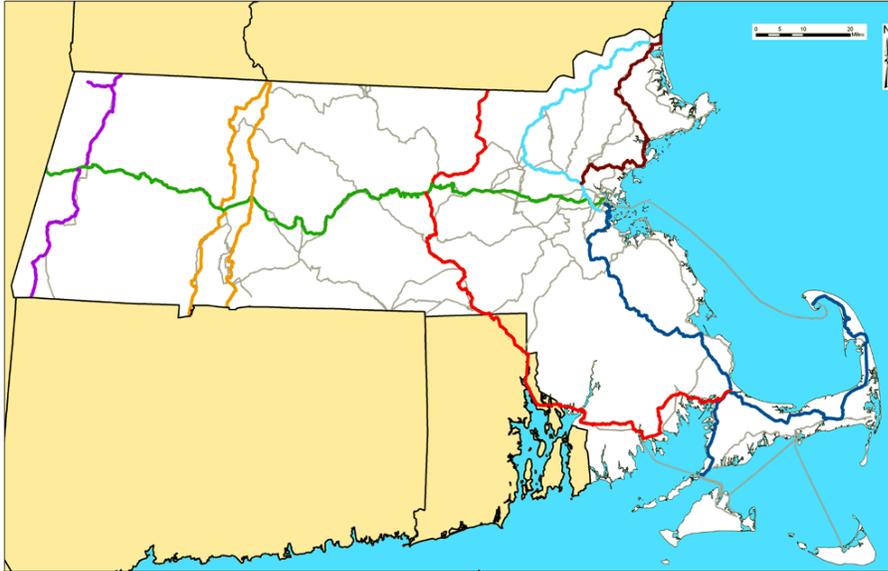
Finally, the construction of this bike trail will help complete a plan proposed by the Massachusetts Highway Department, which officially recognized the importance of bike paths in 1998 by drafting a Statewide Bicycle Plan. This plan is illustrated by the following mission statement:

The vision statement of the Statewide Bicycle Transportation Plan is recognition of bicycling as a viable means of transportation and reasonable accommodation of the needs of bicyclists in policies, programs, and projects. Greater recognition and accommodation of the needs of bicyclists will lead to a more balanced transportation system with greater modal choice and improvements in bicycle safety. Such actions will enhance the environment and quality of life in the Commonwealth, and improve personal mobility.²

The plan, shown in the map below, involves over 500 miles of statewide trail, eventually connecting the North, South, East, and West borders of the state continuously with bike trail.

¹ Lauren Gaherty, Berkshire Planning Commission, Senior Planner, North Adams Survey Results, June 2007.

² <http://www.mhd.state.ma.us/default.asp?pgid=content/bikepaths01&sid=about#para1>, accessed 10-15-07



Proposed Bike Path Routes for State of Massachusetts.³

IV. Community Profile: Defining the places we want to bring together

The neighboring towns of Williamstown and North Adams are two distinctly different communities in Northwestern Massachusetts. Perhaps social class separates the two towns more than anything. Williamstown, rated as one of the top twenty small towns in America, and home to one of the top rated liberal arts colleges in the country, exists as a wealthy community. Five miles east is North Adams, once home to the highest teen pregnancy rate in the country, which continues to struggle as it tries to pull itself out of an economic recession and rebuild its business sector to serve a tourist economy after big industries left town. A bike trail between the two towns would not only serve to connect the towns physically, but allow for these disparate communities to develop a relationship as they share the experience of outdoor recreation.

Williamstown first marked itself on the map in 1793 when Williams College was founded by Colonel Ephraim Williams. The town has remained a college town since, as the

³ <http://www.massbikeplan.org/mapsANDgraphics.htm>

college supplies over half Williamstown residents with jobs. The town is also home to a variety of art museums, including the Clark Art Institute and Williams College Museum of Art (WCMA), and a Summer Theater Festival that brings well known Broadway and Hollywood performers to town. The July 1984 *Connoisseur* stated that Williamstown has the most art per capita of any American Community.⁴

North Adams has a strikingly different history. The city first established itself as an industrial town when sawmills, textile factories, and shoe making companies arrived in the 1720s. In 1929 Sprague Electric moved to town, employing 4,000 residents and becoming one of the most successful producers of electronic products in the world. By the 1970s, greater competition and ever changing technology lead to fewer profits and in 1985 Sprague shut down, leaving many North Adams residents jobless. The town soon went into a severe economic recession causing it to become dormant⁵.

In 1987 Sprague Electric's abandoned twelve acre, twenty-seven building complex was reopened as a Museum of Modern Art under the inspiration of WCMA's director Thomas Krens. After millions of dollars in private donations and financial backing from the state, reconstruction and renovation of the depressed factory area began in 1995. Three years later in May of 1999, the largest center for contemporary arts in the United States opened.⁶ Over the past decade, beginning with the introduction of Mass MoCA, North Adams has taken positive steps towards urban revitalization and developing an economy that focuses on tourists to the area.

Today North Adams is still the medium sized, blue collar town that it has always been, however the mayor and town residents are more excited about the possibility of tourist

⁴ <http://www.mass.gov/dhcd/ipofile/341.pdf>

⁵ http://en.wikipedia.org/wiki/North_Adams,_Massachusetts

⁶ <http://www.massmoca.org/facts.php>

attractions like a recreational bike path.⁷ With 16,797 residents concentrated within a density of 822 persons/ square mile North Adams is twice the population count and five times the population density of Williamstown (8,424 residents and 175 persons/square mile). In trying to describe the current housing situation the latest data from the 2000 census shows, 65.7 % of existing households are family households (have at least one child and a parent living in them) and almost identical in Williamstown at 61.5%. Almost 13% of housing units in the town are subsidized; ranking North Adams among the most financially needy towns in the state of Massachusetts, while in Williamstown only 4.8% of its housing is subsidized.⁸

The 2000 census states the average income in Williamstown (\$51,000) is almost twice that of North Adams (\$27,000).⁹ Williamstown is one of the wealthiest towns in Berkshire County, primarily due to the financial stability of Williams College and the healthy incomes it offers its almost 2,000 faculty and staff, most of whom live in Williamstown. The town also offers abundant sources of recreational activity including biking, hiking, and cross country skiing, as well as many renowned art museums and a one of the top rated golf courses in the country.

Aside from Mass MoCA, North Adams' attractions are more defined by its natural and historical landmarks including the Hoosac Tunnel, regarded as one of Massachusetts greatest engineering feats when built in the 1860s; Western Gate Heritage Park, one of only a few historic urban parks in Massachusetts; Mt. Greylock State Reservation, which claims the state's highest peak, and Natural Bridge State Park, home to the only naturally formed marble bridge in North America.¹⁰

⁷ <http://www.berkshireplanning.org/7/8/> , accessed 11-26-07

⁸ <http://www.mass.gov/dhcd/components/SCP/shiinv.htm> accessed 11-7-07

⁹ <http://www.census.gov/>, accessed 11-7-07

¹⁰ <http://williams.edu/ces/mattcole/resources/onlinepaperpdfs/papers/biketrail.pdf>, accessed 11-7-07

In trying to understand who would benefit from the construction of a bike path it is useful to note the past and current profiles of these communities and how the bike path might change the social and cultural structure of these communities. Both towns have substantial residential populations, North Adams containing larger and more densely populated residential neighborhoods, while Williamstown though mostly oriented around the large and active college campus has many residents who live up in the hills on several acres of open land. Hopefully the path provide a common ground where Williamstown residents living near the college and privileged Williams College Students will leave their comfortable setting and interact with the mixed class neighborhoods of North Adams. Such a common ground could help to unite and foster positive interaction between the two disparate and different towns.

The bike path would also almost certainly become a tourist attraction during the summer and fall seasons, as well as hopefully help Williamstown realize its master plan in becoming a City for Climate Protection, and North Adams to help meet its Open Space and Recreational Plan. Though cost and acquiring open corridors to place to the path are definite issues, we are hoping that these two towns will find a recreational bike path a great addition to their already dynamic and diverse communities.

V. Site History: The Mohican-Mohawk Historical Trail

In the 100 mile corridor stretching from Deerfield, Massachusetts through Pownal, Vermont and eventually ending at the confluence of the Hoosic River and Hudson River in New York, there are remnants of the old Mohican-Mohawk trail. Archaeological evidence shows that Native Americans lived in the Hoosic Basin as early as 4000 B.C. The Mohican-Mohawk trail, which Route 2 follows, was used as a provisioning route during the Revolutionary and French & Indian Wars. Fort Massachusetts was strategically placed near the trail, as Colonel Ephraim

Williams used the trail frequently as commander of the fort from 1744 to 1763. In 1755 Benedict Arnold traveled the trail to capture Fort Ticonderoga, while distinguished authors such as Ralph Waldo Emerson, Nathaniel Hawthorn, and Henry David Thoreau all at one time also traveled the trail.¹¹

One may ask why these historical facts are important to the construction of a bike path? The rich history of the Berkshires serves to promote the tourist economy that continues to develop in North Adams and Williamstown. Like the preservation of Boston's Liberty Trail sites as a kind of memorial to our fore fathers who fought for American Independence, so is the Mohican-Mohawk trail a significant route narrating the advanced trading and communication tactics of the North Eastern Native American tribes. In this sense re-creating the trail is helping memorialize the history of the Native Americans in the Berkshires.

VI. Project History and Work Already Done

The planning of a bike trail between North Adams and Williamstown is set in the context of a rich project planning history. The Hoosic River Watershed Association (HooRWA) has discussed possibilities of a scenic trail along the Hoosic River for past 35 years and in 1969 the Williams College Political Economy 340 class reported that the Conservation Commission in Williamstown and North Adams had proposed a bike trail as early as 1968. In a Williams' College Winter Study Project students retraced the Mohican-Mohawk trail from Deerfield to the eastern boundary of North Adams. But planning efforts have been redoubled in recent years, perhaps in response to the urging of the Massachusetts Highway Department. Over the past decade Mass Highway has encouraged communities to plan their own bike paths as part of a state wide proposal that began in 1998 when they published the Massachusetts Statewide Bicycle

¹¹ <http://williams.edu/ces/mattcole/resources/onlinepaperpdfs/papers/biketrial.pdf>, 11-6-07

Plan. It encourages the creation of new off-road bike paths, bike lanes, bike lockers, and other bicycle related projects, however most the funding has gone to wealthy urban areas in eastern part of state.

The most recent and in depth bike path report between North Adams and Williamstown was conducted by the Williams College Environmental Planning class in spring of 2002. This group assessed the feasibility of three different bike route options connecting Cole Ave to Galvin St: 1). Following a buried sewer line adjacent to the Hoosic River, 2). Following the active railway, and 3). Creating an on-road path along a section of Route 2.

Other recent studies include HooRWA's and the Williamstown Rural Lands Foundation's 1999 evaluation of feasibility of greenway along Hoosic River for hiking. The project was deemed "a feasible and attainable goal."¹² In 2001 HooRWA filed for \$9600 grant for pre-engineering feasibility to follow up on their greenways report. After the success of the Ashuwillticook's construction, the North Adams-Williamstown bike trail plan became a more serious goal, and in 2000 North Adams established the Bikeways Committee and eventually the project was turned over to Berkshire Regional Planning Commission under the direction of Lauren Gaherty, where it continues to develop today.¹³

Work Already Done

Lauren Gaherty and the BRPC have worked in conjunction with another Berkshire organization, the Mohawk Bicycle/Pedestrian Advisory Committee to begin the process of planning a North Adams-Williamstown connecting bike path. Our project will also draw on

¹² <http://www.hoorwa.org/aboutriver.htm>, 11-6-07

¹³ <http://berkshireplanning.org/7/7/>, 11-6-07

work done by other groups and organizations, summarized below. This “work already done” places the tasks yet to be done in a context that must be understood before proceeding further.

Environmental Planning 302 Project, Spring 2002

As mentioned above, previous site investigation was completed by a Williams College Environmental Planning class in the Spring of 2002. Their detailed report included the evaluation of three possible routes:

- 1) Sewer Easement Path (Follows the Hoosic Water Quality District Sewer line near the Hoosic River, starting and the Photech site following a proposed scenic, yet expensive route near the river eventually ending near Ashton Ave.);
- 2) The Rail-With-Trail Alternative (This route along the rail bed would allow for an already level and cleared pathway)
- 3) Route 2 Bike Lane (This was environmentally friendly yet dangerous proposal to create a bike lane along route 2)

Through an “alternatives analysis” the group created and quantitative way to rate the three bike routes (including variable such a conflict points, environmental impact, accessibility, cost, etc.. The Sewer Easement Path received the highest rating followed by the Rail-with-Trail alternative as the second most desirable, and the Route 2 Bike Lane the least acceptable.¹⁴ This study is applicable to our project because it investigated a Route 2 bike route option. However, the study investigated only the possibility of bike lanes, while we are recommending a fully separated multiuse path for safety reasons.

The Ashuwillticook Trail

¹⁴ <http://www.williams.edu/CES/mattcole/resources/onlinepaperpdfs/papers/biketrail.pdf>, accessed 10-15-07

The planning history of our project theoretically goes back to the completion of another bike trail project: the Ashuwillticook Rail Trail (henceforth, ART). The ART is an eleven mile trail running north-south along Route 8 between Adams and Pittsfield, maintained by the Massachusetts Department of Conservation and Recreation.¹⁵ The trail is built along an abandoned railway corridor, allowing a scenic and flat bike route which has been popular among Berkshire County residents. Now that the trail is completed, there has been a push to extend it further into North Adams, and perhaps even South to Lenox. An extension of the trail would make the long-range goal of a Connecticut to Vermont trail possible, as the trail proposed in this project could then serve as a link Pittsfield to North Adams to Williamstown and eventually into Pownal, VT.

Though the Ashuwillticook has served to inspire for the creation of a North Adams to Williamstown bike path, its construction model can unfortunately not be followed in this project. While a railroad does connect the two towns, it is active, and therefore a trail cannot be placed along the entirety of this corridor. Therefore, though the Ashuwillticook serves a sort of inspirational background for our project, other non-rail-trail options are being investigated by the BPRC for the construction of the Mohawk Bike and Pedestrian Path.

Public Interest Surveys

As mentioned above, the Mohawk Bicycle and Pedestrian Advisory Committee conducted a public forum to gauge the interest for the trail. There were fifty responses to the survey, generally in favor of the trail. Because many of the participants said they used the Ashuwillticook Trail, the survey group was probably heavily weighted towards those already

¹⁵ http://www.berkshirebikepath.com/wst_page5.html

interested in using bike trails. Two thirds of the respondents said they would use the trail more than once a week¹.

When asked what they would use the trail for, most respondents replied with recreational uses such as exercise, outdoor enjoyment, and social time with family and friends. Few envisioned the trail as a commuting route. Participants were also asked to rank the first three most important characteristics of a potential trail, out of a list of eleven. The three most chosen responses were safety, accessibility, and scenery¹.

Project Funding

With public interest established for the existence of a North Adams to Williamstown bike route, the BRPC went about gathering the funds to begin feasibility and route assessment studies. Because Route 2 is a part of the Mohawk-Mohican Trail National Scenic Byway, the area is eligible for National Scenic Byway Grant funding. The Berkshire Regional Planning Commission has already received a grant from this program to investigate the feasibility of different routes for a potential bicycle and pedestrian path connecting Williamstown and North Adams. Between state and federal funds, the BRPC has received \$110,000. Our investigation and report help the BRPC to be able to apply for additional funding for the actual construction of the trail.

Site Investigation

With the planning funds mentioned, the BRPC has already identified possible routes for the Mohawk Bike and Pedestrian Path. Lauren Gaherty, the Senior Planner with BRPC, said in an interview that she had already “bushwhacked” sections of land adjacent to the Hoosic River,

and walked other possible roads and routes¹⁶. After collecting field data and performing extensive feasibility studies, the BRPC and the Mohawk Bike and Pedestrian Advisory Committee produced preferred and secondary path routes. Potential bike path areas that the BRPC is looking to survey include: town owned floodplains, parks and playing fields, and land adjacent to the active rail bed. This background information is particularly important to our project because it allowed the BRPC to come to us with a map of road routes (areas where the path came near, crossed, or ran parallel to roads) that it needed us to investigate.

North Adams Trail Feasibility Committee

This North Adams citizen group has produced an informal report drawn from quantitative analysis of possible bike trail routes. We have not yet been able to acquire the report or recommendation justifications, but the recommended route generally follows the Hoosic River closely.

Massachusetts Highway Department Data

Part of our project will include gathering data on existing road shoulders and sidewalks. The Massachusetts Highway Department has already collected much of this data, which will be useful in our analyses, but which we must verify in field visits.

VII. Law and Policy & Technical Issues

Due to issues of safety regarding moving vehicles and other obstructions by the road as well as issues of feasibility and ease of access arising from having a bike path coincide with a pre-existing motor road, we are charged with the task of evaluating motorways connecting North Adams to Williamstown with the expressed goal of gathering information to illuminate the

¹⁶ Lauren Gaherty, Interview, October 2007

current status of those roads considering the afore mentioned issues. Collecting information based on volume of traffic (both trucks and cars), number of intersections, speed limits, traffic signals, bridges, shoulders/sidewalks, shade/shelter, developed versus undeveloped surroundings, street lighting and proximity to residential areas, other recreational/cultural venues, places of employment, schools, bus stops and commercial centers will be part of an on-road evaluation form for each section of road considered.

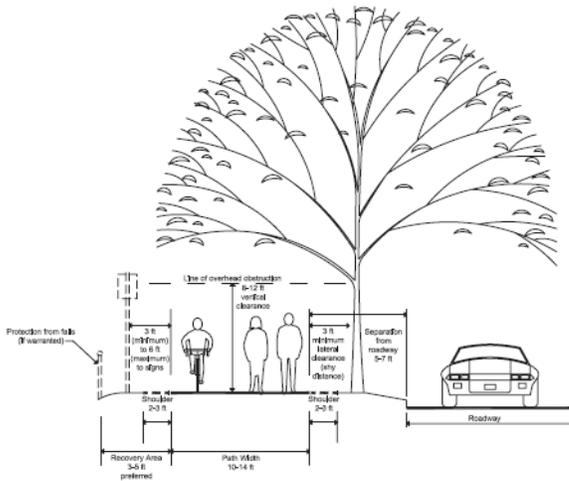
One of our main concerns is that because these roads were not initially constructed with a bike path in mind, they will not adequately conform to the ideal conditions for shared use as a “community path.” The requirements for ideal bike way conditions are as follows:

Chapter 11 of the Mass Highway regulations book (published January 2006) lays out the specifications regarding “Shared Use Paths and Greenways.” The following is a list of specification as outlined in the manual:¹⁷

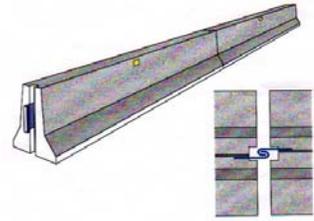
- Slope limitation requirements allows for a maximum 5% grade to receive federal funding
- The path must be physically separated from motorized vehicle traffic by 5-7 feet of open space or a barrier (such as Jersey Barriers)
- At least 2-foot wide (paved or unpaved), graded shoulders to provide stopping and resting areas off the path, allow for snow storage, help prevent root damage, and allow passing and widening at curves
- Minimum 3-foot clearance from edge of path to signs, trees, poles, walls, fences, guardrails, and other obstructions. A wider separation should be considered where the path runs adjacent to canals, ditches, or slopes steeper than 30%. Where greater than 50% slopes exist within 5 feet of path, a physical barrier should be provided at the top of the slope

¹⁷ Mass Highway Department, Shared Use Paths and Greenways, Chapter 11, January 2006.

**Exhibit 11-2
Shared Use Path Dimensions**



Source: Adapted from the VTTrans Pedestrian and Bicycle Facility Planning and Design Manual



-Diagram showing path separation from roadway (5-7 ft recommended)

-Jersey Barriers might be used to separate roadways from mixed use path

- Signing and marking (i.e. centerline)
- Minimum width of a two directional path is 10 feet. A reduction to 8 feet may be granted where severe circumstances are deemed to exist such as extreme environmental, historical and/or structural constraints.
- Minimum of 8 feet overhead clearance to obstruction, with a minimum of 12 feet if equestrian traffic is expected.
- Speed of bike traffic dictated by radius of curves and sight distance

We also looked at what other bike friendly cities, such as Portland, Oregon and Northampton, Massachusetts have set as their standards for mixed use paths. Below is a revised version of what laws and policies we thought would be most useful to consult in the Williamstown/North Adams mixed-use path.

Portland, Oregon, Master Plan for Bicycling (with engineering guidelines):

(Appendix A, Part I, Section C)

- Concrete paths are better than asphalt because lower maintenance, not affected by roots, ice, etc. They are like asphalt, but do cost more to make.
- Five foot minimum separation from roadway.
- Under AASHTO *recommendations*, you can have up to a 10% grade for 500 ft.
- Instead of physical separation from the road, the use of a Jersey barrier to separate bike path from road, with retaining fence 4.5 feet tall.
- “Bicycle lanes” can be constructed by adding an 8 inch stripe on paved shoulder of road
- Bicycle lanes adjacent to curbs or parking must be 5 feet wide (can be 4 feet for less than 1 mile as long as it connects existing bikeways on both ends.)¹⁸
Ex: The section in North Adams nearing the graveyard would have to be 44 feet wide to accommodate a bike lane under these circumstances.

In Northampton, Massachusetts the road was thinned to better accommodate bikes.

One stipulation to this possibility is that bike lanes on state roads must connect to the other bike paths. Though such an option may be recommended for the Williamstown/North Adams bike path it is unlikely that thinning the road would necessarily would even be possible.¹⁹

Yet a third resource to confirm certain laws and policies was bike enthusiast, Tom Galvagni of the Massachusetts Highway Department. In brief discussion via phone Galvagni assured us that a 5-7 ft separation from the road would be most desired for a “mixed-use path.”²⁰ Galvagni also stated that if a two lane separated path along a road way was not possible, individual one lane separated paths could exist on opposite sides for short distances.

VIII. Where We Come In: Client Goals

¹⁸ <http://www.portlandonline.com/shared/cfm/image.cfm?id=40414>, 12-4-07

¹⁹ <http://www.massbike.org/mbpv/involve/updates.html#calm>, 12-4-07

²⁰ Personal Contact with Tom Galvagni, Massachusetts Highway Dept., 12-6-07

With these factors of importance, vision, history, and work already done in mind, our client Lauren Gaherty came to us with the next phase of the project: comparing preferred bike path routes with the feasibility of a road-side path. With the realization that at least a few parts of the path may need to be on the road at points, the goal set by our client can be broadly defined as evaluating the existing roadways between the Williamstown and North Adams, primarily Route 2 and Massachusetts Avenue, for their potential ability to accommodate an additional bike and pedestrian path (mixed use path).

This goal has many technical aspects to it that involve much field work, which was our primary task. Our team's "work tasks" as stated by our client were as follows: 1). Conduct a "bicyclist's point of view" analysis of traveling Rt. 2 and Mass. Avenue, and a few other streets in the downtown areas, whereby a bicyclist will ride the length of each roadway and assess the roadway conditions experienced, 2). Field verify existing data on Rt. 2, Mass. Avenue and a few other streets to identify and correct inaccuracies. Data that will be verified include shoulder widths, sidewalk widths, crosswalk locations, traffic and pedestrian signals, driveways and roadway curb cuts. Data will also include on-road parking, 3). Note areas where the roadways become steep and would be difficult for persons with disabilities (>5%), 4). Document existing land use and topography along the roadways to determine if road widening to accommodate a dedicated bike lane is possible and/or appropriate, 5). Identify areas where creating common driveways may be possible to reduce the number of vehicle/bike/pedestrian conflict sites, 6). Map data collected in GIS format, 7). Quantify route assessment using field check sheets provided by BRPC, 8). Develop assessment report to present findings. With these goals in mind, our project focused on two main forms of analysis: GIS mapping and quantitative analysis.

IX: Methods

A: Methods—data collection:

Both the GIS mapping and the quantitative analysis of this project required data collection through walking and bicycling the roads in question. This task was usually performed in groups of two. One person would mark waypoints with the GPS unit and record the waypoint number, section of road, and conflict point type. This information was needed to later sort the recorded waypoints into separate GPS layers. The second person in the two man carried on-road evaluation forms to collect the data needed to make quantitative analyses of the road sections. A scheme for the data collected for these analyses was developed and is as follows:

Table 1: Collection scheme for data required in quantitative analysis

FEASIBILITY SCORE	
Road Section	
Date	
Safety	Tally
High traffic volumes	yes or no
Truck traffic allowed?	yes or no
> # driveways	#
> # high volume driveways (retail, gas stations, etc)	#, take GPS data
> # road intersections	#, take GPS data
> # traffic lights	#, take GPS data
turn lanes	#, take GPS data
On-street parking	yes or no, see GPS data'
Speed limit >40 mph	yes or no, take GPS data
Subtotals	
Constraints: Building Considerations	
Grade >5%	yes or no, take GPS
Bridges need widening	yes or no, take GPS
Possible encroach on residential properties	yes or no, take GPS
No existing paved shoulder within section	yes or no, take GPS
stormdrain in way of path	#, take GPS
Currently not paved	yes or no, take GPS
Dangerous curves	#, take GPS data
demo or rock blasting required	yes or no, take GPS
Subtotals	

DESIRABILITY SCORE

Road Section

Date

Opportunities: Physical Amenities	Tally
Shade/sheltered area from wind	one to three scale
Interesting views/vistas	one to three scale
Goes through protected open space/APR	yes or no
Undeveloped/natural surroundings	yes or no
Existing raised or separate sidewalk	yes or no, use existing GPS data
Street lighting	yes or no
Subtotals	
Opportunities: Community Amenities	
Connects to recreation/cultural places	one to three
Connects to areas of employment or school/college	one to three
Interesting features on or directly near road	one to three
Number of bus stops	#, take GPS data

After field data was collected, the GPS data was compiled into nine different GIS layers showing 1) road grades greater than 5%, 2) high volume/conflict driveways, 3) intersections, 4) traffic lights, 5) areas with a speed limit greater than 40mph, 6). storm drains in the way of a potential path, 7) dangerous curves/hills with limited visibility, 8). Cross walks, and 9). Turn lanes. In this way, the major “conflict” points can be visualized any number of ways using the GIS maps. Complementing the GIS maps for each section will be a thorough record of all other parameters being accounted for in our data collection. Quantitative analysis raw data was manipulated as described in the evaluation section below to produce comparable results regarding different road sections.

B: Methods—evaluation:

Using the data collected, we performed two quantitative evaluations per section: a feasibility assessment and a desirability assessment. These scores were added to produce a combined score for each section. Our quantitative analyses drew on a pre-constructed “On-Road Evaluation Form” given to us by our client, but incorporated some approved changes in the

factors evaluated. These additional categories will allow us to more appropriately evaluate potential factors specific to roadways, rather than off-road bicycle facilities.

The feasibility assessment contained two sub categories, safety and building constraints, and the following factors were taken into account: 1). Safety: traffic volumes, truck traffic, # driveways, # high volume driveways, # road intersections, # traffic lights, # turn lanes, on-street parking, high speed zones, 2). Building considerations: steep slopes, bridges needing widening, possible encroachment on residential properties, existing shoulder and sidewalk space, storm drains, dangerous curves, encroaching physical topography, and current paved status. After collecting safety and building constraint data for each road section, we converted the raw data from each category into a point value (1 = little or no impact, 2 = moderate impact, 3 = major impact) based on the perceived impact of that factor on the feasibility of a mixed use path. We then multiplied these point values by predetermined weights specific to each parameter, and added the solutions to give the entire road section a feasibility rating. Each feasibility score was then considered negative, and the more negative the score, the less feasible the given section of road is for a mixed use path.

The desirability assessment score is also divided into two sub-categories, physical amenities and community amenities. The goal of this assessment is to determine how desirable a road section is with respect to the opportunities it affords in terms of shade/shelter, interesting views, and connections to schools, commercial centers, recreational centers, places of employment, public transportation, etc. Factors of analysis included: 1). Physical amenities: shade and shelter, views and vistas, surrounding open and natural space, existing raised or separated sidewalk, existing street lighting, and 2). Community amenities: connection to recreation and cultural places, connection to employment and school/college areas, other

interesting features, and number of bus stops. Again, using a 1-3 point scale and predetermined weights, we represented a given section of road with a desirability value. The higher this value, the more desirable this area of road would be for the inclusion of a multi-use path. For a better illustration of these pointing and weighting systems, see Appendix 1 for the actual On-Road evaluation forms.

C: Physical Site Description:

The project site will focus on all major roadways along the five mile stretch of the Hoosic River Corridor connecting North Adams with Williamstown that could potentially accommodate a recreational bike bath. The western-most site to be surveyed will be the Rt. 7/ Rt. 2 roundabout, while the eastern-most point will include the Rt. 8 bridge in North Adams. The northern-most roadway will be Mass Ave., while the southern-most roadway will be Rt. 2 and Barber St. Below are the main site descriptions of the sections of different roads we are surveying. All roads will be surveyed on both sides.

Main Roads:

Rt. 2: Rt. 7 > Cole Ave: This area passes through almost entirely Williams College property which includes large areas of green space on either side of Route 2. Closer to Cole Ave this green space becomes Town Commons and is the process of becoming a National Heritage Site.

Cole Ave: This dense residential area is a likely site for a bike path along the road. Many families live on both sides of this road and nearby is Williamstown Elementary.

Rt. 2: Cole Ave > North Adams: This five mile stretch of mostly two lane and some three lane highway is the target area of most our project surveying. It is densely populated on both sides with commercial and residential areas creating many conflict points for a mixed-use path. We divided Rt. 2 into 5 smaller sections for easier analysis:

- 1) Cole Ave – Dunkin Doughnuts
- 2) Rt. 2: Dunkin Donuts - Airport Rd.
- 3) Airport Rd. - End of Bridge after New St.
- 4) New St. Bridge - Beg of Cemetery
- 5) Beg of Cemetery - Intsct. of State St. & Main St.

Mass Ave.: Cole Ave. > North Adams: This two lane highway stretching along the north side of the Hoosic River and adjacent to the train tracks, offers little shoulder on which to construct a mixed-use. Though it is the more scenic than the section of Rt. 2 running parallel, it runs through fewer residential neighborhoods and is hilly. We divided Mass Ave into 4 smaller sections for easier analysis:

- 1) Cole – Ashton
- 2) Ashton – Protection
- 3) Protection - Tyler St.
- 4) Tyler St. - Eagle St.

Barbour St: This option to leave Rt. 2 allows for a path with less auto traffic, eventually leading to an old abandoned fire road that runs through a beautiful wooded area. Barbour St. also runs through a residential neighborhood, past Brighton Elementary, and the YMCA. However, the slope of this road potentially measures greater than the desirable 5% grade.

Cross Roads:

Galvin Road: This residential cross street currently dead ends at the Hoosic River, however there are plans to construct a pedestrian bridge crossing the river and ultimately connecting with

Mass Ave. This road also has many residential driveways creating and no shoulders, but is one of the best options for a cross street if pedestrian bridge is constructed.

Ashton Rd: This pleasant residential road offers a route to connect Rt. 2 with Mass Ave. The road lies approximately halfway between Williamstown and North Adams, thus serving as a strategic site to cross the Hoosic River. It is also near a residential neighborhood and is not far from the Stop n' Shop grocery store.

Roberts Dr: This wide cross street has several commercial driveways including the bowling alley on one side. The rail bridge that passes over this road does not provide much shoulder space for a potential bike path.

Protection Ave: This short cross street has few driveways and a bridge with no shoulders. However, it is flat and a one of the shortest cross streets.

Brown Street: This is a short cross road approximately 600 yards long connecting Rt. 2 with Mass Ave. The street narrows half way through due to a small train trestle passing over head. This street also lies less than one mile from Mass MoCA and is the last cross street connecting Mass Ave with Rt. 2 before entering downtown North Adams. The street cuts through almost entirely commercial area, however open land adjacent to the river raises the scenic value of this short cross street.

North Adams Roads:

Eagle St: This is a one way street with beautiful four story buildings rising close to the sidewalk on both sides of the street. The street is home to famous Jack's Hotdogs, several thrift stores, two pizza parlors, and uniquely represents North Adams historic downtown. Less than 200 yards in length with on-street parking on one side, this is one street in North Adams that has a big city feeling.

Holden St: This downtown road serves mainly as a cross street connecting Mass Ave. to the traffic light at the base of the large Rt. 2 overpass. As a through route for car traffic Holden St. offers access the down town shopping center including North Adams largest grocery store.

Rt. 2 North Adams Bridge - Eagle St: This section of Rt. 2 contains a large overpass sloping down into downtown North Adams. To the north side of this bridge there lies a primarily vacant parking lot which has been considered as a potential “park and ride” site for families who wish to park their car and begin a recreational bike ride. This busy section of Rt. 2 divides North Adams into a north and south side

Main St. from State- Eagle: Main St. is a four lane road with a five foot median running the length of the street. Near the west end of the Street is North Adams City Hall, while at the east end stands the public library. Along both side of the street lie an assortment of small privately owned businesses mixed with banks and chain stores. The historic and newly refurbished Mowhawk Theater also stands out as a landmark along this main road with wide sidewalks and plenty of pedestrian crosswalks.

Marshall St. (northern section): Mass Ave. to MASS MoCA: This short section of road running from Mass Ave to the stoplight at St. Anthony’s drive (the parking entrance to MASS MoCA) has a very narrow shoulder, and is a high traffic zone, yet remains important in our possible road routes because it passes in front of an important tourist attraction in MASS MoCA.

Marshall St. (southern section): South End of Rt. 8 Bridge To MASS MoCA: A new bridge is currently under construction, and needs to be surveyed so that we can understand the possibility of the bike path crossing train tracks here. This most eastern point in our survey would ultimately serve to turn the bike path south and eventually head towards Adams where it could connect with the existing Ashuwillticook Rail Trail.

X. Results

GIS mapping

GPS data marking conflict points, which were collected in the field, were entered into a GIS map in nine layers: High volume driveways, intersections, traffic signals, high speed zones, steep slopes, turn lanes, blind curves or hills, storm drains, and cross walks. This end product is not specifically useful in recommending certain sections of road over others, as it provides no form of quantitative analysis. The layers that we have added to the map, however, are extremely helpful in providing an overall view of the roads and what conflicts are important to which sections. The GIS map will also be useful in future analyses, because it is not limited by a division into sections, as our quantitative analyses are. Having a hard copy of the data we collected will allow for future quantitative and qualitative analyses involving changing boundaries and parameters.

Quantitative Analysis

The results of our on-road evaluation can be divided into three sections: 1). Main roads, and 2). Cross streets, and 3). Downtown North Adams streets. We have chosen to divide our analyses in such a way because of a large discrepancy in street length which may have otherwise affected our results. While the Main roads evaluated are usually between 0.75 and 1 mile long, the cross streets and downtown streets do not reach than 0.3 miles. Also, the cross streets examined are of particular importance, as they represent critical areas over which a bike path could cross the Hoosic River, something that will surely be needed whether the bike path ends up being on-road or off. The “Main road” sections evaluated were: 1). Barbour Street, 2). Cole Avenue, 3). Massachusetts Avenue: Cole Avenue to Ashton Avenue, 4). Mass. Ave.: Ashton Ave. to Protection Ave., 5). Mass. Ave.: Protection Ave. to Tyler St., 6). Mass. Ave.: Tyler St. to

Eagle St., 7). Route 2: Rt. 7 to Cole Ave., 8). Route 2: Cole Ave. to Dunkin' Donuts, 9). Route 2: Dunkin' Donuts to Airport Rd., 10). Route 2: Airport Rd. to Bridge after New St., 11). Route 2: New St. Bridge to Beginning of Cemetery, 12). Route 2: Beginning of cemetery to Intersection of State St. and Main Street. The "Cross streets" sections analyzed were: 1). Protection Ave., 2). Demond Ave., 3). Roberts Dr. 4). Ashton Ave., 5). Brown St., and 6). Galvin Road. Finally, the North Adams Downtown road sections investigated were: 1). Eagle St., 2). Marshall St. (northern section) Mass Ave. to MASS MoCA, 3). Marshall St. (southern section) MASS MoCA to end of Route 8 bridge, 4). Rt. 2: North Adams Bridge to Eagle St. 5). Holden St. and, 6). Main St.: State St. to Eagle St.

Each section of road was given a "Feasibility Score:" a negative number representing issues with regard to the current level of safety, the construction required to bring the section up to an adequate level of safety and other physical barriers to the construction of a mixed use path. The more negative this score, the less feasible the section of road is for the construction of an adjacent mixed-use path. Each section of road was also given a "Desirability Score," indicating with a positive number how beneficial it would be for a bike path to cross through a given section of road. These two scores were also added together to give each section of road a "Combined Score."

The Feasibility scores for the Main roads and Cross Streets are shown in Table 2 below:

Table 2: Quantitative Feasibility Results

Main Sections	Feasibility Score
Rt. 2: Cole Ave. - Dunkin' Donuts	-38
Barbour St.	-39
Mass Ave: Cole - Ashton	-40
Cole Ave	-41
Rt. 2: Airport Rd. - End of Bridge after New St.	-43
Rt. 2: Rt. 7 - Cole Ave.	-46
Rt. 2: Beg of Cemetery - Intsct. of State St. & Main St.	-46
Mass Ave: Tyler St. - Eagle St.	-47
Mass Ave.: Ashton - Protection	-48
Mass Ave.: Protection - Tyler St.	-52
Rt. 2: Dunkin Donuts - Airport Rd.	-60
Rt. 2: New St. Bridge - Beg of Cemetery	-72
Cross Streets	Feasibility Score
<i>Brown St.</i>	-11
<i>Protection Ave.</i>	-14
<i>Roberts Dr.</i>	-15
<i>Demond Ave.</i>	-25
<i>Ashton Ave.</i>	-29
<i>Galvin St.</i>	-31
North Adams Downtown Streets	Feasibility Score
<i>Eagle St.</i>	-15
<i>Marshall St (Northern section): Mass Ave. to MASS MoCA</i>	-29
<i>Rt. 2 North Adams Bridge - Eagle St.</i>	-29
<i>Holden St.</i>	-32
<i>Main St. from State- Eagle</i>	-36
<i>Marshall St. (southern section): Mass MoCA - End of Rt. 8 Bridge</i>	-40

The Main Road sections varied in feasibility scores from -38 to -72, with the four most feasible sections of road being Rt. 2: Cole Ave. to Dunkin Donuts, Barbour St., Mass Ave.: Cole to Ashton, and Cole Avenue. The least feasible sections of road were both on Rt. 2, from Dunkin' Donuts to Airport Rd., and from the bridge near New St. to the beginning of the cemetery.

The Cross Street sections had better feasibility scores than the Main Road sections, ranging from -11 to -31. The three most feasible cross streets were Brown St., Protection Ave., Roberts St., and the three least feasible cross streets were the Demond Ave., Aston Ave., and Galvin Rd. Finally the most feasible North Adams Downtown streets were Eagle St., the North

section of Marshall St., and Rt. 2: North Adams bridge – Eagle St., and the least feasible sections were Holden St., Main St., and the South section of Marshall St.

Desirability scores presented the data in a different way, showing that the most feasible sections of road were not always the most desirable. These data are shown in Table 3 below:

Table 3: Quantitative Desirability Results

Main Sections	Desirability Score
Barbour St.	40
Cole Ave	38
Rt. 2: Rt. 7 - Cole Ave.	38
Rt. 2: Cole Ave. - Dunkin' Donuts	31
Mass Ave.: Ashton - Protection	30
Rt. 2: Beg of Cemetery - Intsct. of State St. & Main St.	28
Mass Ave.: Protection - Tyler St.	28
Mass Ave: Tyler St. - Eagle St.	25
Rt. 2: Dunkin Donuts - Airport Rd.	25
Mass Ave: Cole - Ashton	24
Rt. 2: Airport Rd. - End of Bridge after New St.	22
Rt. 2: New St. Bridge - Beg of Cemetery	22
Cross Streets	Desirability Score
<i>Protection Ave.</i>	31
<i>Ashton Ave.</i>	31
<i>Galvin St.</i>	21
<i>Demond Ave.</i>	16
<i>Brown St.</i>	14
<i>Roberts Dr.</i>	14
North Adams Downtown Streets	Desirability Score
<i>Main St. from State- Eagle</i>	36
<i>Mass MoCA (St. Anthony's Dr. & Marshall) - End of Rt. 8 Bridge</i>	35
<i>Eagle St.</i>	34
<i>Rt. 2 North Adams Bridge - Eagle St.</i>	29
<i>Mass Ave. to Mass Moca (St. Anthony's Dr. & Marshall)</i>	26
<i>Holden St.</i>	18

The Main Road sections varied in desirability score from a high of 40 to a low of 22. The four highest scoring sections were Barbour St., Cole Ave., Rt. 2: Rt. 7 – Cole Ave, and Rt. 2: Cole Ave. – Dunkin’ Donuts. The least desirable sections were Rt. 2: Airport Rd. to the Bridge after New St., and from this bridge to the beginning of the cemetery.

The desirability scores for the Cross Street sections ranged from a high of 31 to a low of 14. The most desirable were Protection Ave. and Ashton Ave., while the least desirable were

Brown St. and Roberts Drive. Scores for downtown North Adams streets varied from 18 to 36, with the least desirable sections being Holden St. and the Northern section of Marshall St., and the most desirable being Main St. and the Southern section of Marshall St.

Finally, the Combined Scores for the sections, shown below in Table 4, give a better idea of the overall possibility of constructing a bike trail on the given section. These scores were arrived at by adding the feasibility and desirability scores for each section.

Table 4: Quantitative Feasibility and Desirability Results, added to produce a combined score

Main Sections	Feasibility Score	Desirability Score	Combined Score
Barbour St.	-39	40	1
Cole Ave	-41	38	-3
Rt. 2: Cole Ave. - Dunkin' Donuts	-38	31	-7
Rt. 2: Rt. 7 - Cole Ave.	-46	38	-8
Mass Ave: Cole - Ashton	-40	24	-16
Rt. 2: Beg of Cemetery - Intsect. of State St. & Main St.	-46	28	-18
Mass Ave.: Ashton - Protection	-48	30	-18
Rt. 2: Airport Rd. - End of Bridge after New St.	-43	22	-21
Mass Ave: Tyler St. - Eagle St.	-47	25	-22
Mass Ave.: Protection - Tyler St.	-52	28	-24
Rt. 2: Dunkin Donuts - Airport Rd.	-60	25	-35
Rt. 2: New St. Bridge - Beg of Cemetery	-72	22	-50
Cross Streets	Feasibility Score	Desirability Score	Combined Score
<i>Protection Ave.</i>	-14	31	17
<i>Brown St.</i>	-11	14	3
<i>Ashton Ave.</i>	-29	31	2
<i>Roberts Dr.</i>	-15	14	-1
<i>Demond Ave.</i>	-25	16	-9
<i>Galvin St.</i>	-31	21	-10
North Adams Downtown Streets	Feasibility Score	Desirability Score	Combined Score
<i>Eagle St.</i>	-15	34	19
<i>Marshall St. (northern section): Mass Ave. to Mass Moca</i>	-29	26	-3
<i>Marshall St. (southern section): MASS MoCA to End of Rt. 8 Bridge</i>	-40	35	-5
<i>Rt. 2 North Adams Bridge - Eagle St.</i>	-29	29	-2
<i>Main St. from State- Eagle</i>	-36	36	0
<i>Holden St.</i>	-32	18	-14

The highest ranking of the Main Road sections were Barbour St., Cole Ave., and Rt. 2 from Rt. 7 to Dunkin Donuts. The highest rated, by far, of the Cross Streets was Protection Ave., followed by Brown St. and Ashton Ave. Finally, Eagle St. and the two Marshall St. sections received the highest combined scores of the downtown North Adams streets.

Rating: The Red Light Green Light System

Clearly, the scores shown in Table 4 above are overwhelming and hard to analyze as they are in raw form. For this reason, we created a visual system to aid in comparing different sections. We dubbed this system the “Red Light, Green Light System,” and it separates every road section into a red (don’t construct), yellow (construct with caution) or green (construct) category for all three of its scores. The colors were assigned by the scheme outlined below:

Table 5: A color coded rating system

Main Sections

	Green	Yellow	Red
Desirability (22->40)	X>35	35>x>25	25>X
Feasability (-72->-38)	X>-40	-40>X>-50	-50>X
Combined (-50->1)	X>-10	-10>X>-20	-20>X

Cross Streets

	Green	Yellow	Red
Desirability (14-31)	X>27	27>X>20	20>X
Feasability (-29->-11)	X>-15	-15>X>-25	-25>X
Combined (-9->17)	X>0	0>X>-5	-5>X

North Adams Downtown Streets

	Green	Yellow	Red
Desirability (18-36)	X>30	30>X>20	20>X
Feasability (-40->-15)	X>-20	-20>X>-30	-30>X
Combined (-14->19)	X>0	0>X>-5	-5>X

The color categories indicate relative levels of feasibility, desirability, and combined score, and take into account the distribution of all of the scores in the rating process. Below is a graph showing the division of all road sections into these color categories:

Table 6: Quantitative results sorted into color coded categories

Main Sections	Feasibility Score	Desirability Score	Combined Score
Barbour St.	-39	40	1
Cole Ave	-41	38	-3
Rt. 2: Cole Ave. - Dunkin' Donuts	-38	31	-7
Rt. 2: Rt. 7 - Cole Ave.	-46	38	-8
Mass Ave: Cole - Ashton	-40	24	-16
Rt. 2: Beg of Cemetery - Intsct. of State St. & Main St.	-46	28	-18
Mass Ave.: Ashton - Protection	-48	30	-18
Rt. 2: Airport Rd. - End of Bridge after New St.	-43	22	-21
Mass Ave: Tyler St. - Eagle St.	-47	25	-22
Mass Ave.: Protection - Tyler St.	-52	28	-24
Rt. 2: Dunkin Donuts - Airport Rd.	-60	25	-35
Rt. 2: New St. Bridge - Beg of Cemetery	-72	22	-50
Cross Streets	Feasibility Score	Desirability Score	Combined Score
<i>Protection Ave.</i>	-14	31	17
<i>Brown St.</i>	-11	14	3
<i>Ashton Ave.</i>	-29	31	2
<i>Roberts Dr.</i>	-15	14	-1
<i>Demond Ave.</i>	-25	16	-9
<i>Galvin St.</i>	-31	21	-10
North Adams Downtown Streets	Feasibility Score	Desirability Score	Combined Score
<i>Eagle St.</i>	-15	34	19
<i>Marshall St. (northern section): Mass Ave. to Mass Moca</i>	-29	26	-3
<i>Marshall St. (southern section): South End of Rt. 8 Bridge To Mass Moca</i>	-40	35	-5
<i>Rt. 2 North Adams Bridge - Eagle St.</i>	-29	29	-2
<i>Main St. from State- Eagle</i>	-36	36	0
<i>Holden St.</i>	-32	18	-14

XI. Recommendations

Our final recommendations are largely in reference to the current multi-use path plans (provided by the BRPC) that contain the desired route, combining on and off-road sections. While the current plans are for a path that is mostly off-road, there are a number of sections where an on-road path seemed to be the only option, or an easily alternative option. Using our analysis of on-road sections, we looked critically at the specific sections brought into question by

the desired plan in order to make recommendations with regard to the final path layout. Secondly, once these sections were determined, we discussed the conflicts specific to these sections and the resulting changes that need to be made, such that they become adequate for the construction of a mixed-use path.

The preferred path route designated by the BRPC potentially includes or conflicts with the following roads: 1) Route 2 from the traffic circle to Cole Ave. 2) Cole Ave 3) Route 2 from The Spruces to Galvin Street 4) Galvin Road 5) Route 2: New Street Br. to the cemetery 6) Brown St. 7) Marshall St. 8) Mass Ave from Brown St. to Marshall St. 9) Barbour St. A proposed secondary route may include the following on road sections: 1) Route 2 from Galvin Road to Phelps Ave 2) Mass Ave from Roberts St. to Brown St. All the roads in question are discussed in order below. Visualization of these road sections and how they relate to the BRPC proposed routes is enhanced by the use of the GIS map we created. Although we do not see it practical to attach a map image of each section in this paper, we recommend that our analyses our viewed in conjunction with these road sections on our GIS map.

1. Route 2 from the traffic circle to Cole Ave.: This section is particularly important because it connects to downtown Williamstown, which our client explicitly stated as a requirement for the final bike route. Fortunately, the section of road scored high in all assessments (yellow feasibility, green desirability and green combined). Some notable positive aspects of this section are that it has a significant amount of open green space surrounding the road and it connects to cultural, commercial and educational places. Furthermore, the land directly adjacent to the road is part of the town common. A few negative characteristics of the

section are that it has many crosswalks/pedestrian conflicts, a blind hill and steep slopes.



Cole Ave.

Rt. 2: Rt.7 – Cole Ave²¹

2. Cole Ave: This is another important connecting route for the larger vision of the plan. Ideally, it will connect downtown Williamstown to the Photech site (corner of Cole Ave and North Hoosic) through which the BPRC preferred route is planned to pass. The connection of this route to downtown Williamstown is an explicit goal of Lauren Gaherty and the BPRC, and thus Cole Ave. holds great importance. The scores for the section are yellow feasibility and green desirability/combined. Thus, this appears to be one of the roads that is better suited for the mixed use path. Positives aspects of the section are it is wide and mostly flat. Problems may arise in the construction of a trail, however, with regard to other conflict areas. Cole Avenue has moderate levels of traffic which would be particularly troublesome to a bikeroute because of numerous intersection and driveway crossings. Additionally, residential properties reach to the road for almost the entirety of the road section, and the popular support for a trail encroaching on these properties may not be high. Finally, on-street parking (or the elimination of this caused by the creation of a bike trail) and an established storm drains system may cause additional

²¹ <http://www.teresco.org/pics/commencement-20060603-04/DSCF0078.jpg&imgrefurl=http://www.teresco.org/pics/commencement-20060603-04/commencement.html>

problems in path construction. An alternative to placing the connector route on Cole Ave. might be to create a path through Linear Park, but this off-road option will have to be further explored for wetland and property issues.

3. Route 2 from The Spruces to Galvin Road: This is a short section where the preferred path momentarily connects to Route 2. While the larger section encompassing this is given poor scores (red feasibility, yellow desirability, red combined) the part in question is somewhat better than the section as a whole: there are few high volume driveways and there is some green space next to the road (around the Spruces), thus providing a scenic route and room for expansion to side of road. One major drawback to this section though is the large amount of commercial traffic and truck traffic. Also, it is unknown to us how cooperative the owners of the open space will be to having a path through their property.



Rt. 2: Spruces – Galvin Road



Galvin Road

4. Galvin Road: This short cross street is an important part of the proposed preferred bike route because of the possibility for crossing the Hoosic River over a yet-to-be built pedestrian bridge. The section, however, did not receive good scores (red feasibility, yellow desirability, red combined) perhaps because of the absence of a pre-existing bridge. The poor scores for the rest

of the section may be misleading. Though the road does not have an existing shoulder or sidewalk, and may have some building space issues (another small bridge and residential properties) there's also so little traffic that constructing a completely off-road multiuse path in the area might not be necessary to make the roadway safe for a family of four. The section also has beautiful natural surroundings including rural views and access to a river trail.

5. Route 2: New Street Bridge to the Cemetery: The proposed preferred bike route skirts a section of road starting at the bridge east of New St. on Rt. 2 and stretching to the bridge just west of Barbour St. Though the proposed bike path does not actually touch Route 2 in this area, we found it important to explicitly recommend against an on-road route in this section. The section of Route 2 following the New St. Bridge received the lowest scores in all three categories, as it encountered serious conflicts such as steep slopes, road expansion problems, multiple bridges needing to be expanded, and many intersections and high volume driveways. Though some of these conflicts could be abated by combining commercial and residential driveways, the overall low ratings would not be greatly improved, and we recommend that the bike route instead follow one of the proposed preferred routes skirting this area: one through the flood plain next to the Hoosic River, or another on the opposite side of the Hoosic River starting on Barbour St.



Rt. 2: New St. – Cemetery



Brown St.

6. Brown St.: One “preferred” route for the bike path crosses the Hoosic river just before downtown North Adams on a short segment of Brown St. This section received a high feasibility score, but low desirability score (green feasibility, red desirability, green combined). Again, scores may be deceiving as they can weigh factors only to a certain extent. For example, Brown Street contains both an extremely narrow underpass under the railroad and a bridge that might need widening, and though these factors were surely given scores of 3 on the quantitative analysis sheet, other conflicts were so low that the sections still got a green feasibility score. The red desirability score for the section is probably due to mostly commercial surroundings and a lack of connection to cultural and educational places.

7. Marshall St.: For the purpose of having the path end at (or go through) Mass Moca, barring the creation of a new road, Marshall Street will have to be used as the connector street from either Mass Ave or Route 2. Because each approach uses opposite ends of the street, the analysis of Marshall Street was divided into two sections: Marshall from Mass Ave to Mass

Moca (the northern section), and Marshall from north end of the Route 8 bridge to Mass Moca (the southern end) as divided by the light at the St. Anthony Street intersection. The Mass Ave section received a yellow rating for feasibility, desirability and combined score, while the section ending at the Route 8 Bridge received red feasibility, green desirability and yellow combined scores. While the desirability of the southern section was ideal, the better feasibility of the northern section makes us recommend the use of this as the more favorable option. This decision was based on feasibility because the northern section is such a short section and the desirability benefits (downtown North Adams/commercial center, etc.) of the southern section are not actually lost; to walk from where the section ends to the southern section takes less than one minute at a reasonable pace, thus, the desirability benefits are only marginally compromised.



Marshall St.



Mass Ave. from Brown St. to Marshall St.

8. Mass Ave from Brown St. to Marshall St.: This section, in combination with the northern section of Marshall Street, was highly recommended due to its connection to Mass Moca. While it received a yellow feasibility, yellow desirability and red combined score, this was largely due to the encroachment on residential properties on the north side of the street and high number of high volume driveways. However, the south side of the street had a rather large grass strip separating the road and the Hoosic River. This space is more than adequate (in terms

of width and length) for a separate mixed used path running parallel to Mass Ave down to Marshall Street.

9. Barbour St.: This residential street branches south of Route 2 near the oxbow of the Hoosic River, and may be important because it would allow a route that would not require the building of additional bridges. The section also skirts an extremely dangerous section of road, and we are therefore endorsing it as an on-road alternative to a Route 2 side route. Fortunately, the section received green scores for all three categories. Some positive aspects of this section are the low traffic volumes, few driveways, wide road, and connection to natural surroundings and Brayton Elementary School. The one barrier to the construction of a path on this section of road is the slope preceding its culmination at a flat, woodsy, fire road. Our GPS data were not accurate enough to calculate the exact percent grade of the section, but it did not seem overly steep.



Fire Road at the top of Barbour St.



Barbour St.

A proposed secondary route may include the following on-road sections:

1. Route 2 from Galvin Road to Phelps Ave.: This section is the less optimal option when considering an off-road option (that would be on the other side of the river) to avoid it. The piece of road in question includes two different analyzed sections: Dunkin-Airport (which received red feasibility, yellow desirability and red combined scores) and Airport Rd. to the New St. Bridge (yellow feasibility, red desirability and red combined). The ratings of the sections encompassing this stretch of road are not particularly helpful because the section in question is only the very end one section and very beginning another adjacent section as analyzed. Nonetheless, this section was not ideal: much of the surrounding areas is residential, the turn lane in front of Stop and Shop results in a discontinuous shoulder and sidewalk, there are a number of intersections, it is a high speed zone that receives heavy car and truck traffic and the majority of the surrounding area is not very natural for much of the strip. Despite these drawbacks though, the section is very flat, has access to a supermarket and has good views of local mountains around Mt. Greylock. Although not part of our study, another mostly on-road option to pass the same section would potentially be to take Airport Road in order to avoid the residential encroachment problems



The Route 2: Galvin Road to Phelps Road area



Mass Ave: Roberts to Brown St.

2. Mass Ave from Roberts Drive to Brown St.: This section received the following scores: red feasibility, yellow desirability and red combined. Many of the drawbacks to this section were continuous over much of the road. For example, there were multiple (at least 3 separate) blind curves and/or hills and the whole section is a steep slope. The whole section is a high speed zone with no sidewalk and a very small shoulder at most. Furthermore, there were many areas where there were rock outcroppings on the north side of the road and steep embankments and the south side (require either significant blasting or filling to provide room for a path). However, this is one of the most scenic sections, with very few driveways of any kind.

XII. Biases in Research Methods

In our methodology, there were certain aspects that at times produce an unrealistic portrayal of the roadways we examined. These are especially apparent in our data collection. At the beginning of our project, we were given an “On-Road Evaluation Form” by our client Lauren Gaherty which had been used to evaluate potential paths before. The evaluation was divided between Constraints and Opportunities. Constraints included safety and construction concerns under both a “Physical & Built Environment” section and a “Building Considerations” section. Opportunities contained both “Physical Amenities” and “Community Amenities.” The data for each category within each section (e.g. the number of traffic lights in the “Physical & Built Environment” section) was weighted on a 0-3 scale (with 0 having no effect and 3 having the most effect) (weights were provided by the BRPC and previous assessments in order to have continuity between the different assessments) and added together. The total score of the Constraints was given a negative score as it represents negative aspects of a section and the Opportunities a positive score because it represents the positive aspects; When added together,

the results was the combined score for a given section of road, which was helpful for comparing sections of road against other sections, more than for evaluating a section of road on its own.

While this constituted a logical system for evaluating the roadways, there were a few aspects that gave us more inaccuracies than what we believe would have been the most precise analysis possible. For one, our Constraints section captured the volume of several road features but not their severity or seriousness. For example, our data captured the density per mile of driveways, high-volume or commercial driveways and traffic lights. While this gave us a relatively useful measure of vehicle activity or possible vehicular interference with a path on a section of roadway, it did not measure the degree to which these features might affect a path. There could be one driveway that offers a significant obstacle to safety or construction, or one commercial driveway that receives more traffic than another, or a residential driveway that has even more traffic volume than a commercial one, and thus simply the quantity of driveways or traffic lights is not always the best indicator of their status as conflict points that would provide a hindrance to mixed-use path construction or the safety of its users.

The weight system also seemed to be inaccurate at times; specifically in its treatment of bridges, under which we also included railroad trestles: this is significant given the proximity to and frequent crossing over or under the rail lines as the roadways do. Although widening a bridge to accommodate a mixed-use path would often seem prohibitively expensive given the scale and financial backing of the project, it was only given a weight of 1, while high-volume and commercial driveways were given a weight of 3. This was an especially large concern in evaluating the cross streets, as several had to cross the river, the railroad tracks, or both, and if both was the case there was no way to include both of those features in the data; they were simply expressed under the “Bridges needing to be widened for bike lane” category. The best

example of this is Demond Avenue, which has few conflicts except the road passes under the railroad tressel, and in the process narrows to a width that only accommodates one car at a time. Construction would likely not only have to widen the road but widen it enough to accommodate two cars and a mixed-use path with a five-foot gap between them or enough room for a solid barrier. This is clearly a very serious construction issue, yet its severity cannot be accurately expressed in our data analysis.

Thirdly, while it is important to remember that in a numerical evaluation system such as ours, the absolute numbers are arbitrary and the only importance is the scores between road sections, allowing us to create a ranking, there was no way to compare Constraints versus Opportunities in an accurate fashion. We could not determine whether the fact that a road was well-shaded and sheltered from the wind outweighed the fact that the road also had a high density of on-street parking or driveways. For example, if the safety concerns of a section of road make a path an unrealistic or possibly unlawful idea, does it matter what the opportunity score is at all? Implied in this example is that a full cost-benefit analysis, which would be highly useful for this type of project, was not made. While a C-B analysis is somewhat implicit in our data analysis (ex. high-volume driveways being costly to deal with and thus given a high weight), in other areas, such as bridge considerations, it was not as implicit, and while it is obvious that a full cost-benefit analysis would give us a much better idea of how realistic path construction along a certain roadway as well as its potential benefits, given the scale of the project, the time in which the project needed to be completed, the resources available to the project team as well as the lack of professional training in this type of analysis among the team, this was not realistic. A full cost-benefit analysis, however, is likely the next step in the context of the larger project.

Other biases stem from the fact that we analyzed both sides of each given road section in conjunction, rather than providing separate scores for each side. Since we are recommending a separate path on one side of the road, and the road sections often differ from one side to another, a more accurate analysis would have taken this into account. We found such a project beyond the scale of our project.

XIII. Conclusion

The Hoosic River Valley between Williamstown and North Adams presents a rather difficult planning situation when considering construction of a mixed-use path. The mountains surrounding it are rather steep, and the valley itself is quite narrow, and most of the flat areas are occupied by residential or commercial areas as well as roadways and railroads. It is also clear that much of the existing roadways could not accommodate a mixed-use path. This is because of safety concerns such as high traffic volume on Rte. 2 which does not comfortably accommodate our target user of a family of four. This is also because of construction feasibility issues, such as areas where bridges would need to be widened which would likely prove too costly to modify in a cost-benefit analysis. Having examined the data we collected, it is clear that the majority of the path will have to be off the roadways, where it is safer, easier to build, and more beautiful. This is not a bad problem to have, as the goal is to provide the user with a recreational facility that allows them to interact with the natural environment and explore the area from a different perspective.

That being said, there are certain areas where the path will have to go along the roadways, but hopefully not on them. The greatest prudence will be required in designing these sections of trail, for no longer is the cyclist or the jogger alone in his or her surroundings, but joined by motorists who are likely not anticipating any interaction with bicyclists or pedestrians in their

travel through this rural area. Separation from the motorway can be considered as a necessity for the path, and this should be done primarily through physical distance instead of a physical barrier directly on the roadway. Great care must also be taken in working with the surrounding residents in these areas, as a path will likely interfere to some extent with the use of their property, most likely in crossing their driveways. But if creativity is employed in the design of the path, we believe that it will be able to bypass most of the more hazardous areas we evaluated in our project, and utilize the safer and more favorable sections of road. We hope that our analysis, including our on-road evaluations, bicyclists' point-of-view, GIS map and written report will be able to assist the creation of the Mohawk-Mohican Path as well as provide hard data for further grant applications. We wish the individuals and groups that will be working on this project from here on out good luck, and we hope we can witness some construction when we come back for our five-year reunion.

XIV. Acknowledgements

We would like to acknowledge many individuals for helping us develop this report. First of all, our professors Sarah Gardner and Elisabeth Goodman gave us the initial guidance to start this project. Obviously, our client Lauren Gaherty and the rest of BRPC were essential in directing our research. David Dethier provided the GPS unit that we used to collect data, and Sharron Macklin taught us the GIS technology techniques which made our integrated analysis methods possible, and Roger Bolton helped us piece together an appropriate quantitative method of analysis.

Appendix 1: On Road Evaluation Form

ON-ROAD EVALUATION FORM

Section: _____

Explanation

1. Basic information was entered in the Data column
Data is % with the factor unless otherwise noted.
No = 1, Yes = 2
2. The data was made comparable using a system of Points to reflect impacts or work required to develop the trail: 1=Little or no impact, 2=Moderate, 3=Major
3. Weights represent how item meets Goal of on-road recreational bike trail (safely accommodate family of 4):
1=Least important, 2=Moderate, 3=Most important
4. The spreadsheet multiplies Points by Weight to give a Score. Subtotals go to the Summary sheet

Length (miles): _____

FEASIBILITY

Safety

Factor	Data	Points	x	Weight	= Score
High traffic volumes	Very high	3		2	6
Truck traffic allowed?				2	
> # driveways				2	
> # high volume driveways (retail, gas stations, etc)	20 / mile	3		3	9
> # road intersections				2	
> # traffic lights				1	
Turn lanes				2	
On-street parking				2	
Speed limit >40 mph				2	
Accident Rating				2	
Subtotals					

Constraints: Building Considerations

Grade >5%				3	
Bridges needing to be widened for bike lane				1	
Bike lane will encroach on residential properties				3	
No existing paved shoulder within section				2	
Has existing stormdrain system in path of bike travel				1	
Currently not paved				1	
Dangerous curves				2	
Building demolition or rock blasting required				3	
Subtotals					

DESIRABILITY

Opportunities: Physical Amenities

Factor	Data	Points	x	Weight	= Score
Shade/sheltered area from wind	none	1		2	2
Interesting views/vistas				3	
Goes through protected open space/APR				2	
Undeveloped/natural surroundings				2	
Existing raised or separate sidewalk				2	
Street lighting				2	
Subtotals					

Opportunities: Community Amenities

Connects to other recreation/cultural places				2	
Connects to areas of employment or school/college				1	
Interesting features on or directly near road				2	
Number of bus stops					

