GENEVA ACTIVE TRANSPORTATION PLAN

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1. EXECUTIVE SUMMARY

The Active Transportation Plan is a guide designed to fulfill Geneva's vision for developing a network of sidewalks, on-road bicycle facilities, and trails that allow for safe and convenient travel in and around the City and Town of Geneva. Multiple forces support the need for active transportation planning within Geneva including:

- Recent award of a $10 million Downtown Revitalization Grant;
- Increasing population growth;
- Developing and improving connections between the Seneca Lake waterfront and the City;
- Improving community health, reducing transportation hazards, and fostering safe connections to key destinations; and
- The adoption of Complete Streets Legislation by New York State as well as the completion of Active Transportation plans for many communities within the region.

In support of the community vision, the Plan examines existing conditions for on-street bicycling and the sidewalk network, identifies a series of specific facility needs, establishes design guidance for new facilities, and recognizes existing and future opportunities for programmatic outreach and education activities that can lead to increased levels of bicycling and walking. The Plan's recommendations, when implemented, will help Geneva achieve many public health, economic, and quality of life benefits that result from greater active transportation choices.

All recommendations are "concept level planning and design" and intended as guidance for further consideration and/or development. As such, the programming, design, and implementation of the Plan's recommendations will not occur until all facility-owner concerns are addressed, whether they are owned by the City or Town of Geneva or other agencies including NYSDOT and Ontario County. As the City and Town consider and implement these recommendations, they are committed to working with all stakeholders to ensure that their requirements and concerns are met.

The following sections are included in the Active Transportation Plan:

INTRODUCTION AND SUMMARY: This section outlines the background and setting for the Plan. Summarized within this section are the many natural and planned characteristics that provide both the setting for the Plan's initiatives and a description of the many benefits that can be realized as a part of its implementation. The Active Transportation Plan is based on stakeholder and public involvement, input from an active Project Advisory Committee (PAC), and feedback received from Geneva's residents.

EXISTING CONDITIONS EVALUATIONS: Using the nationally implemented Level of Service Models as the primary performance measure, the evaluation process begins with an assessment of conditions that Geneva's roadway network currently offers bicyclists and pedestrians. The results of this assessment indicate that at a community-wide level, bicycling and pedestrian conditions are adequate (average level of service "C"), with many specific roads still presenting significant opportunities for improvement. In addition to these supply-based evaluations, the existing conditions section also includes a non-motorized demand assessment that identifies areas within Geneva that have the greatest potential for increased levels of bicycling and walking based on the proximity of key trip origins and destinations. An evaluation of existing transit stops identified four stops, based on highest volume of ridership, for improvements.

FACILITY RECOMMENDATIONS: The Plan identifies numerous strategic, location-specific facility needs that will help complete Geneva's bicycle and pedestrian network, based on existing conditions and public/stakeholder input. The recommendations include new bicycle facilities, important sidewalk connections, new or improved shared use paths and trails that link to the region's extensive off-road network, and transit stop improvements. To help establish momentum, several recommended facilities are identified for "early implementation." Initial implementation priorities, divided into facility types, are developed based on the demand analysis described above. Concurrently, the City and Town will continue to implement projects in accordance with capital improvement schedules and specific funding opportunities.

FACILITY DESIGN GUIDANCE: This section is a valuable ongoing resource for the City and Town of Geneva as new bicycle and pedestrian facilities are constructed, including many of those identified in the Plan. Based on relevant Federal and State of New York sources and standards, the Plan's design guidance covers many established and emerging facility types including sidewalks, curb ramps, bike lanes, Shared Lane Markings, bike boulevards, midblock crossings, and shared use paths.

OUTREACH AND EDUCATION RECOMMENDATIONS: Conducting outreach and education programs is another important aspect of the active transportation planning process. The Plan's associated recommendations seek to increase the number of bicyclists and pedestrians while improving safe and appropriate behavior by bicyclists, motorists, and pedestrians. One highlight of this section is a focus on connecting with local and regional partners to maximize the effectiveness of existing resources, programs, and materials. An additional recommendation is to appoint and sustain a public bicycle/pedestrian committee to engage with various groups and promote bicycling and walking in the community.

FUNDING AND IMPLEMENTATION STRATEGY: The Active Transportation Plan includes recommendations for ongoing strategies to pursue relevant funding resources, both traditional and innovative, that are available to the City and Town as they seek to implement this Plan. Each of these resources is described, including federal, state, regional, and private sector resources that provide grants for both facilities and programs.

FOLLOW-ON ACTIVITIES: The final report highlights a wide range of needed improvements that were identified by residents during the planning process. However, there are follow-on activities that were not included within the plan's original scope/budget. The Geneva Active Transportation Plan does not identify all of the specifics required to construct every recommended project. These follow-on activities can be addressed by the City and Town and/or stakeholders on an ongoing basis as implementation takes shape.

2. INTRODUCTION & SUMMARY

2.1 BACKGROUND AND PURPOSE OF THE PLAN

This report summarizes the analysis, planning, and design recommendations included in Geneva's Active Transportation Plan. It represents the City and Town's approach to active transportation by providing a community based, data driven blueprint to guide future policy decisions and infrastructure investment. The Plan is intended to guide pedestrian and bicycle facilities development by establishing a network of sidewalks, on-road bicycle facilities, and off-road trails that make it safer and easier to walk, ride a bicycle, or access public transportation. As a result Geneva becomes a more sustainable community enhancing its reputation as a great place to live, work, play, visit, and raise a family.

The goal of planning is to improve the welfare of people and their communities by creating more convenient, equitable, healthful, efficient, and attractive places for present and future generations. As such, planning is an orderly, open approach to determining a community's needs and goals, and developing strategies to address those needs and meet those goals. Transportation planning enables civic leaders, businesses, and citizens to play a meaningful role in creating communities that enrich people's lives.

Geneva is gifted with a variety of characteristics, both natural and planned, which collectively make Geneva a great place to live and provide a setting that is well positioned for this important planning initiative. City of Geneva is home to 13,261 residents (according to the 2010 U.S. Census).

- Town of Geneva is home to 2,291 residents (according to the 2010 U.S. Census).
- Proximity to Seneca Lake.
- Thriving central business district, supporting over 200 firms and 1,500 jobs.
- Historic downtown.
- Unique agricultural heritage as region's wine-making capital.
- Seneca Lake Wine Trail and growing agritourism industry.
- Hobart and William Smith Colleges and Finger Lakes Community College.

2.2 ACTIVE TRANSPORTATION BENEFITS

Motorized transportation accounts for more than **25 percent** of the carbon dioxide emissions in the United States (EPA, 2014). In addition, motorized transportation is a significant household expense for many people. However, there are other transportation options, which include active transportation choices, such as walking and bicycling. Walking and bicycling enhance quality of life by offering significant environmental, public health, economic and social benefits.

Although active transportation provides the following individual benefits, the synergy between these varied and disparate benefits also results in enhanced community sustainability:

- A local economy that is robust and balanced, with better access to jobs, education and health care.
- Increased health for persons engaging in active transportation, and increased safety for all.
- Ecosystems that thrive as a result of reduced air pollution and reduced greenhouse gas emissions.
- Infrastructure that encourages culturally and socially diverse groups to prosper and connect to the larger community.

ENVIRONMENTAL BENEFITS

Switching to active transportation reduces greenhouse gas and particulate emissions and other pollutants that contribute to global warming, smog, and acid rain. Choosing active transportation is an easy way to reduce environmental impact – bicycling and walking create zero greenhouse gas emissions. Active transportation can reduce air pollution, minimize traffic congestion, and help to lessen our national dependence on petroleum. Bicycling and walking can also serve as the final leg of transit trips to and from other parts of the region, allowing walkers and riders to get between home and their boarding stop and between their disembarking stop and their final destination.

HEALTH BENEFITS

Improved bicycling conditions add to the vitality and quality of life of the community and provide access to recreational destinations across the region. Despite the proven benefits, most people – including more than 50% of American adults – do not get enough physical activity to provide meaningful health benefits (CDC, 2012). With this in mind, opportunities for exercise and healthful outdoor activity are more than expendable extras. Active transportation provides an opportunity to incorporate regular physical activity into the daily routine.

Land use and building patterns exacerbate health problems when they are limited to providing new, disconnected neighborhoods that have few opportunities for walking or biking. In addition, our lifestyles have become increasingly sedentary in our post-industrial society. Walking and bicycling provide an opportunity to simultaneously obtain the benefits of transportation and physical exercise. Active transportation can also benefit young people by giving them a healthy start in life.

...Studies have found that overweight and obese children have lowered academic achievement in standardized test scores...

(California Department of Education, 2005)

The relationship between weight loss and physical activity is clear, but there are also less obvious health benefits attributed to active transportation. Active transportation has a calming effect on traffic that results in fewer fatalities involving vehiclists, cyclists, and pedestrians. Countries with the highest number of bike commuters have lower transportation fatality rates. For example, the Netherlands, which has a bike commuter rate of over 30%, has a vehicle fatality rate three times lower than the US, a cyclist fatality rate three times lower than the US, and a pedestrian fatality rate six times lower than the US (RCA, 2016). The same rule holds true for US cities, in Portland, Oregon, as the active transportation rate increased, bicycle crashes decreased by a dramatic by 50%.

ECONOMIC BENEFITS

Health care costs and insurance rates are escalating, causing serious impacts to the local economy. Lack of physical activity is a contributing factor to a growing number of serious illnesses and health problems among all age groups. In addition to health-related costs, operating a personal automobile is very expensive. With the money saved on a vehicle, or even just the additional parking, fuel and maintenance required to commute in a vehicle, an active commuter can pay for transit expenses, purchase a good quality bicycle, or buy new walking shoes, with money left over.

Better bicycling conditions will provide access to recreational and work destinations, schools, public transit, and local shops. This will, in turn, promote additional economic development in the vicinity of these destinations. The number of people bicycling can be a good indicator of a community's livability - a factor that has a profound impact on attracting new residents, businesses, workers, and tourists, all of which stimulate the local economy. By developing transportation programs and encouraging active transportation options, the local economy captures the disposable income that results from greater use of non-motorized transportation. Shoppers remain centrally located, resulting in increased community reinvestment.

Cities that promote bicycling tend to retain youth, attract young families, and increase social capital.

(Indianapolis Bicycle Master Plan)

SOCIAL BENEFITS

Improving transportation equity by cultivating better walking and bicycling conditions provides mobility choices for the one-third of United States residents who do not own or have ready access to a car. A significant portion of the City of Geneva is within a potential environmental justice area. These areas are defined by high percentages of residents who identify as members of minority groups (51.1% or greater in urban areas) or a high percentage of the population below the poverty line (23.59% or greater). These populations are more likely to depend on active and public transportation to access jobs, education, and health care.

Bicycling and walking are appealing for families wishing to engage in new and affordable recreational opportunities while increasing opportunities for social interaction, which contributes to an overall sense of community. Communities across the country have embraced non-motorized transportation as an option that residents increasingly expect and visitors actively seek when making choices about where to locate their families. Cities that promote bicycling tend to retain youth, attract young families, increase social capital and benefit economically.

Active transportation reduces stress and promotes community interaction. Riding a bicycle allows a commuter to choose a less busy route and by-pass traffic signals. Walkers and cyclists see more of their community than just stoplights, white lines and car bumpers. It is easier and less expensive to park a bike than a car, which further reduces the stress of commuting. In addition, a culture dependent on cars encourages urban sprawl development patterns that compromise the sense of community by keeping people isolated from one another. With this Plan, Geneva is taking important steps towards a future in which bicycling, walking and transit are experienced as viable options for trips of all purposes.

See ***Appendix A*** for more community impacts of trails.

2.3 COMMUNITY OUTREACH AND PUBLIC INPUT

Planning of any kind cannot be done in a vacuum, and must be informed by local residents. GTC regularly identifies community participation as an objective in the Long Range Transportation Plan for the Genesee-Finger Lakes Region, which guides their planning efforts. The Plan states, “The transportation planning process should be conducted in as open and visible a manner as possible, encouraging community participation and interaction between and among citizens, professional staff, and elected officials.”

New York State has also identified principles to guide community planning processes, stating that planning should be continuous, comprehensive, participatory, and coordinated. Citizen participation is not just a requirement, but rather is an essential component in the process and a critical element of a successful plan. ***Table 2*** chronicles the meetings that were conducted in support of this project.

The planning process for this study included outreach to both the general public and key stakeholders. The project advisory committee was comprised of representatives from the City of Geneva, Town of Geneva, GTC staff, and interested landowners. Committee members provided continuity and study oversight. Members of the advisory committee are listed below. ***Appendices B*** and ***C*** include information related to public outreach.

PROJECT ADVISORY COMMITTEE

GTC

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STAFF

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CITY

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David Strickland

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Mark Venuti

Mark Palmieri

Aaron Palmieri

Karen English

Noah Lucas

Angela Thomas

Seamus Hogan

2.4 RELATIONSHIPS TO OTHER PLANS AND STUDIES

The goal of planning is to improve the welfare of people and their communities by creating more convenient, equitable, healthful, efficient, and attractive places for present and future generations (APA, 2011). Planning enables civic leaders, businesses, and citizens to play a meaningful role in creating communities that enrich people's lives. In developing new plans, it is important to refer to plans and studies that have already been completed to evaluate how the new plan relates to existing plans. Several such precedent plans exist in this case:

- City of Geneva Comprehensive Plan, 2016
- Genesee-Finger Lakes Walkability Action Plan, 2016
- Hobart and William Smith Colleges Master Plan Update, 2015
- Genesee-Finger Lakes Regional Trails Initiative Update, 2014
- Geneva, New York - North End Brownfield Opportunity Area, 2014
- City of Geneva Lakefront-Downtown Connectivity Study, 2010

2.5 PLAN SUMMARY

The Geneva Active Transportation Plan assumes a broad approach to the promotion of bicycling and walking within Geneva. A significant number of the Plan's recommendations identify and describe specific infrastructure improvements that will improve pedestrian and bicycle travel in Geneva. Beyond that, the Plan recognizes that there are many other ways to promote walking and bicycling activity. Through specific outreach and education initiatives, more residents can become aware of existing and future active transportation opportunities. Engaging the private sector can also serve to increase its role in providing active transportation facilities.

Following this background and purpose section, the Plan is divided into six parts:

- Existing conditions evaluations;
- Facility recommendations;
- Facility design guidance;
- Outreach and education recommendations;
- Funding and implementation strategy; and
- Pilot projects and follow on activities.

3. EXISTING CONDITIONS EVALUATIONS

3.1 COMMUNITY CHARACTERISTICS

Geneva is located at the northern end of Seneca Lake in the Finger Lakes Region. The City is 5.8 square miles, which includes 1.6 square miles of Seneca Lake. According to the 2010 census, the City population was 13,261 persons. The majority of the City of Geneva is in Ontario county. Adjacent Seneca Lake waters within the city limits are part of Seneca county.

The Town of Geneva is 19.1 square miles, and is entirely within Ontario County. The 2010 census lists the town's population as 3,291 persons.

The community is home to four colleges and universities. Hobart and William Smith Colleges, a satellite campus of Finger Lakes Community College, the Marion S. Whalen School of Practical Nursing, and Cornell University's College of Agriculture and Life Sciences agriculture experiment station are all located within the study area. Geneva is also known for its wine-making and is an increasingly popular destination for agritourism.

The City of Geneva has won the All American City Award, given by the National Civic League in recognition of those communities whose citizens work together to identify and tackle community wide challenges.

A portion of the City of Geneva is within a potential environmental justice area. Environmental justice areas have a high percentage of residents who identify as members of minority groups (51.1% or greater in urban areas) or a high percentage of the population below the poverty line (23.59% or greater). These populations are more likely to depend on active and public transportation to access jobs, education, and health care.

3.2 EXISTING BICYCLING AND PEDESTRIAN CONDITIONS

An important element of any bicycle and pedestrian planning initiative is to determine how well or how poorly area roadways accommodate all users of the transportation system. While much of this information is gathered from input provided by the public, an objective and defensible system-wide evaluation is also useful in setting the stage for identifying and prioritizing facility improvements.

An evaluation of existing bicycling and pedestrian conditions was conducted for the City and Town network of arterial and collector roads (approximately 131 directional segments totaling about 39 centerline miles) using the Bicycle & Pedestrian Level of Service Models. These models, which have been applied to hundreds of thousands of miles of roads throughout the United States, are fundamental performance measures and design tools in the **Highway Capacity Manual (HCM 2016)**. The following sections provide background information and data descriptions for these evaluation tools.

LEVEL OF SERVICE MODELS

The Bicycle Level of Service (BLOS) Model and Pedestrian Level of Service (PLOS) Model existing conditions performance measures are "supply-side" criteria. The models are objective measures of roadway bicycling and walking conditions, providing an evaluation of users' perceived safety and comfort with respect to motor vehicle traffic and roadway conditions. These nationally adopted and widely used methodologies quantify the current quality or level of service (accommodation) for bicyclists and pedestrians that exists within the roadway environment.

A major benefit of incorporating the BLOS and PLOS is the information they provide regarding which network segments have the greatest needs. They use the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. These methods are not limited to merely assessing conditions. Results can be used to provide a snapshot of existing bicycling and walking conditions, identify roadways that are candidates for bicycle and pedestrian facility improvements, conduct a benefits comparison among proposed facilities and roadway cross-sections, and prioritize and program roadways for such improvements.

With statistical precision, the BLOS Model clearly reflects the effect on bicycling suitability or "compatibility" due to variations in the following primary factors:

- Bike lane or paved shoulder width;
- Outside lane width;
- Traffic volume, speed, and type;
- Presence of on-street parking; and
- Pavement surface condition.

In a similar manner, the PLOS Model incorporates the following primary factors:

- Sidewalk presence, width;
- Outside lane width;
- Traffic volume and speed;
- Presence of buffer, width; and
- Presence of barriers (on-street parking, street trees).

For each study network segment, the level of service analysis produces an objective score and "grade" which measures accommodation on that section of roadway, as shown in the following table.

Table 1: Level of Service.

Level of Service	Numerical Range
A	≤ 1.5
B	> 1.5 and 2.5 ≤
C	> 2.5 and 3.5 ≤
D	> 3.5 and 4.5 ≤
E	> 4.5 and 5.5 ≤
F	> 5.5

EXISTING CONDITIONS ANALYSIS RESULTS

Bicycling conditions analysis were performed for more than 131 directional network segments based on the collected network data. The distribution of bicycle level of service grades is shown in ***Figure 1***. At a distance-weighted network-wide level, Geneva was found to currently provide bicycling conditions that correspond to a bicycle level of service 2.60 ("C"), which is generally favorable compared with many other municipalities nationwide. ***Appendix D*** provides additional information about the BLOS Model, and ***Appendix E*** provides the BLOS data sheets for all roadways that were analyzed in the course of the study.

Pedestrian conditions analysis were evaluated for the same study network. The distribution of pedestrian level of service grades is shown in ***Figure 2***. At a distance-weighted network-wide level, Geneva was found to currently provide pedestrian conditions that correspond to a pedestrian level of service 2.78 ("C"), which is also generally favorable compared with many other municipalities nationwide. ***Appendix D*** provides additional information about the PLOS Model, and ***Appendix E*** provides the PLOS data sheets for all roadways that were analyzed in the course of the study.

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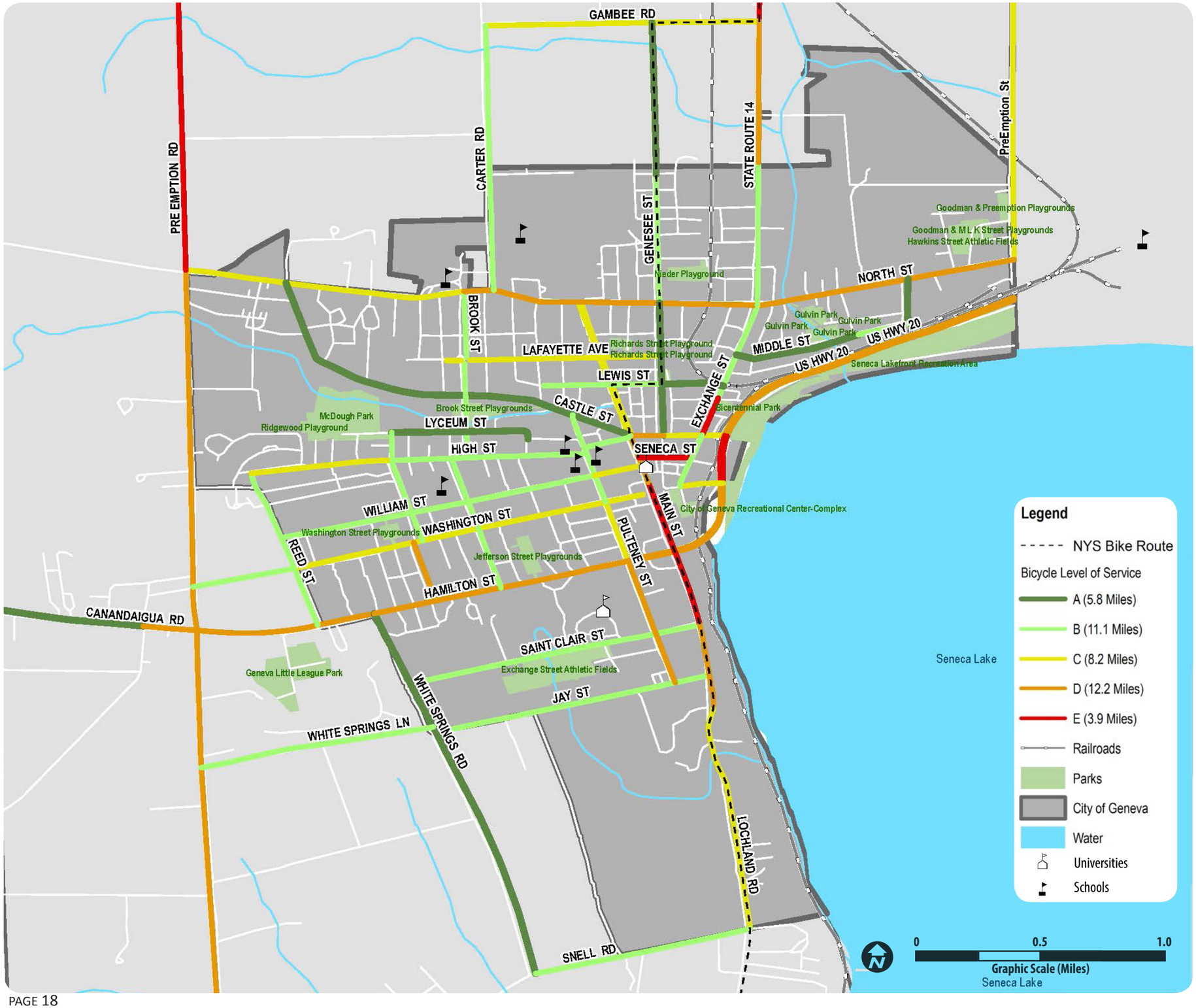
FIGURE 1

BICYCLE LEVEL OF SERVICE



EXAMPLES OF BICYCLE LEVEL OF SERVICE


A
Canandaigua


White Spring Rd


B
Carter Rd


Snell Rd


C
Lafayette Ave


Pulteney St


D
Hamilton St


US-20


E
S. Main St


US-20

Note

In instances where the Level of Service rating is different directionally, the figure shows the worse rating of the two results.

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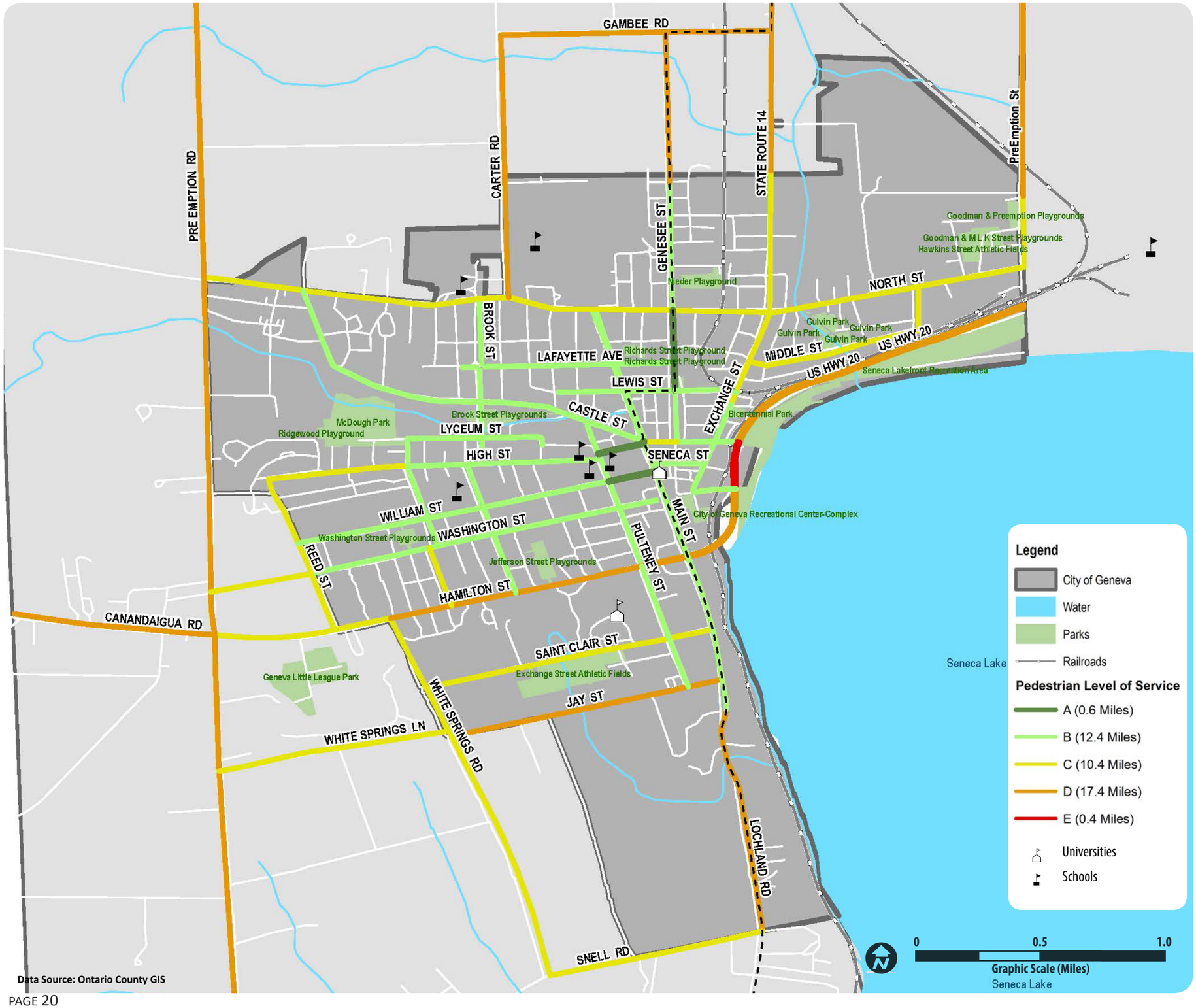
FIGURE 2

PEDESTRIAN LEVEL OF SERVICE



Data Source: Ontario County GIS

EXAMPLES OF PEDESTRIAN LEVEL OF SERVICE


A
Genesee St


William St


B
N. Main St


Washington St


C
Copeland Ave


North St


D
PreEmption Rd


S. Main St


E
US-20


US-20

Note

In instances where the Level of Service rating is different directionally, the figure shows the worse rating of the two results.

TOPOGRAPHIC ANALYSIS

Geneva road topography was analyzed in the course of this study. Steep topography can present many challenges for active transportation. Building new sidewalks in areas with steep topography is generally more expensive, and it may be difficult or impossible to make sidewalks along particularly sleep slopes accessible for all users. Most pedestrians and cyclists also prefer relatively flat topography.

Within the study area:

- 19% of roads have less than 3% slope;
- 43% of roads have 3-8% slope; and
- 48% of roads have 8% slope or greater.

Refer to ***Figure 3*** for more information.

3.3 SHARED-USE TRAILS

The Seneca Lake Wine Trail is an 80 mile on-road trail that circles Seneca Lake. There are 35 wineries along the trail. Though primarily used by automobiles, the trail is also marketed to cyclists. The trail is moderate difficulty for cyclists, with only one steep section near Watkins Glen. Geneva is located at the northern-most point along the trail and benefits from the agritourism industry of Seneca Lake.

Geneva is well-positioned to take advantage of the regional trail network. The Erie Canal Trail passes through Lyons, approximately 14 miles north, an hour and fifteen minutes by bicycle. The Finger Lakes Trail Network passes through Watkins Glen, at the southern tip of Seneca Lake. Keuka Outlet Trail connects Dresden, on the western edge of Seneca Lake, with the Village of Penn Yan on Keuka Lake.

Creating a clearer relationship between these trails for potential users, including members of the Geneva community and visitors, could boost both active transportation and tourism throughout the region.

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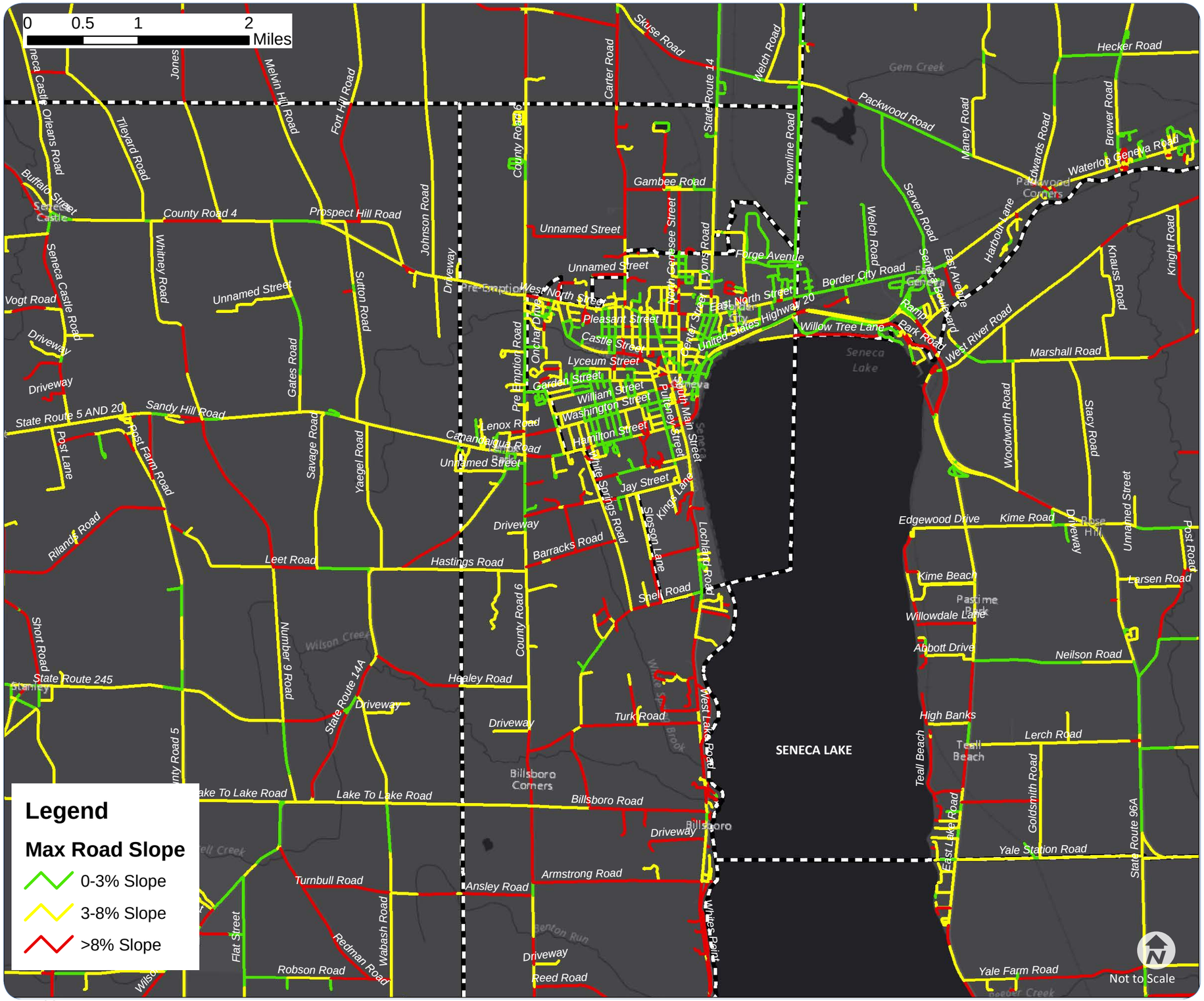
FIGURE 3

SLOPE MAP



Prepared by Barton & Loguidice, DPC and Sprinkle Consulting, Inc.

3.4 SCHOOLS AND UNIVERSITIES

The City and Town of Geneva are served by the Geneva City School District. The Geneva City School District includes four schools; Geneva High School, Geneva Middle School, West Street School, and North Street School.

Strong school districts support a strong local economy and help create an environment for lifetime residency. Providing safe opportunities for walking and bicycling to the schools can have positive health impacts for school age children and help reduce short-distance automobile trips. Refer to ***Figure 4*** in the Recommendations section for an existing school locations map.

In addition, Geneva is home to Hobart and William Smith Colleges, the Marion S. Whalen School of Practical Nursing, the Cornell University Agricultural Experiment Station, and a Finger Lakes Community College satellite campus. These colleges are community resources that are considered within the Geneva Active Transportation Plan.

3.5 PRIORITY INTERSECTIONS

The priority intersections serve as case studies which highlight improvement strategies that can be applied over time to other intersections in Geneva that were not studied. Intersection selection was a collaborative effort involving City and Town staff, Project Advisory Committee members, and the consultant team.

A combination of statistical data, field observation, and input from residents was used to evaluate existing conditions at the Priority Intersections. Criteria for selection included 10 year crash data, proximity to priority destinations, overall density of use, special needs populations, anecdotal information and perceived safety issues. It is important to note that in selecting intersections, consideration was given to students who may be walking and bicycling to school facilities, as well as senior citizens who have active transportation needs to access community services and health care providers. Bicycle and pedestrian facilities are particularly important to both of these groups.

Six intersections in Geneva were selected for further study and more detailed recommendations for improvements. The intersections selected for detailed analysis, in addition to the controlling jurisdictions, are listed below:

Pulteney Street (City of Geneva)
Hamilton Street (New York State - US 20)

North Street (Ontario County - County Road 4)
Exchange Street (New York State - New York 14)

North Street (Ontario County - County Road 4)
Carter Road (City of Geneva)

PreEmption Road (Ontario County - County Road 6)
West Washington Street (City of Geneva)

Hamilton Street (New York State - US 20)
Spring Street (City of Geneva)
White Springs Road (City of Geneva)

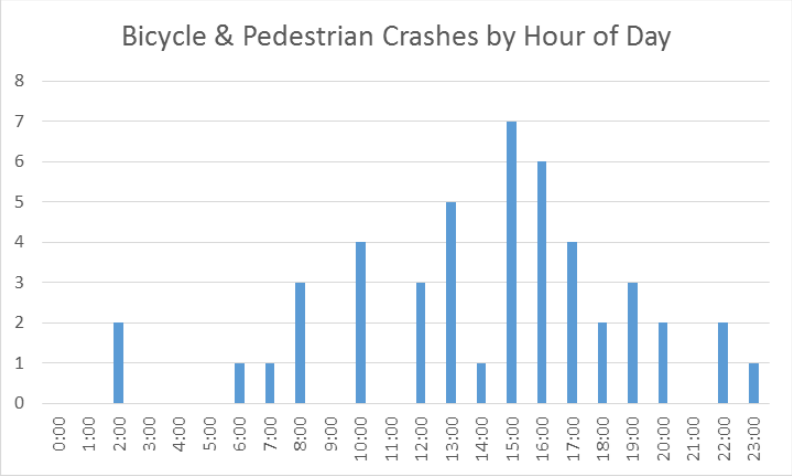
Washington Street (City of Geneva)
Nursery Avenue (City of Geneva)

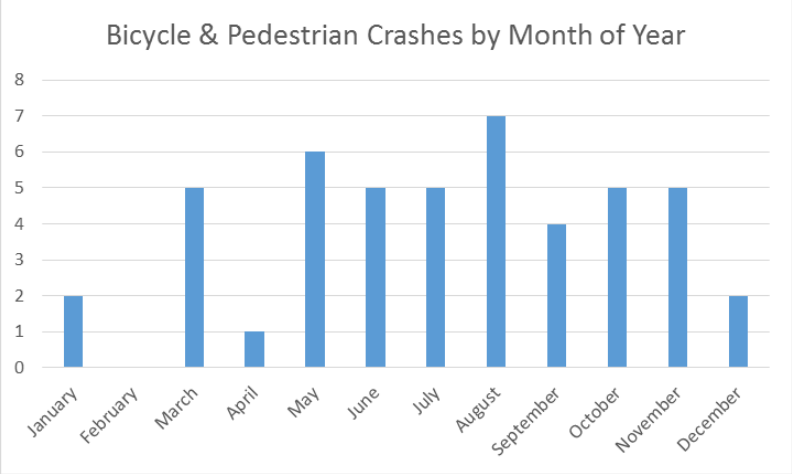
A detailed analysis of the six identified intersections was completed, considering in part notes from the Priority Intersection Field Inspection conducted on March 16-17, 2016. Field investigations considered the physical and operational characteristics of each location pertinent to pedestrian and bicycle safety. Desktop analysis with AutoTURN software was used to verify the layout. For all intersections, consideration of the following is recommended for all approaches:

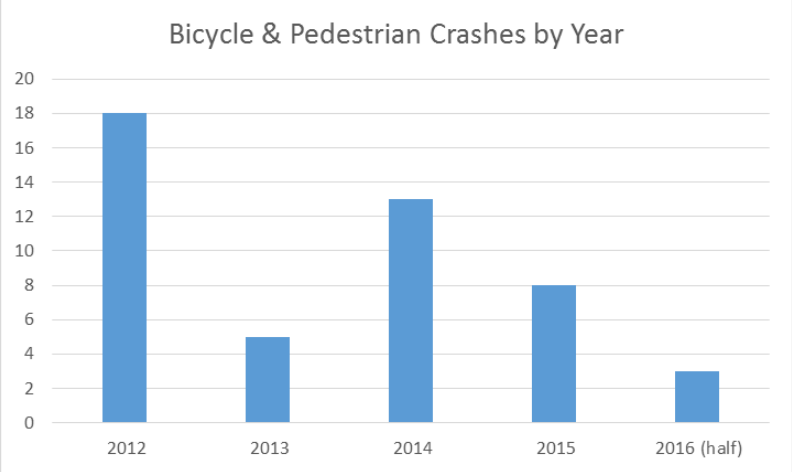
- Sidewalks;
- Curb ramps;
- Pedestrian Signals;
- Upgrading existing pedestrian push buttons and indications to most current NY State standards;
- No Turn on Red / Yield to Pedestrians on-demand blank-out signs; and
- Leading pedestrian intervals where there are right turn lanes.

Public input recorded during public meetings held on August 5th and August 11, 2016 was used to help evaluate the actual and perceived safety of the priority intersections in Geneva. There were a significant number of anecdotal reports regarding problems for pedestrians and bicyclists at these intersections. Public input clearly indicated that many Geneva residents do not feel safe walking or riding through these areas. The perceived lack of safety may be contributing to a reduction in the number of potential walking and cycling trips in Geneva. An important goal of the project is to encourage more walking and cycling trips, so addressing safety conditions at these intersections is a priority concern.

Refer to ***Section 4.3*** for more details on Priority Intersections.







3.6 SAFETY ANALYSIS

CRASH ANALYSIS

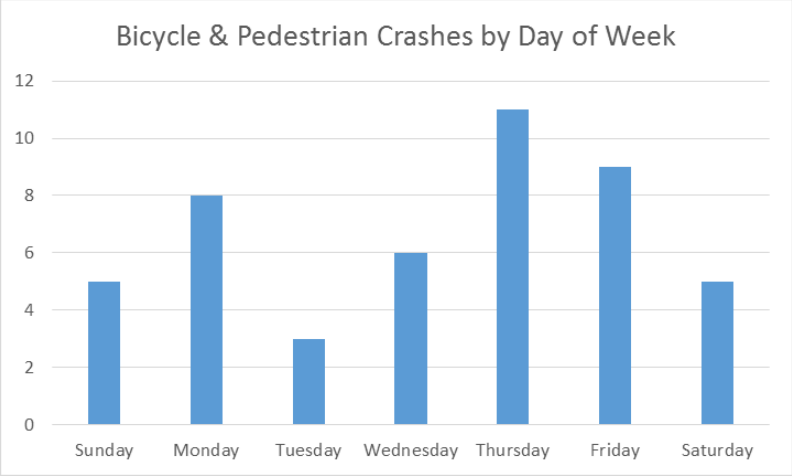
The Geneva Police Department provided copies of crash reports for all crashes involving bicyclists or pedestrians between January 2012 and June 2016. The following sections provide temporal and crash type analysis of the forty-seven reviewed crashes.

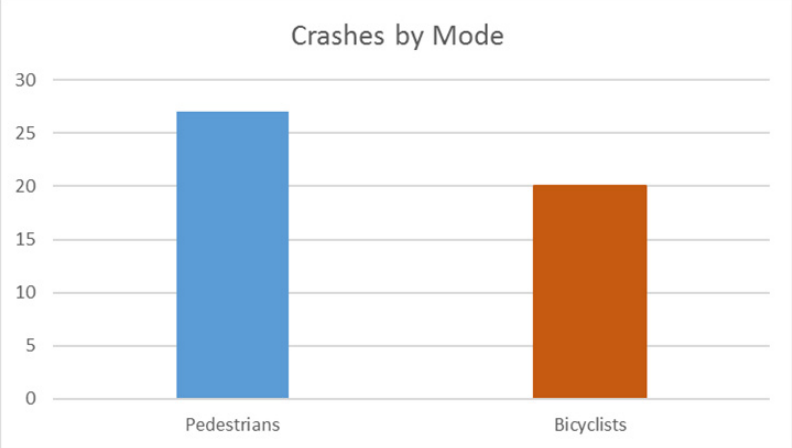
TEMPORAL CRASH ANALYSIS

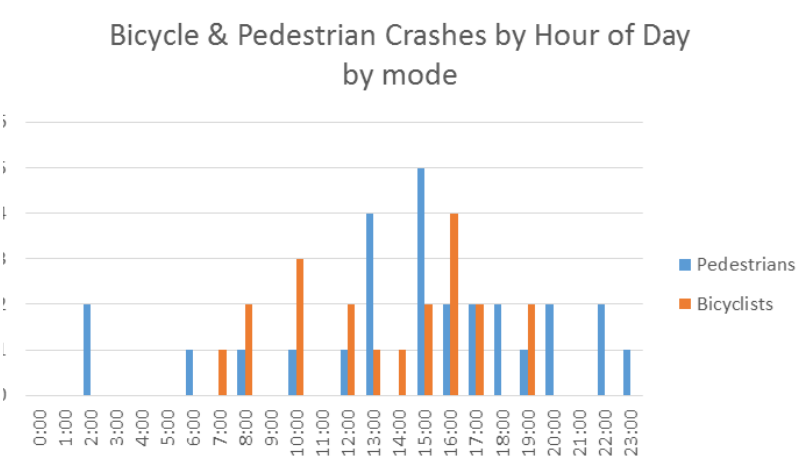
The relatively small sample size of crashes involving bicycles and pedestrians in Geneva since 2012 makes it difficult to draw definitive conclusions regarding temporal variations. Still, certain trends are apparent. While exposure (i.e., count) data is not readily available, the time of day and month of year trends correspond with anecdotal observations of times when more people are riding and walking. Very few crashes occur in the overnight hours, and more occur in the afternoon and evening than in the morning, peaking between 3:00 and 5:00 PM. Crashes are noticeably more frequent in warmer months than in colder months, a trend that is even more prominent when crashes are separated by mode. All four crashes in December and January, and four of the five crashes in November, were pedestrian crashes, confirming that walking is more prevalent than bicycling in cold weather.

The available data seem to exhibit a downward trend in the number of crashes over time, with 18 crashes in 2012 and lower numbers in more recent years.

The data do not exhibit a clear pattern by day of week, with the highest and lowest number of crashes occurring on days in the middle of the week (Thursday and Tuesday, respectively). The average number of crashes on weekend days (5.0) is marginally lower than on weekdays (7.4).







CRASH TYPE ANALYSIS

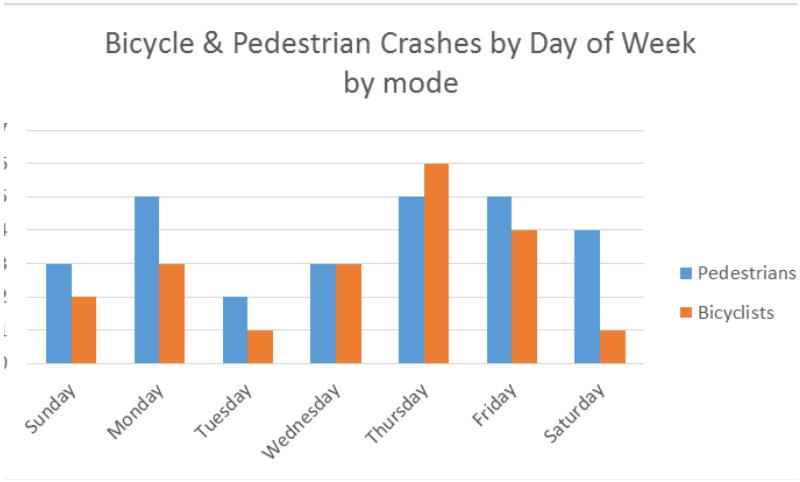
Pedestrians

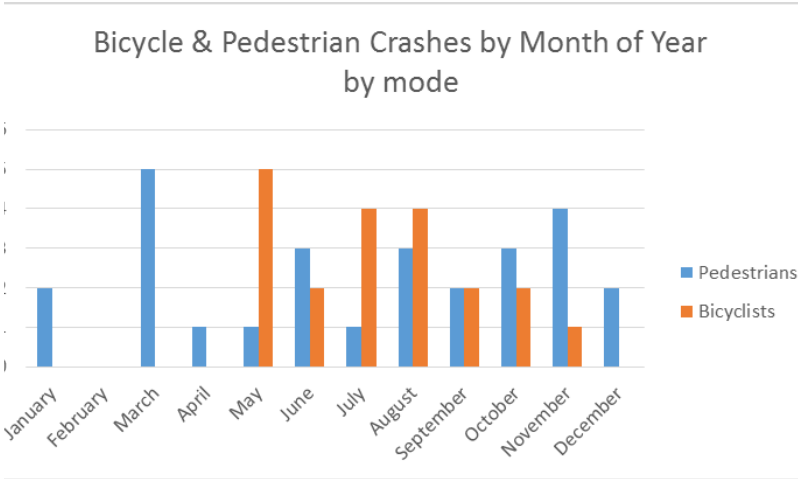
The most common type of pedestrian crash (five crashes) involved pedestrians entering the roadway at "midblock" locations. Two of these actually occurred just beyond the crosswalks at intersections. Both pedestrians were hit by turning vehicles. Two others involved pedestrians stepping out from behind parked cars. One involved a pedestrian crossing a congested roadway through queued traffic. All these crashes represent a pedestrian choosing an inappropriate gap in traffic because they failed to look for traffic or because they misjudged the gap.

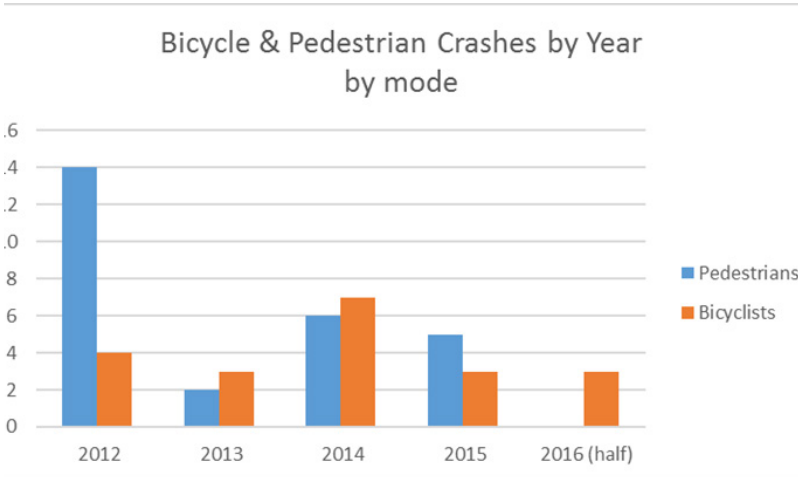
Four crashes involved motorists making improper turns at signalized intersections. Two of these were left hook crashes in which the motorists had a green signal indication but failed to yield to pedestrians in the crosswalk. One of the other two was a right turn on red crash. The final such crash appears to have been a right turn on green crash. Two additional crashes resulted from motorists turning left hitting pedestrians walking on a sidewalk/crosswalk of the receiving travel-way. All of these crashes likely resulted from the motorists not scanning for pedestrians prior to turning.

Three of the crashes resulted from pedestrians violating traffic signals.

One crash involved a motorist failing to comply with the red flashers and stop paddle of a school bus and hitting a pedestrian. The driver claimed ignorance of what the flashers and signs meant.







Two of the pedestrian collisions appeared to be the result of social or domestic altercations and thus are hard to address as traffic crashes. An additional five of the pedestrian crashes occurred within parking lots; two were backing crashes. One of the parking lot crashes was a secondary collision involving a car which had just been involved in a crash being pushed into a parking lot.

Bicycles

The bicycle crashes were even less well clustered by crash type. The most common crash type (three crashes) involved bicyclists violating traffic signals. It is possible that one of these involved a signal trap, in which a bicyclist enters during the yellow and is hit by a vehicle that subsequently gets a green indication.

Three crashes involved bicyclists being “right hooked” by motorists. These varied in that one involved a bicyclist riding in the travel lane with traffic. One involved a bicyclist riding on the sidewalk (with traffic). In the third crash, it is possible the bicyclist tried to pass a right turning motorist on the right.

Two crashes involved motorists overtaking bicyclists. In one crash the motorist was distracted – looking at a GPS unit. In the other, a motorist swerved to avoid a car turning onto the opposing lane of the roadway and hit a bicyclist on his right.

Four crashes involved motorists failing to notice bicyclists on the sidewalk (five if one counts the aforementioned “right hook” crash). Of these four, one involved a left hook, while two others involved bicyclists riding against traffic. The final such crash involved a visual screen (vegetation) which hid the motorist and bicyclist from each other.

Three crashes involved bicyclists making improper turns. In one a bicyclist swerved off a sidewalk into the street. Another involved a bicyclist passing queued motorists on the right and then turning left in front of the queue just as the signal turned green. The third involved a bicyclist turning onto a road after riding against traffic on a one-way street.

Another crash involved a bicyclist riding out from a sidewalk in front of a car because he (the bicyclist) was unable to stop in time to avoid the collision.

CONCLUSIONS

Ideally, this review would identify temporal and causal trends that could be addressed through targeted engineering, enforcement, and educational campaigns. However, over the past five years, there have not been enough pedestrian and bicycle crashes in Geneva to suggest such trends. This is, of course, a positive – fewer crashes means fewer injuries, less property damage, and better overall safety. However, it does mean that general pedestrian and bicycle safety campaigns rather than targeted campaigns should be identified to help reduce crashes.

The National Highway Safety Administration (NHTSA) has materials that can be used by local communities to promote safety. These materials can be found at ***http://www.nhtsa.gov/Bicycles*** and ***http://www.nhtsa.gov/Pedestrians***. Ideally, the materials prepared by NHTSA would be adapted to show Geneva environments. Using local roads, schools, or commercial districts in videos, brochures, and other materials makes safety campaigns more relevant to local populations.

3.7 COMMUNITY FEEDBACK

COMMITTEE AND PUBLIC MEETINGS

The planning process for this study included outreach to both the general public and key stakeholders. A Project Advisory Committee, whose members are listed in the Introduction, was comprised of representatives from the City of Geneva, Town of Geneva, GTC staff, and interested landowners. Committee members provided continuity and study oversight. *Appendices B* and *C* include information related to public outreach.

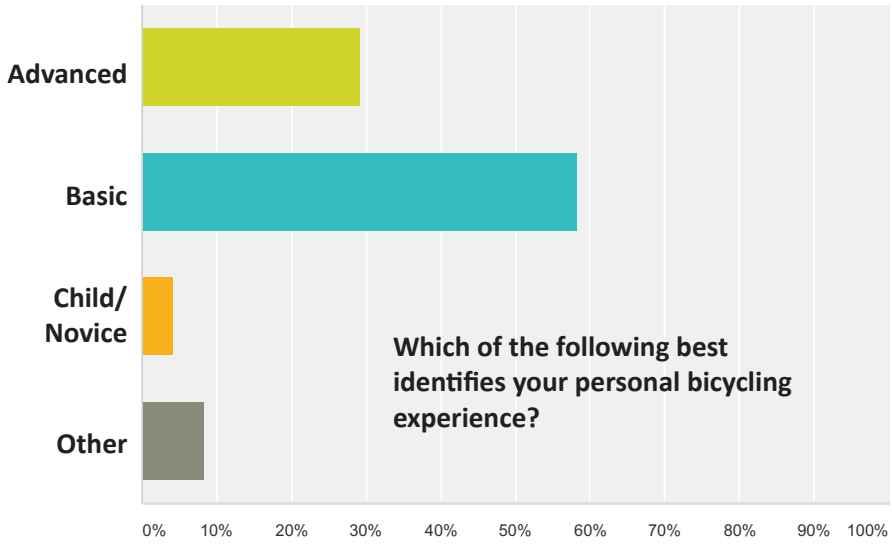
Table 2: Chronology of Community Involvement

Date	What	Purpose
January 20, 2016	Project Advisory Committee Meeting	Kick Off Meeting
April 16, 2016	Project Advisory Committee Meeting	Bike Tour
April 21, 2016	Project Advisory Committee Meeting	Walk Tour
July 27, 2016	Project Advisory Committee Meeting	Committee Meeting Update
August 05, 2016	Public Info Session	Info Session 1
August 11, 2016	Public Info Session	Info Session 1 at Farmer's Market
March 07, 2017	Project Advisory Committee Meeting	Committee Meeting Update
April 29, 2017	Public Info Session	Info Session 2

ACTIVE TRANSPORTATION SURVEY

An active transportation survey was used to gather information reflecting Geneva residents' current levels of walking, bicycling and transit use activity, their attitudes toward walking, bicycling and transit use, and their insight to barriers that presently exist. The 27 question survey was developed in collaboration with the Project Advisory Committee and City and Town officials.

Survey data was captured through the use of Survey Monkey, a third party online survey tool. The survey went live in May of 2016 and has received 247 responses to date. The survey was provided in both English and Spanish.



Answer Choices
Advanced (you use a bicycle as you would a motor vehicle)
Basic (you prefer not to ride on roads with busy and fast motor vehicle traffic)
Child or novice
Other (please specify)

The survey included demographic data such as age, gender, and neighborhood, as well as information on bicycling and walking habits, and recommendations for Geneva.

A few of the survey statistics are listed below. The entire Survey can be found in ***Appendix B***.

- The improvements survey users listed as most likely to increase their active transportation were availability of secure, weather protected bicycle parking, signed bicycle routes, and designated on street bicycle lanes.

Bicycling Habits

- 60% of users characterized themselves as basic bicycle users (cyclists who prefer not to ride on busy roads or with fast moving vehicles), 30% as advanced users, and 30% as novice users or 'Other'.
- 55% of survey users said that their cycling habits varied significantly by season, while only 15% said their cycling did not vary by season.
- 40% of users prefer to ride on roads, 35% prefer to ride on trails and 25% prefer to ride on sidewalks.
- The main impediments to biking in Geneva were listed as winter weather conditions, road conditions and safety with respect to motor vehicle traffic.

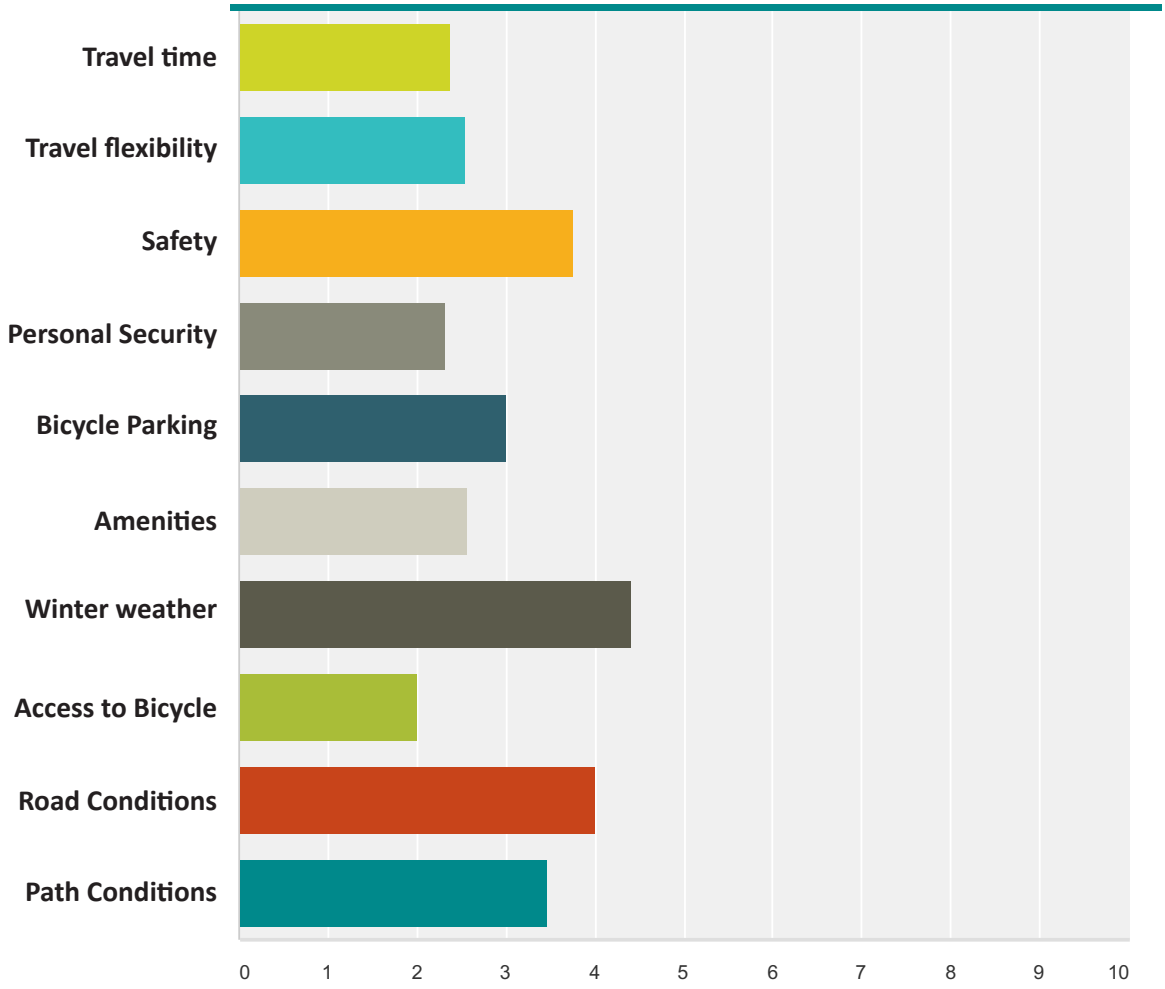
Walking Habits

- 27% of survey users said that their walking habits varied significantly by season, while 23% of users said that their walking habits did not vary by season.
- 56% of survey users said that they preferred to walk on sidewalks, 22% said they preferred to walk on trails, 9% selected on-road and 9% selected 'track/fieldhouse/recreational facility'.
- The main impediments to walking in Geneva were listed as winter weather conditions, sidewalk availability and sidewalk conditions.

Public Transportation

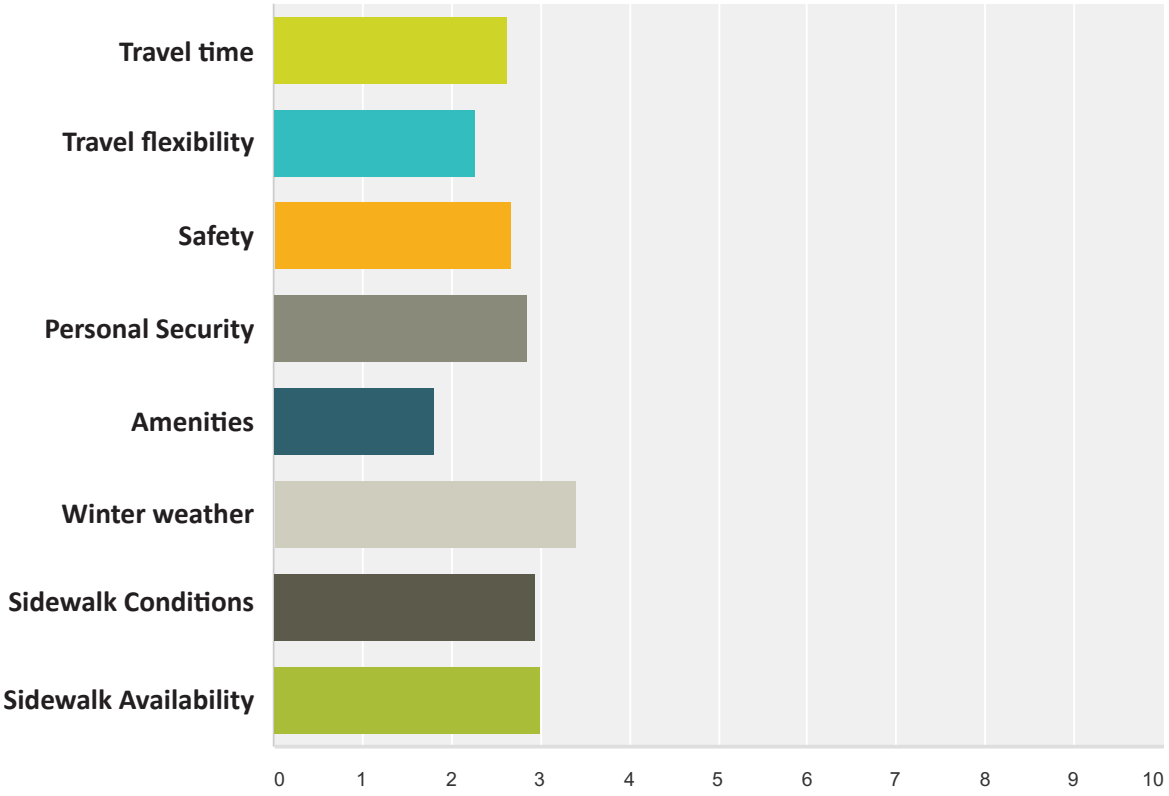
- No survey users reported using the Regional Transit Service in the last year.
- The improvements survey users listed as most likely to increase their public transportation use were improved ADA accessibility, availability of weather protected transit stops, and improved walkability between transit stops and destinations.

What do you consider to be the primary barriers to bicycling in Geneva that keep you from bicycling more often?



	1	2	3	4	5	N/A	Total	Weighted Average
Travel time	37.50% 6	12.50% 2	6.25% 1	12.50% 2	12.50% 2	18.75% 3	16	2.38
Travel flexibility	12.50% 2	25.00% 4	18.75% 3	6.25% 1	6.25% 1	31.25% 5	16	2.55
Safety (with respect to motor vehicle traffic)	5.56% 1	5.56% 1	27.78% 5	22.22% 4	33.33% 6	5.56% 1	18	3.76
Personal security	23.53% 4	29.41% 5	29.41% 5	11.76% 2	0.00% 0	5.88% 1	17	2.31
Availability of secure, weather-protected bicyde parking	23.53% 4	11.76% 2	29.41% 5	11.76% 2	23.53% 4	0.00% 0	17	3.00
Availability of end-of-trip amenities (showers, lockers, etc.)	35.29% 6	5.88% 1	23.53% 4	23.53% 4	5.88% 1	5.88% 1	17	2.56
Winter weather conditions	0.00% 0	5.56% 1	11.11% 2	16.67% 3	61.11% 11	5.56% 1	18	4.41
Possession of / access to a bicycle	64.71% 11	0.00% 0	0.00% 0	5.88% 1	17.65% 3	11.76% 2	17	2.00
Road conditions (street obstacles, potholes, storm drains, etc.)	5.88% 1	0.00% 0	29.41% 5	11.76% 2	47.06% 8	5.88% 1	17	4.00
Path conditions (path obstacles, drainage issues, etc.)	5.88% 1	11.76% 2	29.41% 5	17.65% 3	23.53% 4	11.76% 2	17	3.47

What do you consider to be the primary barriers to walking in Geneva that keep you from walking more often?



	1	2	3	4	5	N/A	Total	Weighted Average
Travel time	29.41% 5	17.65% 3	23.53% 4	5.88% 1	17.65% 3	5.88% 1	17	2.63
Travel flexibility	35.29% 6	23.53% 4	11.76% 2	5.88% 1	11.76% 2	11.76% 2	17	2.27
Safety (with respect to motor vehicle traffic)	26.32% 5	15.79% 3	31.58% 6	15.79% 3	10.53% 2	0.00% 0	19	2.68
Personal security	14.29% 3	23.81% 5	28.57% 6	28.57% 6	4.76% 1	0.00% 0	21	2.86
Availability of end-of-trip amenities (showers, lockers, etc.)	61.11% 11	11.11% 2	0.00% 0	5.56% 1	11.11% 2	11.11% 2	18	1.81
Winter weather conditions	15.00% 3	10.00% 2	25.00% 5	20.00% 4	30.00% 6	0.00% 0	20	3.40
Sidewalk conditions (sidewalk obstacles, cracked pavement, etc.)	20.00% 4	15.00% 3	30.00% 6	20.00% 4	15.00% 3	0.00% 0	20	2.95
Sidewalk availability	20.00% 4	10.00% 2	35.00% 7	20.00% 4	15.00% 3	0.00% 0	20	3.00

4. FACILITY RECOMMENDATIONS

Review and analysis of existing conditions, stakeholder involvement, and extensive public input collectively provide a broad picture of both general active transportation needs (i.e. facility types) in Geneva, as well as specific projects that would most improve bicycle and pedestrian accommodation. General facility types include closure of sidewalk gaps, designated bike lanes, intersection improvements, and bicycle-specific signage and pavement markings (such as Shared Lane Markings and Share the Road signage). The projects range from those that can be implemented quickly and at very low costs to those that would be long term and more costly because of the need for further study prior to design and implementation. See ***Appendix F*** for schematic costs of bicycle and pedestrian infrastructure.

Identification of the facilities in this Plan significantly improves the likelihood of their implementation as opportunities arise. The established prioritization serves as a general guide for Geneva in phasing implementation, but does not suggest a specific order in which projects will ultimately be constructed. Recommended improvements, regardless of their established priority, may be tied to capital improvement schedules and specific opportunities.

A list of the Plan's specific recommended facility improvements, many of which were directly derived from community member input, is shown in ***Tables 3 through 5***, as separated by facility type. Refer to ***Figures 4-20***. The Recommendations section proposes significant number of recommended projects. ***Tables 3 through 5*** summarize all of these proposed projects and their associated phasing. Each project varies in priority based on the number of people served by the project and the feasibility of construction and funding. Each project was ranked according to the following phasing options:

- Priority – Highly beneficial projects that are immediately feasible, or will have the most impact, and therefore should be addressed first.
- Recommended – Beneficial projects that will have a significant impact and should be addressed next.
- Possible – Beneficial projects that have a less critical time frame, or cannot begin until other projects are completed or issues are addressed.

For more detail on the facilities recommended in this section, please see Chapter 5. The Facility Design Guidance in Chapter 5 provides an ongoing resource for Geneva which references existing design standards and best practices for active transportation projects.

4.1 PEDESTRIAN FACILITY IMPROVEMENTS

SIDEWALK NETWORK PRIORITY GAPS

An important element of Geneva's Active Transportation Plan is to identify gaps in the existing sidewalk network and to recommend priority sidewalk additions to help close the gaps. The long-term goal for Geneva is to have sidewalks on both sides of all arterial and collector roads. It is recognized that local streets with low traffic volumes can often provide a safe pedestrian environment without a full sidewalk system. In certain locations, new sidewalk construction can also serve as off-street neighborhood connections to enhance walkability.

The inventory of existing conditions mapped the current sidewalk system in Geneva along all roads using geographic information systems software. See *Figure 4*. A majority of the major arterial roadways in Geneva have existing sidewalks.

Roads within the study network with missing sidewalks have been identified in *Figure 4*. These have been divided into two categories - those with constraints that would make constructing sidewalks difficult, and those without identified constraints.

Table 3: Sidewalk Network Priority Gaps

Roadway/Location	Recommended Facility Improvement	Coordinating Jurisdiction	Phase
Jay Street between White Springs Rd and Lomar Dr.	Complete sidewalk north side	City of Geneva	Recommended
West High Street between Reed and Nursery	Complete sidewalk both sides	City of Geneva	Recommended
Castle Street east of Highland Avenue for .2 miles	Complete sidewalk south side	City of Geneva	Priority
Middle Street from Gulvin Park to Evans	Complete sidewalk south side	City of Geneva	Recommended
5 & 20 Between from Lake St to Elizabeth Blackwell St	Complete sidewalk west side	New York State	Priority
Saint Clair from White Springs Road to College Avenue	Complete sidewalk south side, complete sidewalk north side White Springs Road to Odell's Pond Road	City of Geneva	Recommended
Lochland from Snell Rd to One Mile Point	Complete sidewalk both sides	Ontario County DOT	Possible

Though there are relatively few sidewalk gaps in Geneva, many of the existing sidewalks are in poor condition. Improving existing sidewalks would have a significant impact on walkability within Geneva.

City and Town code have different policies on sidewalk maintenance. While both the City and Town of Geneva code require property owners to perform basic maintenance such as trash and snow removal, the City also requires property owners to repair damaged sidewalks.

All sidewalks constructed within the City and Town of Geneva must be compliant with the Americans with Disabilities Act Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (July 26, 2001) or most recent ADA standards for public rights of way. Sidewalks should be provided on both sides of all public roadways.

COMPLETE STREETS

According to the National Complete Streets Coalition (NCSC), complete streets are roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users (NCSC, 2008). Pedestrians, bicyclists, motorists and public transport users of all ages and abilities are able to safely and comfortably move along and across a complete street. Complete streets also create a sense of place, improve social interaction, and generally increase land values of adjacent property.

Complete streets look different in different places. They must fit with their context and the transportation modes expected (Laplante & McCann, 2008). Although no singular formula exists for a complete street, an effective one includes at least some of the following features:

- Sidewalks
- Bus pullouts
- Bike lanes
- Special bus lanes
- Wide shoulders
- Pedestrian scale lighting
- Raised crosswalks
- Plenty of crosswalks
- Audible pedestrian signals
- Refuge medians
- Sidewalk bump-outs (bulb-outs)

Incomplete streets – those designed with only cars in mind – limit transportation choices by making walking, bicycling, and taking public transportation inconvenient, unattractive, and, too often, dangerous. Changing policy to routinely include the needs of people on foot, public transportation, and bicycles would make walking, riding bikes, riding buses and trains safer and easier. People of all ages and abilities would have more options when traveling to work, to school, to the grocery store, and to visit family.

Smart Growth America, 2016

These features make a street safer and more pleasant for pedestrians and vehicles. A Federal Highway Administration safety review found that designing a street for pedestrian travel by installing raised medians and redesigning intersections and sidewalks reduced pedestrian risk by 28% (NCSC, 2009). The practice of complete streets is not only about allocation of street space, but also about selecting a design speed that is appropriate to the street typology and location, and that allows for safe movements by all road users (Laplante & McCann, 2008).

GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

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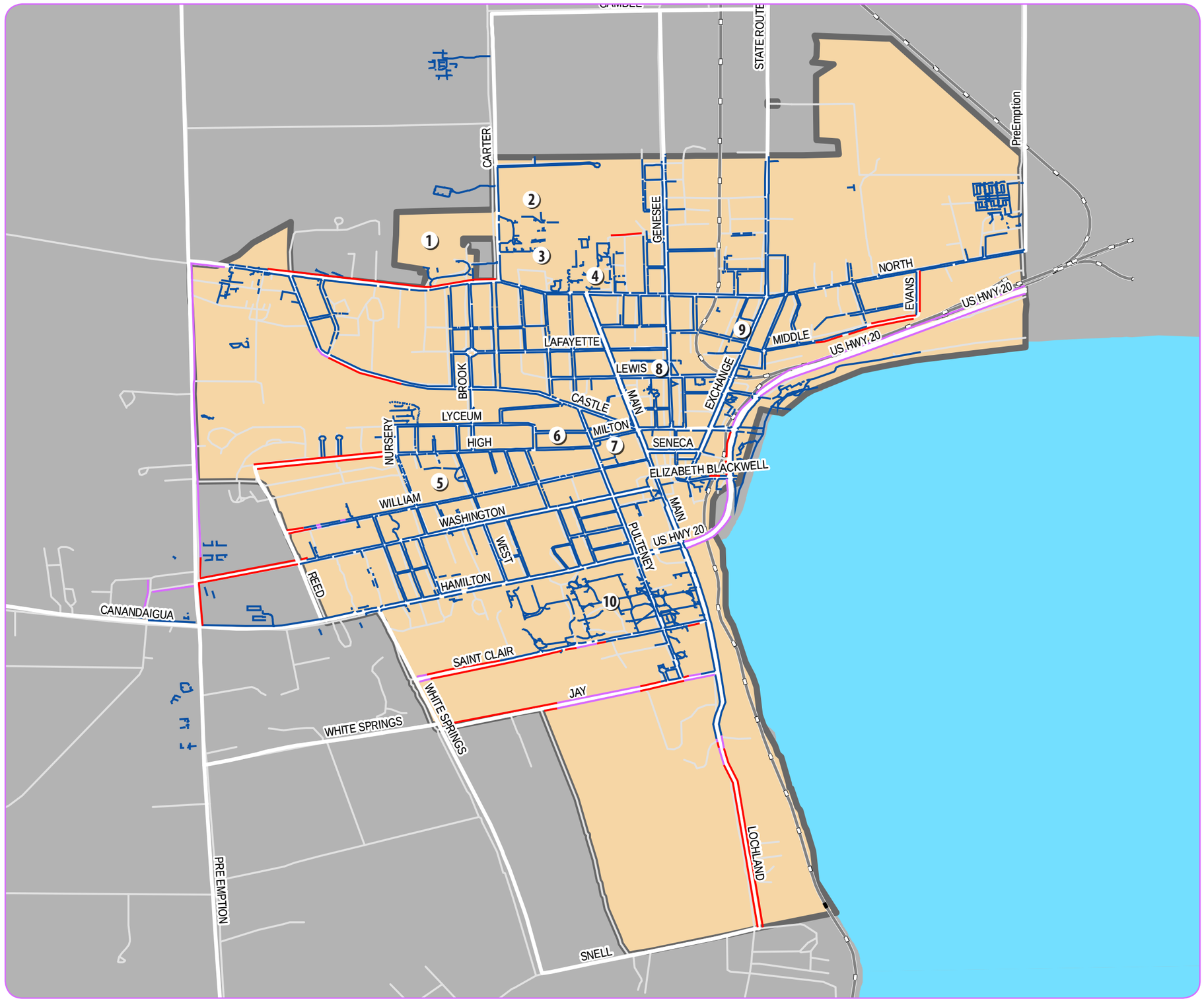
FIGURE 4

SIDEWALK GAPS



SCHOOLS AND UNIVERSITIES

1 Geneva North Street School
2 Geneva High School
3 Geneva Middle School
4 Marion S Wheeling School
5 West Street Elementary School
6 Saint Francis
7 Finger Lakes Community College
8 Children's Hour School
9 De Sales High School
10 Hobart & William Smith Colleges

Existing Sidewalks
Sidewalk Gaps
High Priority Sidewalk Gaps

Railroads
City of Geneva

0 0.5 1.0
Graphic Scale (Miles)

Gap constraint levels have been identified for arterial Level of Service roads. High constraint gaps have topographic constraints that would make them more challenging to install.

Prepared by Barton & Loguidice, DPC and Sprinkle Consulting, Inc.

TRANSIT STOP IMPROVEMENTS

Public transportation and active transportation are mutually supportive. Every trip on public transportation begins and ends with a walk or bicycle ride.

In addition, encouraging public transportation has many of the same benefits as encouraging active transportation - including health benefits, environmental benefits, and social benefits.

- Public transit users spend more than 3 times as much time walking as non-public transit users (Besser and Dannenberg 2005).
- Nearby Rochester could more than 10 million lbs of CO2 emissions every day by using public transit (Reconnect Rochester, 2016).
- Increased walking, cycling and public transit tends to increase overall security and reduce crime rates by providing more monitoring of city streets (Sahbaz, 2006).

When all impacts are considered, improving public transit can be one of the most cost effective ways to achieve public health objectives, and public health improvements are among the largest benefits provided by high quality public transit and transit-oriented development.

American Public Transit Association, 2010

The recommended transit stop improvements within Geneva encourage the use of public transportation and act as a key element in enhancing active transportation throughout the community. Refer to the Facility Design Guidelines section for the minimum design standards. A few key improvements serve as recommendations for all stops:

- Installing level concrete pads,
- Ensuring that all stops are ADA accessible,
- Installing bike racks, lighting and trash receptacles where missing, and
- Implementing a snow removal plan for all bus stops. Currently, in both Town and City code, the adjacent property owner is responsible for the removal of snow on all sidewalks.

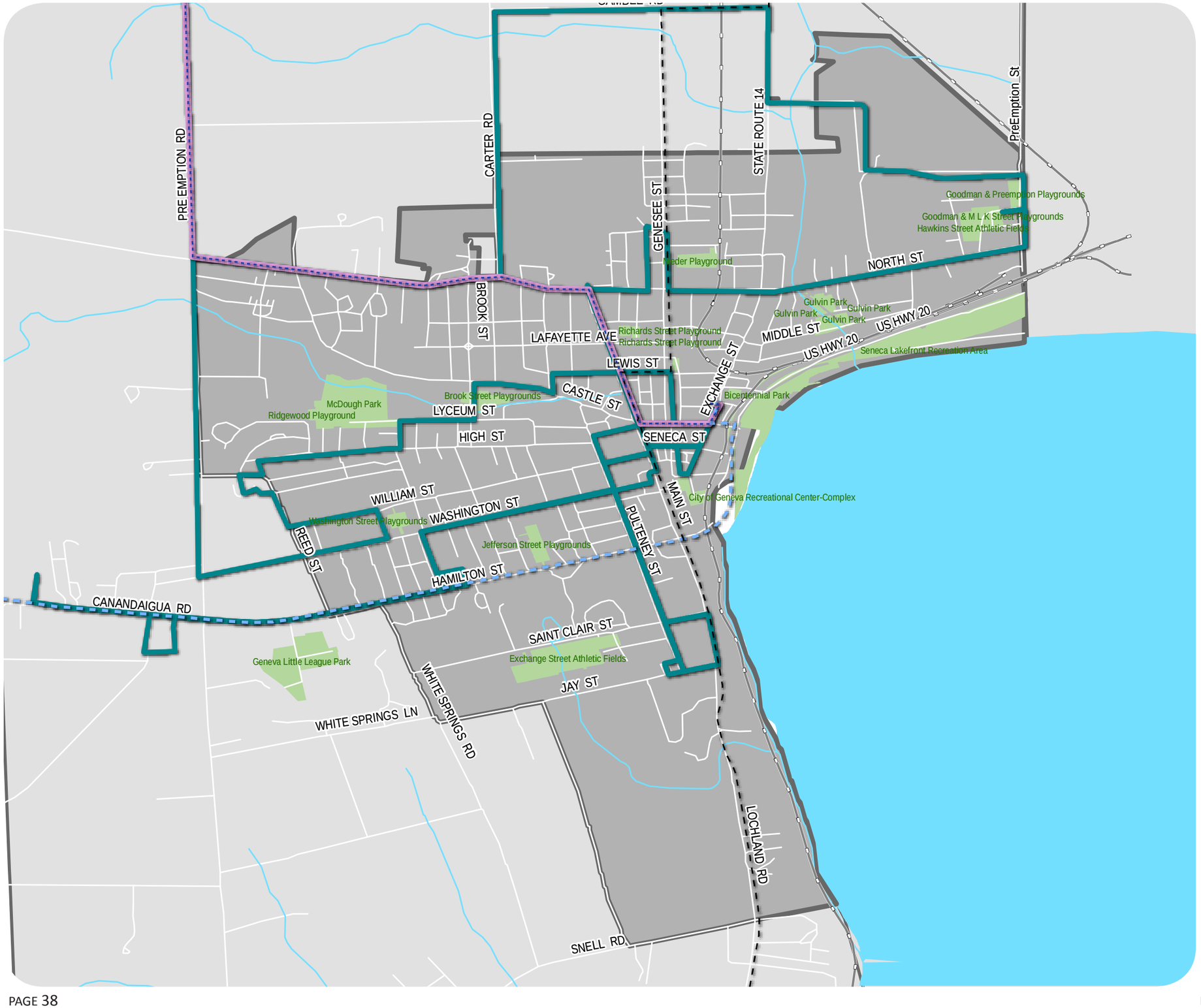
See ***Figure 5*** for more information.

GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 5

EXISTING TRANSIT



LEGEND

- Route 1: Geneva
- Route 4: Canandaigua-Geneva 5&20
- Route 5: Canandaigua-Geneva 21&96
- Route 5X: Geneva-Victor
- NYS Bike Route
- Railroads
- Parks
- City of Geneva
- Water

0 0.5 1.0

Graphic Scale (Miles)

Prepared by Barton & Loguidice, DPC and Sprinkle Consulting, Inc.

4.2 BICYCLE FACILITY IMPROVEMENTS

BIKE BOULEVARDS

A bike boulevard is a local street or series of contiguous street segments that have been modified to provide enhanced accommodation as a through street for bicyclists while discouraging through automobile travel.

Bike boulevards usually make use of low volume, very low speed local streets. While local motor vehicle traffic is maintained along the bike boulevard, motor vehicle traffic diverters may be installed at intersections to prevent through motor vehicle travel while having bypasses for bicyclists to continue on along the bike boulevard. Bike boulevards can be facilitated by connecting the ends of cul-de-sac roadways with shared use paths. At intersections the bicycle boulevard should be given priority over side streets.

- Typically established on neighborhood streets with low traffic volumes that provide cyclists with safe and convenient alternatives to high-traffic corridors.
- Shared roadway intended for through-moving bicyclists.
- Cost effective because they utilize existing infrastructure.
- Accessible for cyclists of all ages and abilities.
- Especially valuable in school zones to promote safe routes for children.
- Limited to local motorized traffic by geometric design.
- Should connect important community destinations, and provide routes that are reasonably direct and easy to navigate.

Implementation of a Bicycle Boulevard system can be as simple as selecting routes, distributing information, and identifying Bicycle Boulevards in the community with an integrated system of signage and pavement markings. Concurrence from facility owners should be obtained prior to implementation. Any improvements outside the City or Town of Geneva should be coordinated with neighboring municipalities.

Several candidates for bike boulevards are identified in ***Figure 6***. These roads were selected as bicycle boulevard candidates based on their ability to provide direct routes through town, especially to and from schools and universities, their low speeds (25 mph), and their proximity to parallel roads with higher traffic.

Potential bike boulevard candidates are listed in ***Table 4***. More information about bicycle boulevards is available in the ***Facility Design Guidance*** section of this report.

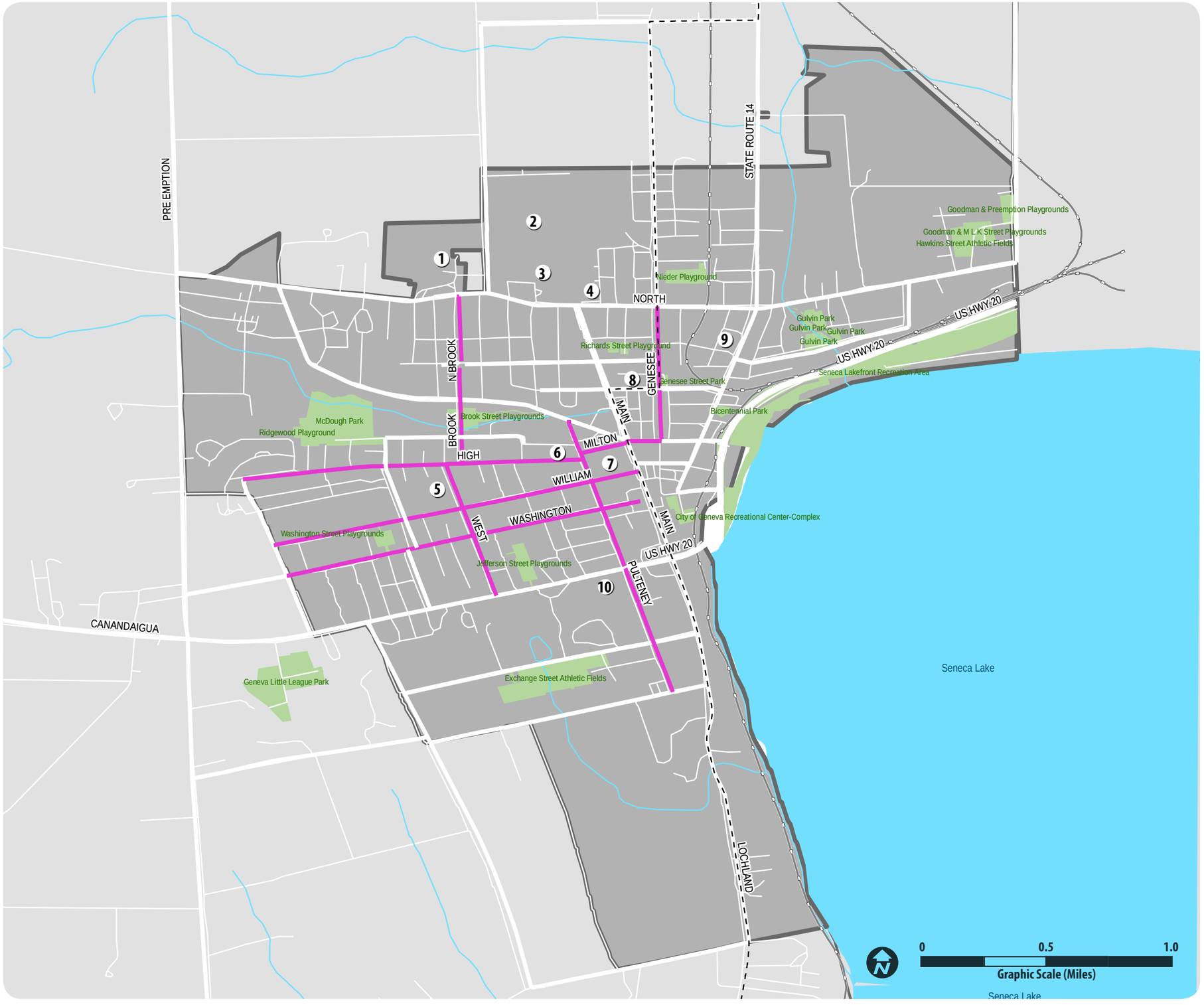
GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

DRAFT

FIGURE 6

BICYCLE BOULEVARDS



POTENTIAL CANDIDATES FOR BIKE BOULEVARDS

Brook St
Genesee St
High St
Milton St
William St
Washington St
West St
Pulteney St

SCHOOLS AND UNIVERSITIES

1 Geneva North Street School
2 Geneva High School
3 Geneva Middle School
4 Marion S Wheeling School
5 West Street Elementary School
6 Saint Francis
7 Finger Lakes Community College
8 Children's Hour School
9 De Sales High School
10 Hobart & William Smith Colleges

These roads have been identified as potential candidates for bicycle boulevards based on proximity to local schools and universities, direct routes and running parallel to higher traffic roads.

Prepared by Barton & Loguidice, DPC and Sprinkle Consulting, Inc.

Table 4: Bicycle Boulevard Candidates

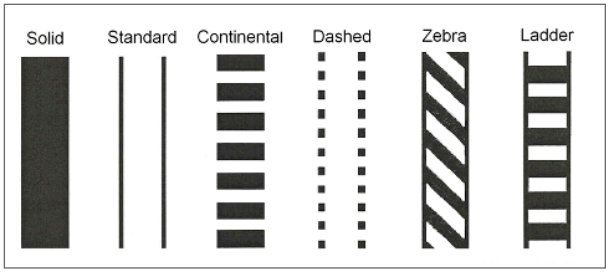
Bicycle Boulevard Candidate	Recommended Facility Improvement	Coordinating Jurisdiction	Phase
Brook Street	Bicycle boulevard signage and pavement markings	City of Geneva	Priority
Genesee Street	Bicycle boulevard signage and pavement markings	City of Geneva	Recommended
High Street	Bicycle boulevard signage and pavement markings	City of Geneva	Priority
Milton Street	Bicycle boulevard signage and pavement markings	City of Geneva	Recommended
William Street	Bicycle boulevard signage and pavement markings	City of Geneva	Recommended
Washington Street	Bicycle boulevard signage and pavement markings	City of Geneva	Recommended
West Street	Bicycle boulevard signage and pavement markings	City of Geneva	Priority
Pulteney Street	Bicycle boulevard signage and pavement markings, further recommendations for Pulteney Street active transportation are included in *Section 4.5* of this report	City of Geneva	Priority
East Castle from North Main Street to Genesee Street	Bicycle boulevard signage and pavement markings	Ontario County	Possible

4.3 PRIORITY INTERSECTION IMPROVEMENTS

The Priority Intersections serve as case studies, which highlight improvement strategies that can be applied over time to other intersections in Geneva. Intersections were selected that could serve as examples for other intersections in Geneva.

A combination of statistical data, field observation, and input from residents was used to evaluate existing conditions at the Priority Intersections. Criteria for selection included 10 year crash data, proximity to priority destinations, overall density of use, special needs populations, anecdotal information and perceived safety issues. It is important to note that in selecting intersections, consideration was given to students, who may be walking and bicycling to school facilities, as well as senior citizens, who have active transportation needs to get to community services and health care providers. Bicycle and pedestrian facilities are particularly important to both of these groups.

Please note that NYSDOT does not currently support use of high visibility crosswalks (typically ladder, continental or zebra style) at signalized intersections. NYSDOT's present standard applies high visibility crosswalks only at non-signalized intersections or midblock crossings. For signalized intersections and stop controlled crossings, NYSDOT applies a standard crosswalk treatment. A consistent and uniform approach to crosswalks in Geneva is recommended.



Crosswalk Types, ***www.fhwa.dot.gov***

The objectives of investigation and recommendations include the following:

- Minimize conflicts between different modes of transportation;
- Improve visibility between modes; and
- Elevate motorist awareness of pedestrian and bicycle activity.

Six intersections in Geneva were selected for further study and more detailed recommendations for improvements. The overall goals for the suggested intersection improvements are to improve pedestrian safety and support an increased number of walking and bicycling trips. The conceptual improvement packages recommended for each intersection are designed to make them function better for pedestrians and bicyclists while not adversely impacting other travel modes. The six intersections selected for detailed analysis, in addition to the controlling jurisdictions, are listed below:

Pulteney Street (City of Geneva)
Hamilton Street (New York State - US 20)

North Street (Ontario County - County Road 4)
Exchange Street (New York State - New York 14)

North Street (Ontario County - County Road 4)
Carter Road (City of Geneva)

PreEmption Road (Ontario County - County Road 6)
West Washington Street (City of Geneva)

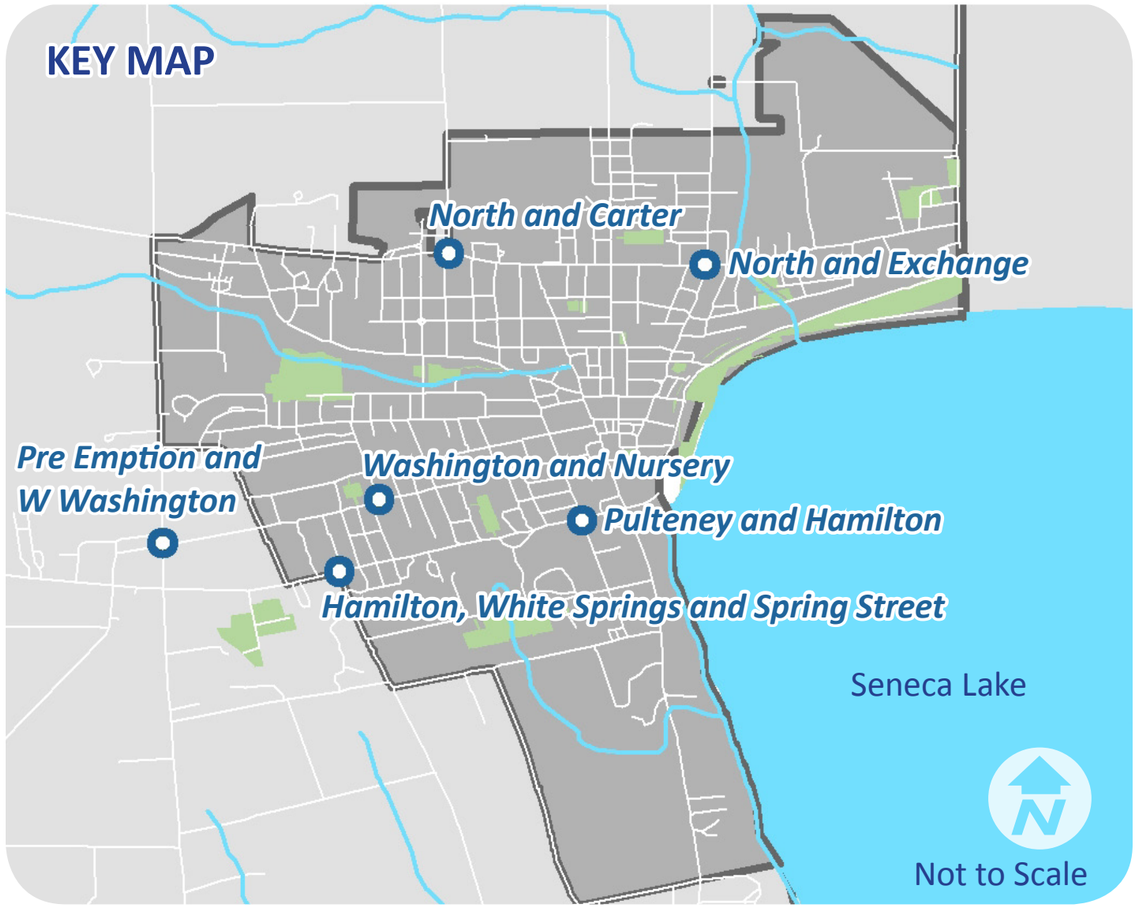
Hamilton Street (New York State - US 20)
Spring Street (City of Geneva)
White Springs Road (City of Geneva)

Washington Street (City of Geneva)
Nursery Avenue (City of Geneva)

A detailed analysis of the six identified intersections was completed, considering in part notes from the Priority Intersection Field Inspection conducted on March 16-17, 2016. Field investigations considered the physical and operational characteristics of each location, pertinent to pedestrian and bicycle safety. A desktop analysis using AutoTURN software verified the layout. For all intersections, consideration of the following is recommended for all approaches:

- Sidewalks;
- Curb ramps;
- Pedestrian Signals;
- Upgrading existing pedestrian push buttons and indications to most current NY State standards;
- No Turn on Red / Yield to Pedestrians on-demand blank-out signs; and
- Leading pedestrian intervals where there are right turn lanes.

Priority intersections are shown in ***Figures 7-13.***



PRIORITY INTERSECTION PURPOSE

The priority intersections serve as case studies which highlight improvement strategies that can be applied over time to other intersections in Geneva that were not studied. Intersection selection was a collaborative effort involving City staff, steering committee members, and the consultant team.

A combination of statistical data, field observation, and input from residents was used to evaluate existing conditions at the Priority Intersections. Criteria for selection included 10 year crash data, proximity to priority destinations, overall density of use, special needs populations, anecdotal information and perceived safety issues. It is important to note that in selecting intersections, consideration was given to students, who may be walking and bicycling to school facilities, as well as senior citizens, who have active transportation needs to get to community services and health care providers. Bicycle and pedestrian facilities are particularly important to both of these groups.

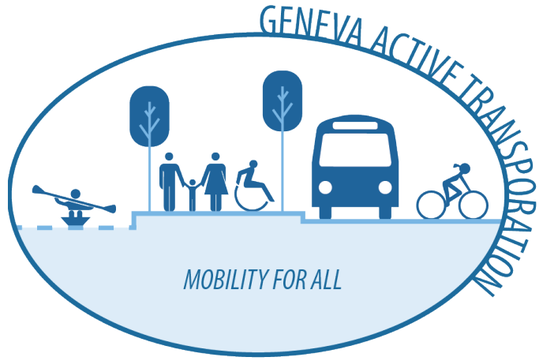


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FIGURE 7
Priority Intersection Recommendations
INTRODUCTION

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.

PRIORITY INTERSECTION GENERAL RECOMMENDATIONS

A detailed analysis of the six identified intersections was completed, considering in part notes from the *Geneva Walk Tour – April 21, 2016*. For all intersections, the consideration of the following is recommended for all approaches:

- Sidewalks
- Curb ramps – must be made ADA compliant
- Pedestrian Signals where there are crosswalks
- Upgrading existing pedestrian push buttons and indications to most current NY State standards
- No Turn on Red / Yield to Pedestrians on-demand blank-out signs
- Leading pedestrian intervals (LPI) where there are right turn lanes
- At all signalized intersections, the vehicular detection should be checked to ensure it detects bicyclists and the detection zone marked with bicycle detection symbols supplemented with the Bicycle Signal Actuation (R10-22) sign
- On multi-lane roadways, two-stage left turn boxes should be considered to help facilitate bicyclists' left turns.

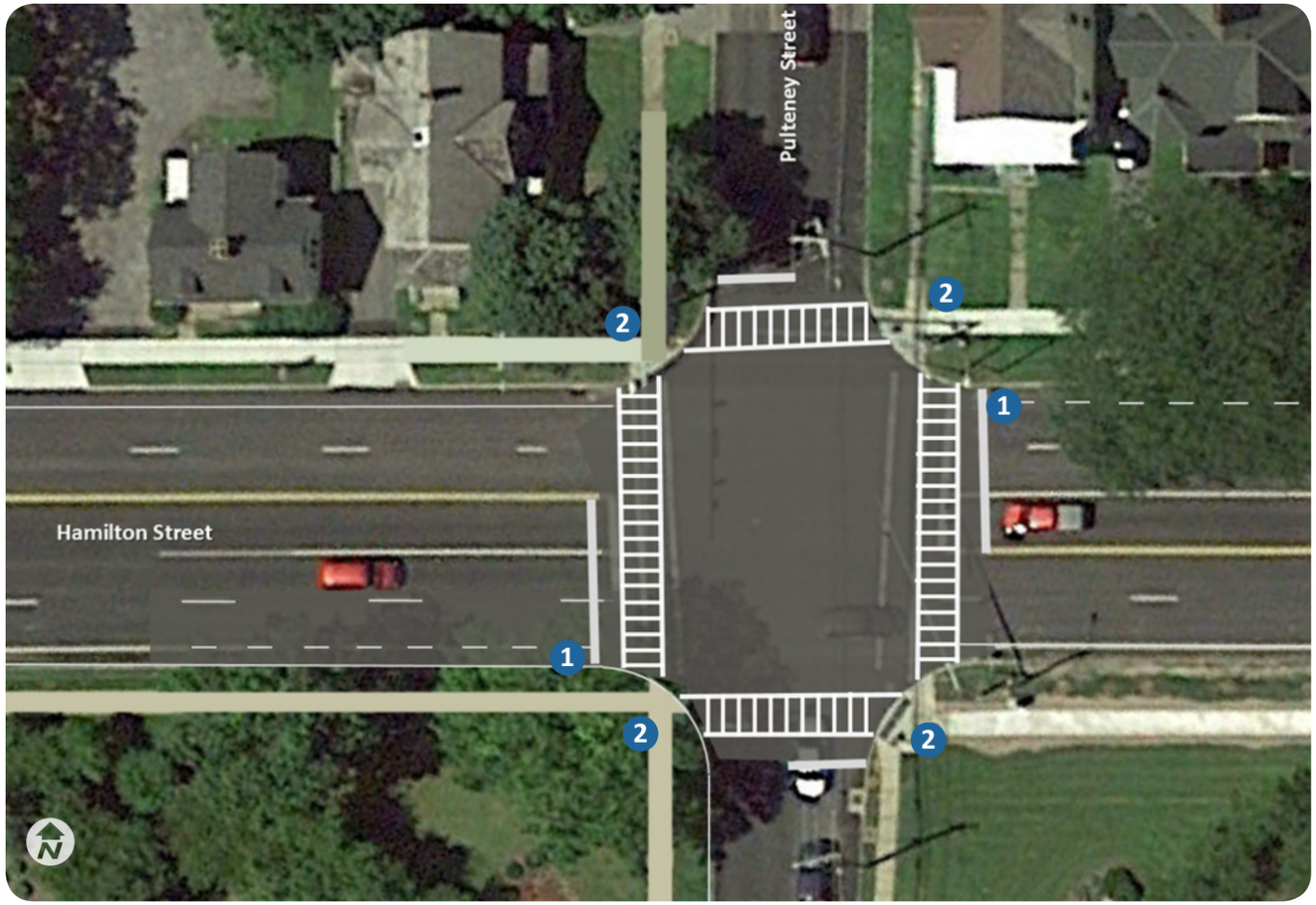
Table 5: Priority Intersection Improvements

Roadway/ Location	Recommended Facility Improvement	Coordinating Jurisdiction	Phase
Pulteney Street and Hamilton Street	The bike lanes appear to be striped right up to the stop bar. When making a right turn, both the approach for a right turn and a right turn shall be made as close as practicable to the right hand curb or edge of the roadway or, where travel on the shoulder or slope has been authorized, from the shoulder or slope. Striping the bike lane to the intersection discourages this behavior. Therefore, bike lanes should be dotted on the approach to the intersection. Reconstruct ramps so that they are ADA compliant. Install two ramps per corner The field notes state that there are no countdown indications at this intersection; they should be installed.	City of Geneva and New York State	Priority
North Street and Exchange Street	The curb radii at this intersection are not true radii, but combinations of tapers and radii. These designs result in effective corner radii ranging from 25 feet (northeast corner) to 75 feet (southeast corner). Consideration should be given to reducing the southeastern corner radius; a 35' radius is shown in the graphic. Relocate the crosswalks closer to the intersection. This will result in better visibility of pedestrians to right turning motorists departing the intersection.	Ontario County and New York State	Priority

Roadway/ Location	Recommended Facility Improvement	Coordinating Jurisdiction	Phase
North Street and Carter Road	The applicable times supplemental plaques under the NO LEFT TURN signs are fluorescent yellow-green. Technically, these are regulatory signs and should be black and white. Fluorescent yellow-green signs are warning signs and may not be enforceable. This should be discussed with law enforcement. A fluorescent yellow-green SCHOOL plaque (S4-3) should be used above the NO LEFT TURN signs and standard black and white S4-1p (time of day) and S4-3p (Mon-Fri) plaques used to regulate time periods for the prohibition. (This comment actually applies to numerous sign assemblies – including the SCHOOL SPEED LIMIT sign assembly – along W North St). Some law enforcement agencies have a preference for when flashing supplemental signs and beacons or blank-out signs for temporal prohibitions. These formats remove all potential ambiguity about exactly when the prohibition is in place. Consider a YIELD TO PEDS IN XWALK blank-out sign for left turning vehicles making the southbound to eastbound left turn. This could be activated by the pedestrian crossing detector. It appears the crosswalks had some sort of visibility enhancing pattern placed between the white lines. These have faded significantly. High visibility crosswalks should be considered for the school crossing. Consider SCHOOL pavement markings on the approach to the school zone and school crossing locations. Consider restricting Maxwell Avenue to right-in/right-out only to simplify operations at this intersection. However, more than 25 homes would be impacted by this change in operations.	Ontario County and City of Geneva	Priority
PreEmption Road and Washington Street	Because there is not stop control on the PreEmption Road approaches, two-stage bicycle left turn boxes should be considered to facilitate crossing of PreEmption Road. This would require installing stop lines on the Washington Street approaches at this intersection. To facilitate pedestrian crossings of Washington St, consider crosswalks across Washington St. Again, stop lines should be included on the Washington St approaches. Additionally, detectable warning strips would need to be included where the crosswalks meet the shoulders and a landing provided behind the detectable warning strips. If a pedestrian crossing of PreEmption Road is desired, consider Rectangular Rapid Flashing Beacons at this location.	Ontario County and City of Geneva	Priority

Roadway/ Location	Recommended Facility Improvement	Coordinating Jurisdiction	Phase
Hamilton Street, White Springs Road, and Springs Street	The bike lanes appear to be striped up to the stop bar. Bike lanes should be dotted on the approach to the intersection. At this location dotting the bike lane across the Spring Rd approach should be considered. Pedestrian heads should be installed for both marked crossings. LPIs should be implemented for the pedestrian crossings to help mitigate potential conflicts arising from the visual screens on the southern corners.	New York State and City of Geneva	Priority
Washington Street and Nursery Avenue	Remove the existing crosswalk. Add crosswalks east of Nursery and west of Copeland. If the crosswalks are not relocated, and the traffic turning onto Washington Rd from Nursery and Copeland Aves is problematic, right turns from Nursery and Copeland should be prohibited when pedestrians are present. This could be done with a static sign, on the Copeland Ave approach; but a static sign would not work for the Nursery Ave approach as the distance to the crosswalk is significant. A passive detection (of pedestrians) blank out sign could be used to prohibit right on red when pedestrians enter the crosswalk. Another option is to use the TURNING VEHICLES YIELD TO PEDs (R10-15) sign. Parking should be prohibited on the approaches to the crosswalk(s).	City of Geneva	Priority

PROPOSED CONDITIONS



EXISTING CONDITIONS

PULTENEY STREET

HAMILTON STREET

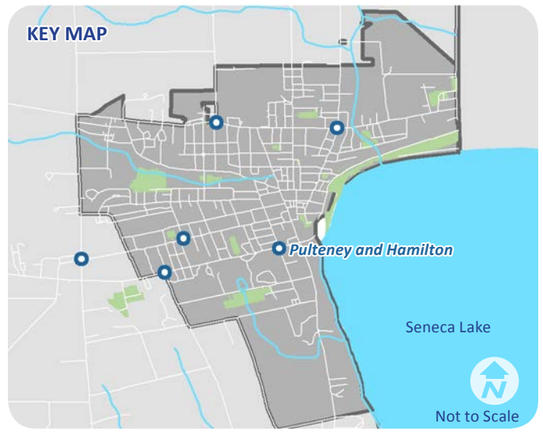
GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

DRAFT

FIGURE 8

Priority Intersection Recommendations
PULTENEY AND HAMILTON



PULTENEY STREET AND HAMILTON STREET

It appears that bike lanes have been added to Hamilton Street since the Google Earth aerials and street view photos were last taken.

Pulteney Street Jurisdiction: City of Geneva
Hamilton Street Jurisdiction: New York State (US 20)

RECOMMENDATIONS

1. The bike lanes appear to be striped right up to the stop bar. When making a right turn, both the approach for a right turn and a right turn shall be made as close as practicable to the right hand curb or edge of the roadway or, where travel on the shoulder or slope has been authorized, from the shoulder or slope. Striping the bike lane to the intersection discourages this behavior. Therefore, bike lanes should be dotted on the approach to the intersection.
2. Reconstruct ramps so that they are ADA compliant. Install two ramps per corner The field notes state that there are no countdown indications at this intersection; they should be installed.

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.

PRELIMINARY RECOMMENDATIONS

EXISTING CONDITIONS

EXCHANGE STREET

NORTH STREET

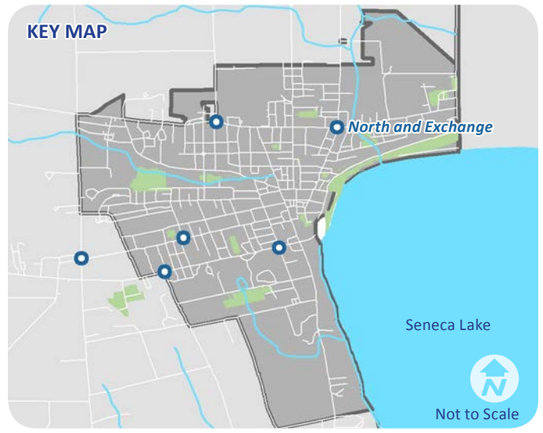
GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

DRAFT

FIGURE 9

Priority Intersection Recommendations
NORTH AND EXCHANGE



NORTH STREET AND EXCHANGE STREET

North Street Jurisdiction: Ontario County (County Road 4)
Exchange Street Jurisdiction: New York State (New York 14)

RECOMMENDATIONS

1. The curb radii at this intersection are not true radii, but combinations of tapers and radii. These designs result in effective corner radii ranging from 25 feet (northeast corner) to 75 feet (southeast corner). Consideration should be given to reducing the southeastern corner radius; a 35’ radius is shown in the graphic.
2. Relocate the crosswalks closer to the intersection. This will result in better visibility of pedestrians to right turning motorists departing the intersection.

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.

NORTH STREET AND CARTER ROAD

This is actually a combination of a pair of tee-intersections with North Road: Carter Road to the north and Maxwell Avenue to the south. Turns are prohibited for the following movements during school drop-off and pickup hours:

- Right turns from southbound Carter Road to westbound on North Street
- Left turns from westbound North Street to southbound Maxwell Avenue
- Right turns from northbound Maxwell Avenue to eastbound North Street.

North Street Jurisdiction: Ontario County (County Road 4) *Carter Road Jurisdiction: City of Geneva*

RECOMMENDATIONS

1. The applicable times supplemental plaques under the NO LEFT TURN signs are fluorescent yellow-green. Technically, these are regulatory signs and should be black and white. Fluorescent yellow-green signs are warning signs and may not be enforceable. This should be discussed with law enforcement. A fluorescent yellow-green SCHOOL plaque (S4-3) should be used above the NO LEFT TURN signs and standard black and white S4-1p (time of day) and S4-3p (Mon-Fri) plaques used to regulate time periods for the prohibition. (This comment actually applies to numerous sign assemblies – including the SCHOOL SPEED LIMIT sign assembly – along W North St).
2. Some law enforcement agencies have a preference for when flashing supplemental signs and beacons or blank-out signs for temporal prohibitions. These formats remove all potential ambiguity about exactly when the prohibition is in place.
3. Consider a YIELD TO PEDS IN XWALK blank-out sign for left turning vehicles making the southbound to eastbound left turn. This could be activated by the pedestrian crossing detector.
4. It appears the crosswalks had some sort of visibility enhancing pattern placed between the white lines. These have faded significantly. High visibility crosswalks should be considered for the school crossing.
5. Consider SCHOOL pavement markings on the approach to the school zone and school crossing locations.
6. Consider restricting Maxwell Avenue to right-in/right-out only would simplify operations at this intersection. However, more than 25 homes would be impacted by this change in operations.

NORTH STREET

CARTER ROAD

GENEVA ACTIVE TRANSPORTATION

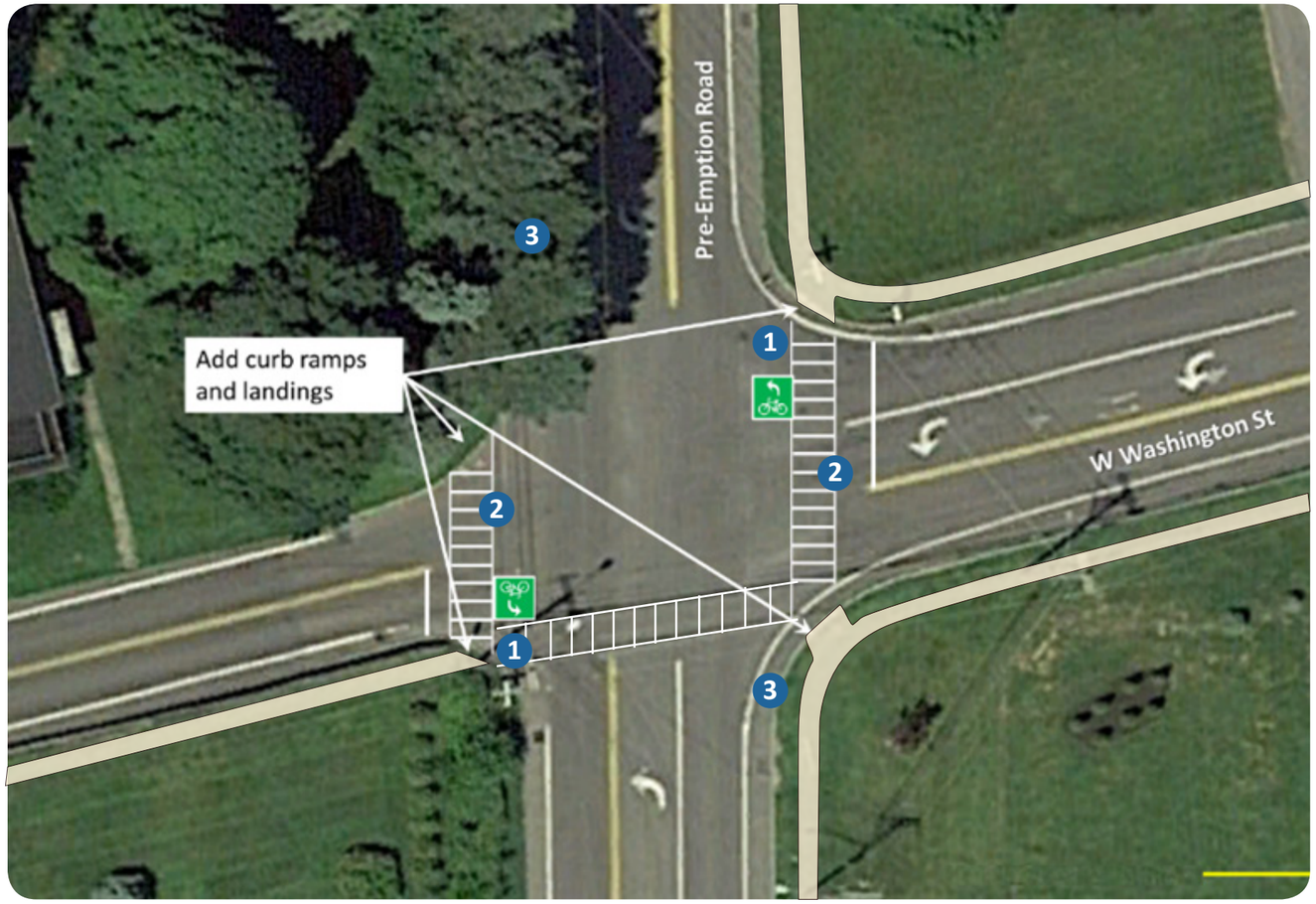
MOBILITY FOR ALL

DRAFT

FIGURE 10

Priority Intersection Recommendations
NORTH AND CARTER

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.



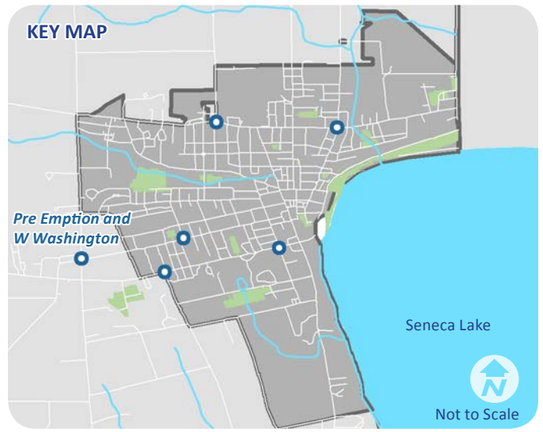
GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

DRAFT

FIGURE 11

Priority Intersection Recommendations
PRE-EMPTION AND W WASHINGTON



PRE-EMPTION ROAD AND W WASHINGTON STREET

This intersection is a two-way stop controlled intersection with the stop control on the Washington St. approaches.

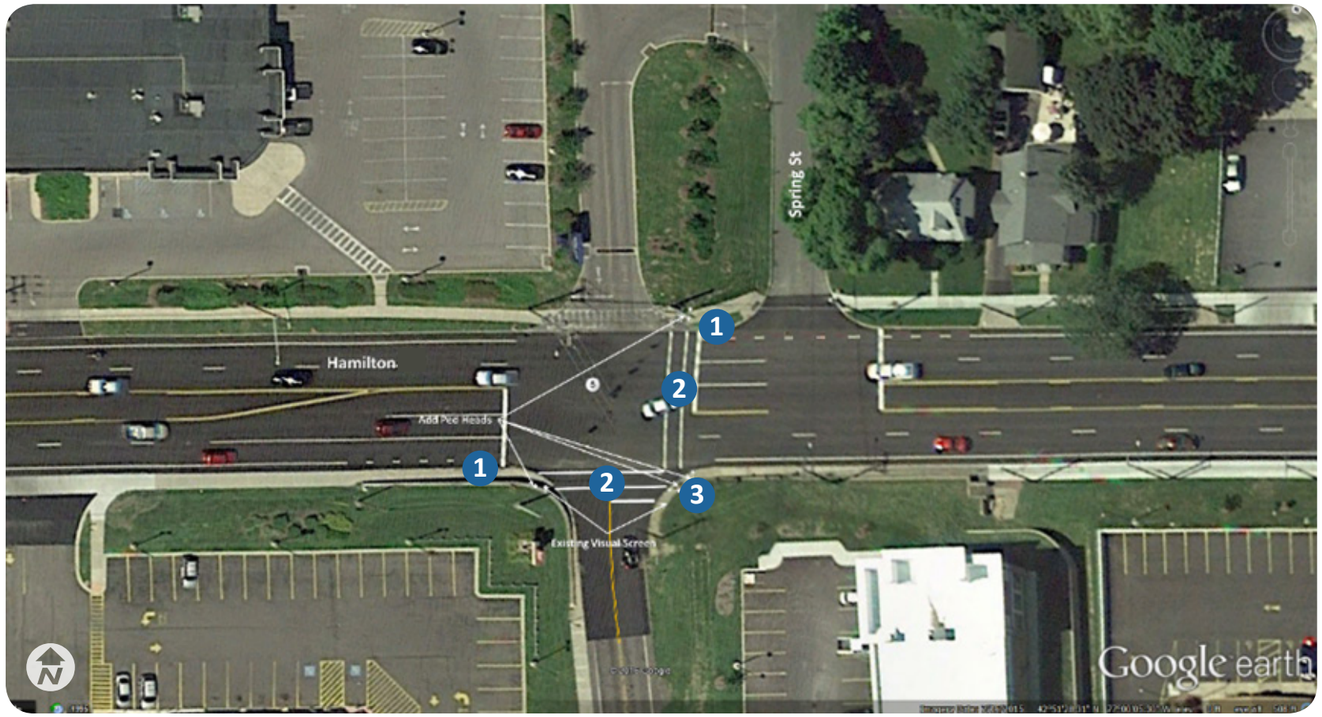
Pre-Emption Road Jurisdiction: Ontario County (County Road 6)
West Washington Street Jurisdiction: City of Geneva

RECOMMENDATIONS

1. Because there is not stop control on the Pre-Emption Road approaches, two-stage bicycle left turn boxes should be considered to facilitate crossing of Pre-Emption Road. This would require installing stop lines on the Washington Street approaches at this intersection.
2. To facilitate pedestrian crossings of Washington St, consider crosswalks across Washington St. Again, stop lines should be included on the Washington St approaches. Additionally, detectable warning strips would need to be included where the crosswalks meet the shoulders and a landing provided behind the detectable warning strips.
3. If a pedestrian crossing of Pre-Emption Road is desired, consider Rectangular Rapid Flashing Beacons at this location.

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.

PRELIMINARY RECOMMENDATIONS



HAMILTON STREET AND WHITE SPRINGS ROAD

In addition to the signalized intersection of Hamilton St and White Springs Rd, this study intersection includes the area of an unsignalized intersection at Hamilton and Spring Rd.

There are significant retaining walls on the southwest and southeast corner of the intersections. These retaining walls create visual screens between pedestrians walking along the sidewalks on the south side of Hamilton St and motorists approaching on White Springs Road. Right turn on red is currently prohibited at this location; this should prevent conflicts with pedestrians crossing within the crosswalks.

Hamilton Street Jurisdiction: New York State (US 20)
Spring Street Jurisdiction: City of Geneva
White Springs Road Jurisdiction: City of Geneva

RECOMMENDATIONS

1. The bike lanes appear to be striped up to the stop bar. Bike lanes should be dotted on the approach to the intersection. At this location dotting the bike lane across the Spring Rd approach should be considered.
2. Pedestrian heads should be installed for both marked crossings.
3. LPIs should be implemented for the pedestrian crossings to help mitigate potential conflicts arising from the visual screens on the southern corners.

EXISTING CONDITIONS

HAMILTON STREET

SPRING STREET

WHITE SPRINGS ROAD

GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

DRAFT

FIGURE 12
Priority Intersection Recommendations
HAMILTON, WHITE SPRINGS AND SPRING ST

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.

PRELIMINARY RECOMMENDATIONS

EXISTING CONDITIONS

WASHINGTON STREET

NURSERY AVENUE

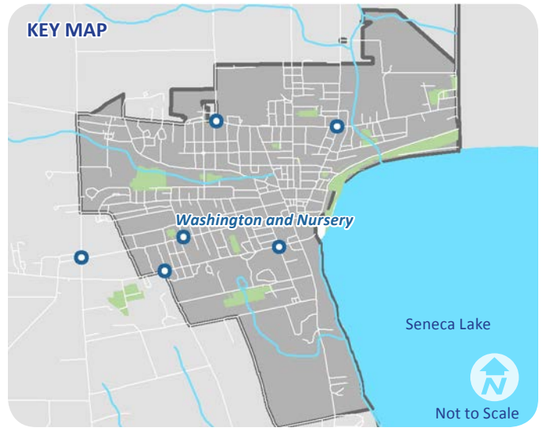
GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

DRAFT

FIGURE 13

Priority Intersection Recommendations
WASHINGTON AND NURSERY



WASHINGTON STREET AND NURSERY AVENUE

This study intersection includes the area of Washington Rd from Copeland Ave to Nursery Ave. While this appears to be a relatively low volume roadway, traffic patterns appear to include significant through type movements flowing from Nursery Ave to Copeland Ave. If this pattern is consistent throughout the day, consideration should be given to relocating the crosswalk out from between Copeland and Nursery.

Washington Street Jurisdiction: City of Geneva *Nursery Avenue Jurisdiction: City of Geneva*

RECOMMENDATIONS

1. Remove the existing crosswalk. Add crosswalks east of Nursery and west of Copeland.
2. If the crosswalks are not relocated, and the traffic turning onto Washington Rd from Nursery and Copeland Aves is problematic, right turns from Nursery and Copeland should be prohibited when pedestrians are present. This could be done with a static sign, on the Copeland Ave approach; but a static sign would not work for the Nursery Ave approach as the distance to the crosswalk is significant. A passive detection (of pedestrians) blank out sign could be used to prohibit right on red when pedestrians enter the crosswalk. Another option is to use the TURNING VEHICLES YIELD TO PEDS (R10-15) sign.
3. Parking should be prohibited on the approaches to the crosswalk(s).

The Priority Intersections fall under the jurisdiction of New York State, Ontario County Department of Transportation (OCDOT) and local jurisdiction. The recommendations for improvements presented in this plan are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.

4.4 DOWNTOWN - LAKEFRONT CONNECTION

The City of Geneva includes 1.6 square miles of Seneca Lake. Seneca Lake is an invaluable resource for Geneva, providing numerous opportunities for active transportation and recreation including boating, fishing, and swimming. It is also part of the Underwater Blueway Trail, a trail of shipwreck locations for divers to explore.

Lakefront Park on the edge of Seneca Lake offers a host of activities including ice skating, lacrosse, soccer, boxing, and a summer concert series. These resources and activities encourage active healthy lifestyles, promote civic engagement, and foster community identity.

Improving the connection between downtown Geneva and the lakefront will reinforce the positive impact these resources have on Geneva, and further the perception of Geneva as a great place to live.

The upcoming $10 million Downtown Revitalization Initiative presents an unrivaled opportunity to reestablish the connection between downtown Geneva and Seneca Lake. State Route 5 & 20 is included within the boundaries of the revitalization initiative.

A combination of approaches is recommended in this report, including:

- A potential new overpass across Routes 5 & 20,
- Improvements to the existing underpass south of Elizabeth Blackwell Street, and
- At grade improvements.

NEW OVERPASS OPPORTUNITY

Routes 5 & 20 form a principal arterial within the City of Geneva. However, the five and six lanes of traffic cutting through the waterfront area creates a significant obstacle to pedestrian and bicycle traffic between downtown and the waterfront.

One possible pedestrian connection alternative would be the construction of a pedestrian bridge over Routes 5 & 20. This would provide a safe alternative to current crosswalks at the intersections of Elizabeth Blackwell Street, East Castle Street, and Lake Street and at the same time could provide a visually significant gateway to the waterfront.

- As terrain is relatively flat near these intersections, an extensive ramp system would need to be installed to provide access to the bridge. The ramps on each approach would likely be 400 feet in length.
- The main span of the bridge would be approximately 100 feet long and require 16 foot vertical clearance to the roadway below. The location of the Finger Lakes Railroad immediately west of 5 & 20 would require a secondary span of 50 feet over the railroad.
- Right of way acquisitions are likely and traffic signal modifications may be required to maintain adequate visibility to signal heads.
- Construction costs for similar pedestrian bridges are on the magnitude of $1.5 to $2 million and will vary depending on site selection and bridge type.

See *Figure 14A* for more information.

The Lakefront / Downtown Connectivity Study recommends the new overpass be placed between East Castle Street and Elizabeth Blackwell Street. The Lake Street intersection is another potential candidate for a new overpass because of its direct access to the Lakefront Park Visitor's center and because it is further from the existing underpass.

"If a pedestrian bridge is to be built it should be looked at as a design feature for the City of Geneva. A bridge with a unique design could become a landmark feature for the City."
- Lakefront/Downtown Connectivity Study, 2010

UNDERPASS IMPROVEMENTS

Improvements to the underpass just south of Elizabeth Blackwell Street and the surrounding area would capitalize on existing infrastructure to improve connectivity across 5 & 20 at relatively low cost. Improving this underpass is recommended in the 2010 Lakefront/Downtown Connectivity Study. These improvements could include increased signage for the Waterfront Trail trailhead off of Elizabeth Blackwell Street, increased lighting within the underpass, and additional landscaping to create a more park like atmosphere around the trail entrance.

Creating an improved parking lot at the underpass entrance and incorporating green infrastructure best practices is another way to encourage use of the underpass. A well designed green infrastructure parking lot could replace the existing under-utilized parking lot with cutting edge sustainability practices, demonstrating Geneva's commitment to the stewardship of Seneca Lake. Sustainability practices including tree islands and rain gardens would add visual interest to a nondescript parking lot site. In addition, these improvements would be good candidates for state funding, including the Green Innovation Grant Program and the Water Quality Improvement Projects program. See *Figure 14A*, *Figure14B* and *Figure 14C*.

Through careful planning and design, a surface lot can double as a public space that can support active transportation, stormwater management, and community sustainability.

These underpass improvements could be paired with improving the pedestrian experience along Elizabeth Blackwell Street through facade improvements, additional shade trees and street furniture, as recommended in the 2010 Lakefront/Downtown Connectivity Study.

Combining well designed, well placed parking lots with pedestrian experience improvements to encourage walking is a technique that could be used throughout Geneva to address inadequate parking perceptions.

IMPROVED AT GRADE CROSSING

In addition to underpass improvements and a potential new overpass, improving at grade crossing between downtown and Lakefront Park is recommended. Many pedestrians prefer crossing at grade to avoid stairs or long ramps or traveling to underpass or overpass locations. Providing multiple choices for crossing 5 & 20 will ensure that the maximum number of people are comfortable accessing the park from downtown.

At grade crossing improvements for Routes 5 & 20 were studied extensively in the 2010 Lakefront/Downtown Connectivity Study. Recommendations from that report also include the following:

- Improve the pedestrian experience along Lake Street and Elizabeth Blackwell Street;
- Develop a wayfinding system that integrates the downtown and the lakefront;
- Incorporate public art and other focal points into the landscape;
- Modify traffic signal timing and phasing;
- Improvements to the Lakefront Zoning District and code changes;
- Pedestrian scale decorative lighting;
- High visibility crosswalks;
- Remove right turn lanes;
- Install sidewalks and landscaping along the west side of 5 & 20 between Lake Street and Elizabeth Blackwell Street;
- Install a landscape median - through the reduction of lane width from 12' to 11' or through implementing a road diet; and
- Build a multiuse path along 5 & 20 if implementing a road diet.

These recommendations are explained further in the 2010 Lakefront/Downtown Connectivity Study. In addition to these measures, other traffic calming measures are included in the ***Priority Intersection*** section of this report.

Improvements along 5 & 20 will benefit from being paired with improvements along the rail line. At-grade crossings of the active rail line can be assessed for compliance with the "Pedestrian and Bicycle Considerations" section of the Railroad-Highway Grade Crossing Handbook provided by the U.S Department of Transportation.

Lakefront/Downtown Connectivity Study

"The City should develop and implement a comprehensive way-finding sign program to help improve connectivity between the downtown and the waterfront. The program should include both downtown and lakefront destinations and consider all users including motorists, bicyclists and pedestrians from the time they reach Geneva to the time they leave. Consideration should be given to pavement markings and other visual cues."
- Lakefront/Downtown Connectivity Study, 2010

GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 14A

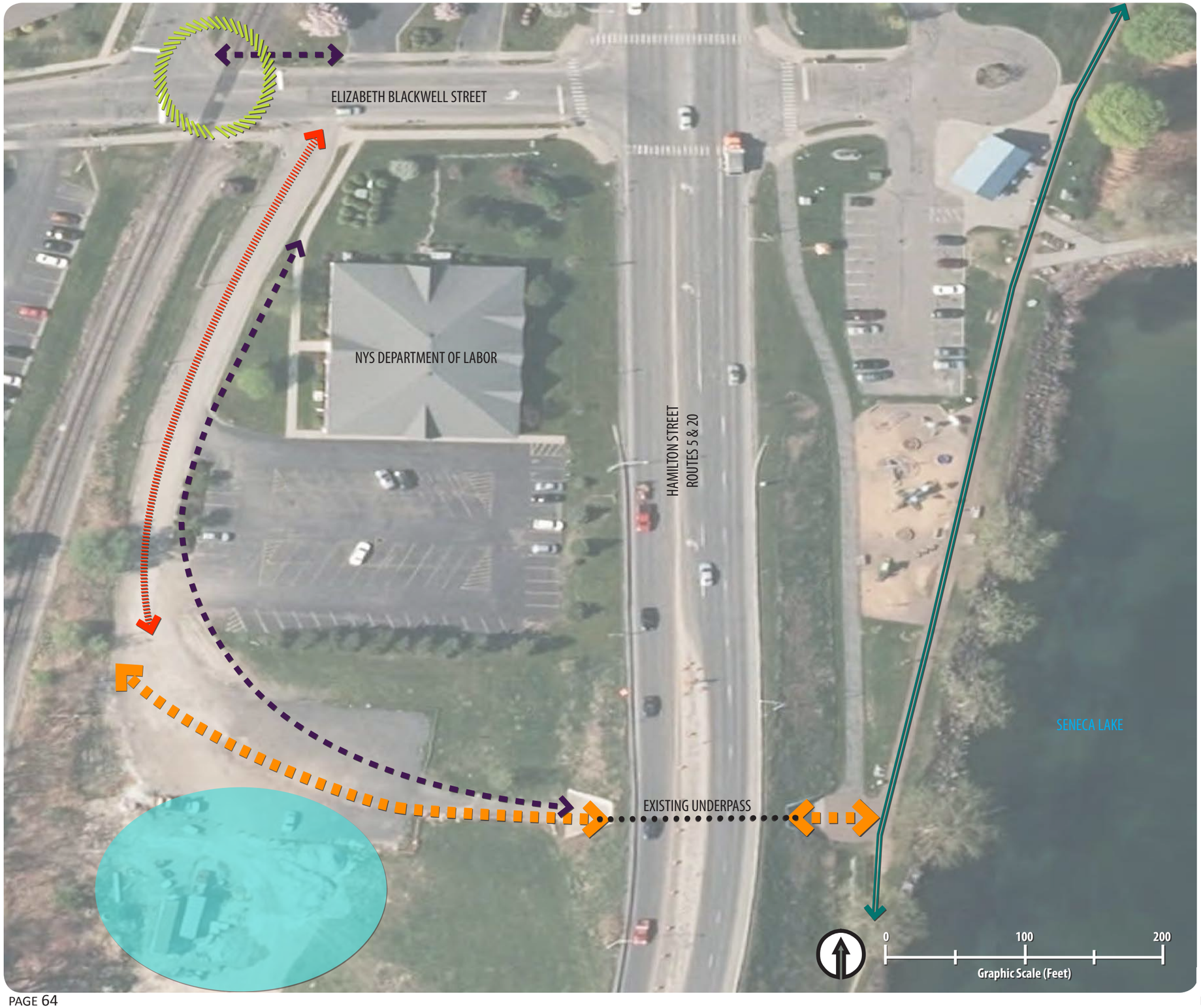
CITY-TO-LAKE CONNECTIVITY

RECOMMENDED IMPROVEMENTS

1. Pre-Emption and 5&20 (At Grade Crossing - Traffic Calming)
2. Lake Street and 5&20 (Overpass)
3. E Castle Street and 5&20 (At Grade Crossing - Traffic Calming)
4. Elizabeth Blackwell Street and 5&20 (At Grade Crossing - Traffic Calming)
5. South Main Street and 5&20 (At Grade Crossing - Traffic Calming)
6. Existing Connection (Underpass)

Refer to 2010 Connectivity Study for more Information:

http://www.gtcmpo.org/sites/default/files/pdf/2010/GenevaConnectivityStudy_ExecSum_09222010.pdf



GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 14B

CITY-TO-LAKE CONNECTIVITY EXISTING UNDERPASS: CONCEPT PLAN

RECOMMENDED IMPROVEMENTS

- Existing Waterfront Trail
- New 5’ Wide Sidewalk
- New Shared use lanes
  - » Pavement markings and signage
- New 10’ wide asphalt bike path
- New parking area with bike share
- Railroad crossing pedestrian and bicycle improvements, in accordance with ***Federal Highway Administration Railroad-Highway Grade Crossing Handbook.***

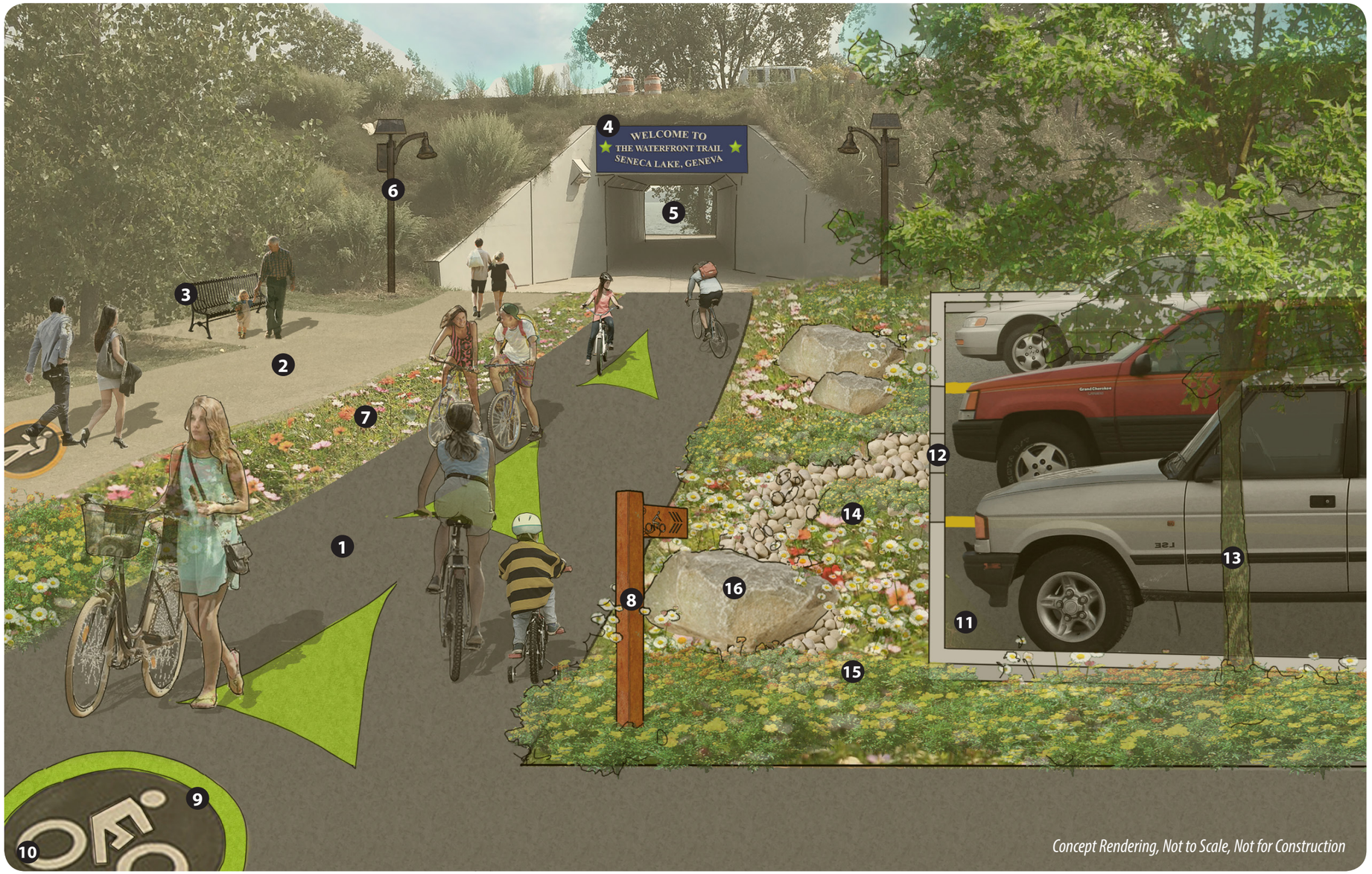
**Refer to following sheet for conceptual rendering showing more detailed opportunities.

GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 14C

CITY-TO-LAKE CONNECTIVITY
EXISTING UNDERPASS: CONCEPT SKETCH



Concept Rendering, Not to Scale, Not for Construction

Existing Conditions

The value of existing spot improvements will be enhanced by connecting them to a community-wide active transportation network. The existing Route 5/20 tunnel underpass could benefit from a suite of basic site improvements to help reach its full potential as a sustainable mobility asset in Geneva.

RECOMMENDED IMPROVEMENTS

1. 10’ wide asphalt bike path
2. 6’ wide stone dust walking path
3. Resting point
4. Wayfinding signage
5. Connects to Waterfront Trail
6. Solar powered pedestrian scale lighting
7. Wildflower border
   - » Low-maintenance
   - » Drought tolerant
   - » Pollinator habitat
8. Corten steel bikeway marker
9. Thermo-plastic pavement graphics
10. Connects to Elizabeth Blackwell Street
    - » .5 miles to City Hall downtown.
    - » 10 minute walk, 4 minute bike ride
11. Drive lanes and parking spaces are striped to maximize parking efficiency. Provide ADA spaces for improved accessibility.
12. Drop curb
13. Salt-tolerant native shade trees. Provide storm water intercept, improved air quality, and mitigation of heat island effect.
14. Rain garden strip allows water to filter into the ground, reducing the impact of the parking lot on water quality and reducing site run off to Seneca Lake.
15. Native plantings provide pollinator benefits, evapotranspiration, and increase sense of place.
16. Local stone blocks provide attractive, low maintenance, sustainable seating.

4.5 DETAILED CORRIDOR EVALUATIONS

The character of Geneva and the results of the existing conditions evaluations, such as LOS, confirm the majority of streets in Geneva, by virtue of their relatively low traffic volumes and speeds, provide reasonably comfortable bicycling conditions for many users even without a dedicated bicycle facility. The City and Town pursued a more detailed look at the handful of roads with relatively poor bicycling conditions to examine alternative route/bike boulevard-type solutions and/or identify some spot-specific improvements on the roads themselves to help mitigate these gaps and better provide area wide connectivity.

PULTENEY STREET

Pulteney Street is the spine of Hobart and William Smith Colleges and an area with a high number of pedestrians and cyclists. Key improvements to Pulteney Street will enhance the safety and comfort of active transportation users in the area and strengthen the connection between Hobart and William Smith Colleges and downtown Geneva.

This will encourage students and college employees to travel to and from downtown using active transportation, decreasing parking demand downtown and making it more convenient for students to visit downtown to buy goods and services, further integrating the entire community.

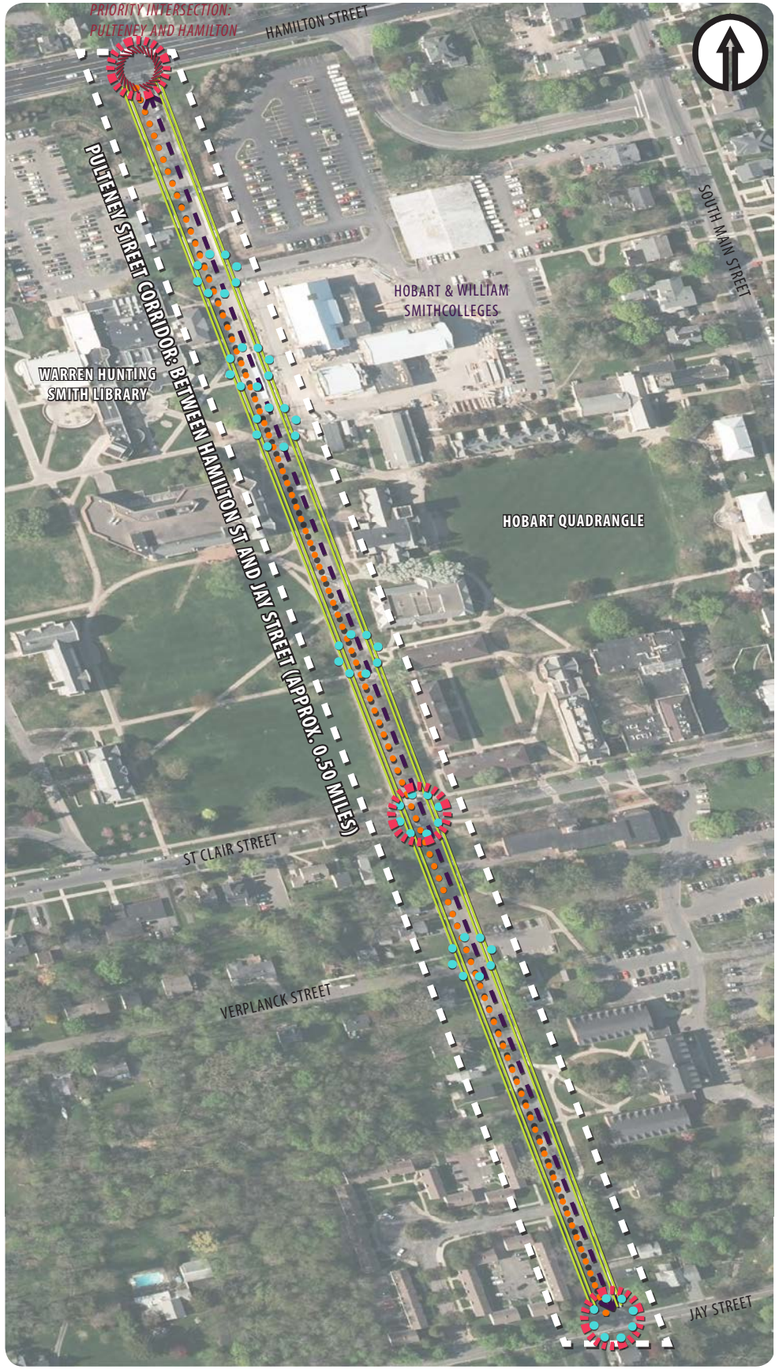
General improvements could include some of the following steps:

- Re-milling and resurfacing Pulteney Street;
- Checking all sidewalks and intersections for ADA compliance;
- Curbing areas where curbs are missing;
- Allowing parking to reduce road width and provide traffic calming - parking for each block should be on alternate sides of street to create a more meandering experience for cars and further calm traffic;
- Ensuring that maximum walk time is allowed for crossings at intersections;
- Ensuring that signals detect bicycles;
- Including advisory bike lanes or sharrows along Pulteney Street to encourage bicycle usage; and
- Reducing the number of crosswalks but increasing their effectiveness by increasing signage, raising crosswalks, and/or installing pedestrian activated signals.

The intersections of Pulteney Street with Jay Street, Hamilton Street, and Milton Street provide further opportunities for placemaking, traffic calming, and active transportation. Potential steps at these intersections could include:

- Raised crosswalks or raised tables;
- Pavement graphics or use of different pavement materials; and
- Reducing curb radii with bump outs.

See ***Figure 15*** for more information.



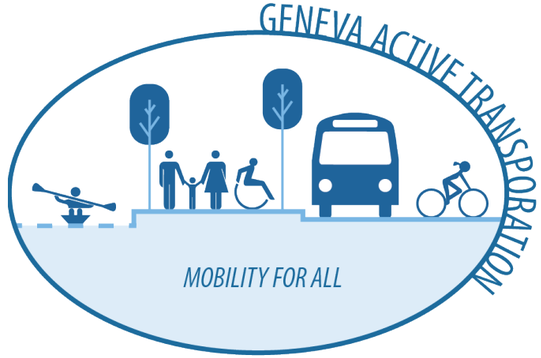


FIGURE 15A
PULTENEY STREET ON STREET RECOMMENDATIONS

RECOMMENDED IMPROVEMENTS

- Curb Additions & Improvements
  - » Entire stretch of Pulteney Street to be curbed (both sides). ADA ramps shall be present at all crossings.
- Roadway and On-Street Bicycle Facility Improvements
  - » Full Depth Reconstruction or Mill & Re-Surface Roadway: previous re-surfacing has caused the curb to be less defined in areas thus creating an open feeling.
  - » Propose adding bike lanes as additional measures or installing Shared Lane Markings to alert motorists of the presence of bicyclists.
  - » Allow on-street parking in select locations. Delineate parking spaces and install curb bump outs as necessary. Provides traffic calming.
- Sidewalk Improvements
  - » Expand existing sidewalk to create a 10' wide shared use sidepath, only where feasible. Provide sidewalk in discontinued areas. Provide seating/ resting areas at repetitive intervals. Utilize signage and wayfinding elements to help define corridor.
- Crosswalk Improvements
  - » ADA accessible raised crosswalks prioritize bicyclists and pedestrians. The amount of crosswalks could be condensed to prioritize pedestrian movement and provide hierarchy for pedestrians, bicyclists, and motorists.
- Gateway Treatments
  - » Signage, pavement materials and colors, and place-making elements would help define the corridor.
- *Refer to Priority Intersection Recommendations*

Where demand exists and conditions are appropriate, converting existing sidewalks to 10' wide side-paths can provide multiple benefits for a reasonable cost:

- *Off-street, inclusive, shared use pathways that support all mobility levels in Geneva.*
- *The north-south Pulteney Street Side Path could connect HWS and FLCC to an east-west "family-friendly route" on Washington Street.*
- *ADA and American Association of State Highway and Transportation Officials (AASHTO) -compliant facility that enhances community character, sustainability and healthy living.*

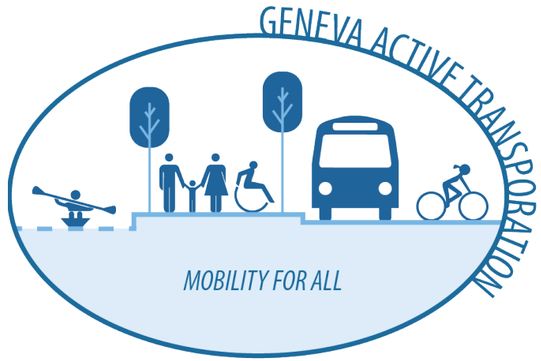
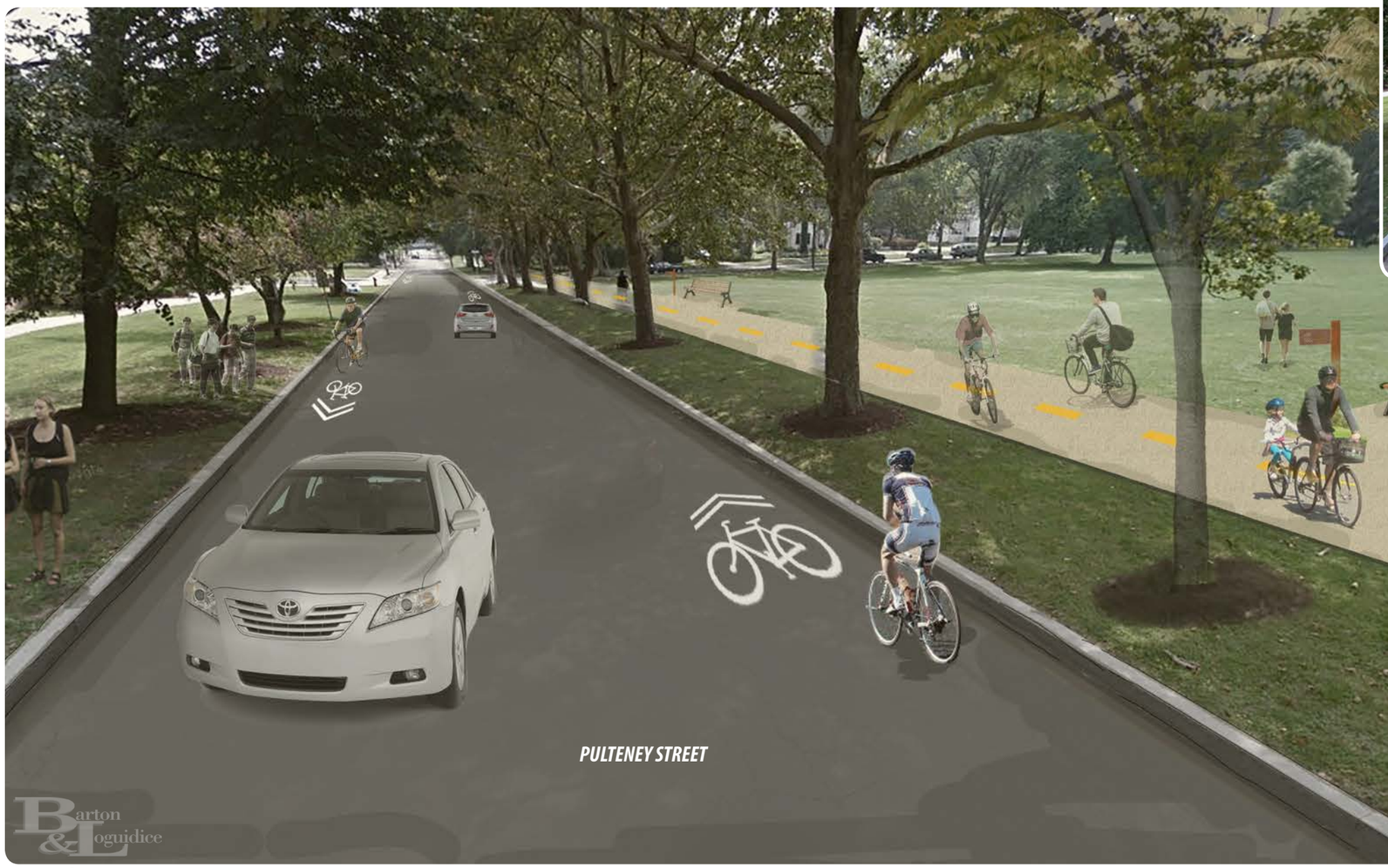
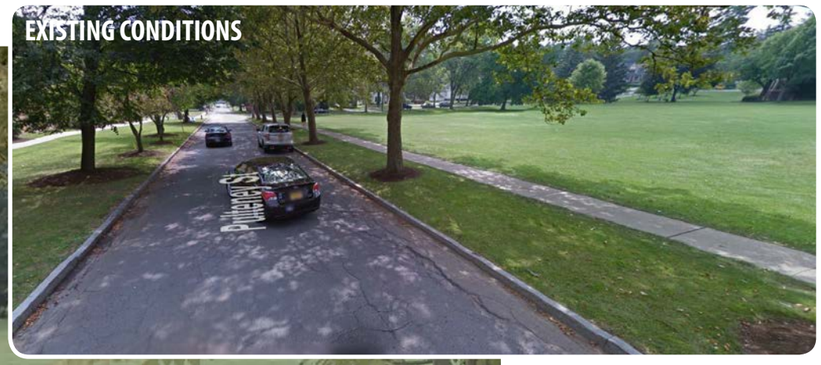


FIGURE 15B
PULTENEY STREET
ON STREET RECOMMENDATIONS





Consolidation of mid-block crossing points as raised crosswalks:

- » *Enhances ADA compliance*
- » *Provides traffic calming*
- » *Prioritizes pedestrian movement*
- » *Establishes Pulteney corridor streetscape vocabulary*

GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 15C

PULTENEY STREET CROSSWALK IMPROVEMENTS

EXISTING CONDITIONS

Concept Rendering, Not to Scale, Not for Construction

Utility improvements for Pulteney Street are currently in the works. Coordinating utility and active transportation improvements would improve the efficiency of both projects and minimize construction costs.

NORTH STREET

North Street is the main east-west corridor running through the northern half of the City. It is the location of many of Geneva's community resources including Geneva High School, Geneva Middle School, Geneva North Street School and Geneva General Hospital. This makes North Street an important target street for active transportation in order to improve safety for children, establish early habits of physical activity, and ensure equitable access to health care for the entire community. See ***Figure 16*** for more information.

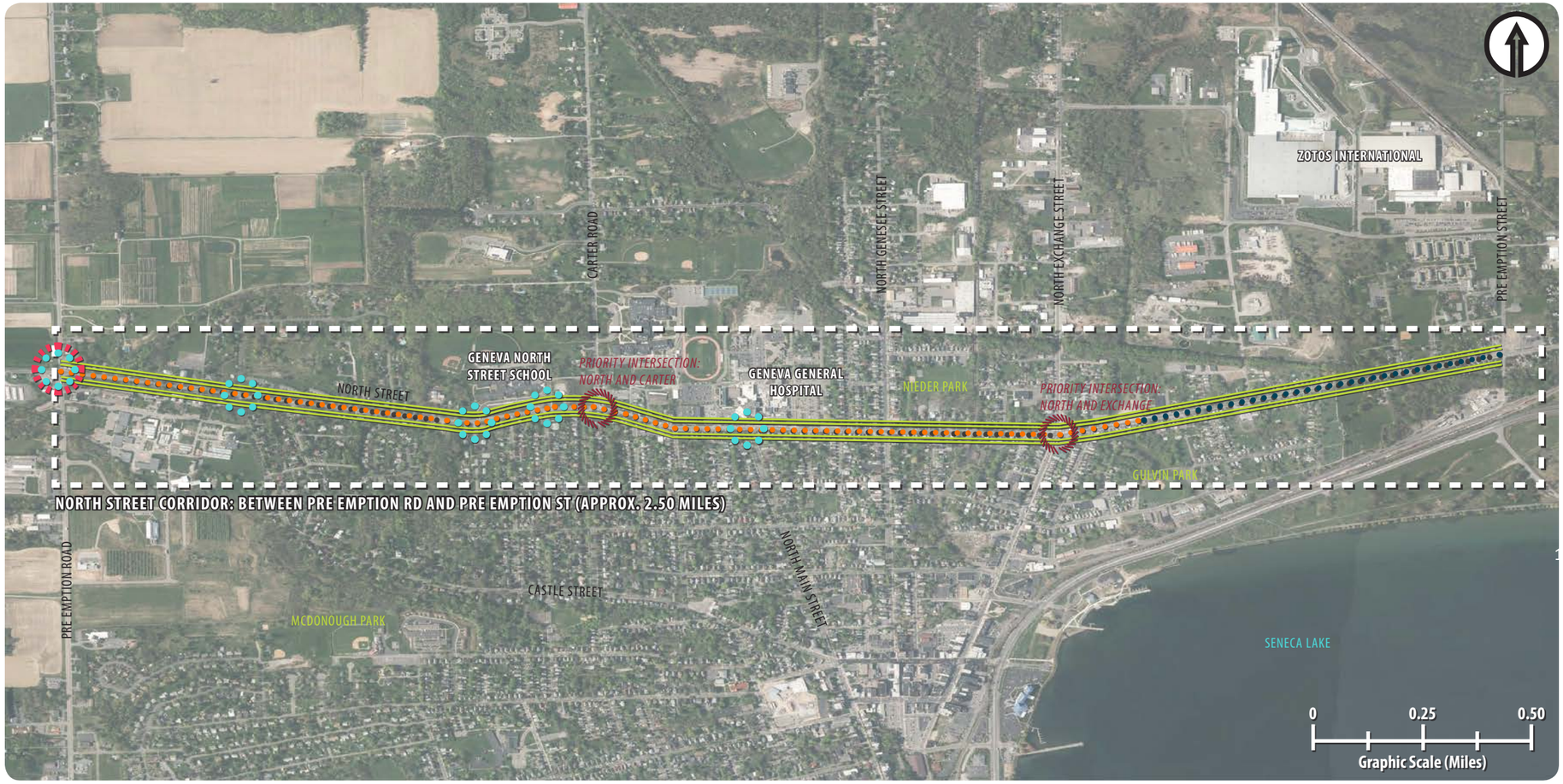
Measures to improve pedestrian and bicycle safety along North Street include the following:

Bicycle Safety and Comfort

- Resurfacing roadway to improve bicyclist comfort.
- Widen shoulders to at least 4 feet. Consider widening to 4.5-5 feet for greater benefits.
- Consider designating bike lanes if shoulders are 5 feet or greater.
- Clear vegetation in shoulders.
- Consider selecting curb inlets with a narrower grate.
- At all signalized intersections, ensure bicycles can be detected on all approaches.

Pedestrian Safety and Comfort

- Complete sidewalks on both sides of North Street.
- Make repairs to existing sidewalks where necessary.
- Make sure all sidewalks are ADA accessible.
    - Some sidewalks currently lack detectable warning strips at curb ramps.
    - Some sidewalks lack landings.
    - Many locations where sidewalk slope exceeds 2%.
- Consider improving bus stops with ADA compliant landings and shelters.



GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 16

NORTH STREET ON STREET RECOMMENDATIONS

Existing Conditions

View east near Geneva North Street School

View east near Main Street intersection

RECOMMENDED IMPROVEMENTS

Possible Roundabout

- » This could provide a gateway type treatment onto North Street; reducing travel speeds through this intersection and serve as calming on the approaches to the intersection, making it less intimidating.

Roadway and On-Street Bicycle Facility Improvements

- » Mill & re-surface this section of roadway to improve bicyclist comfort level.
- » Widen shoulders to 4 feet minimum, 5 feet minimum for designated bicycle lanes. Provide designated bicycle lanes, both directions, except at intersections with turn lanes (from Brook Street to Exchange Street).
- » Provide shared lane markings in more narrow areas, both directions.

Sidewalk Improvements

- » Complete sidewalk on both sides of North Street and improve surface conditions to be ADA compliant as needed.
- » Install proper curb ramps with landings.

Major Intersection Improvements

- » Install bicycle detection at signalized intersections.
- » Install advance stop lines with R1-5a (Yield Here to Pedestrians) signs on approaches to Geneva North Street School crosswalk. Update signage to comply with current MUTCD standards.
- » Install ADA compliant pedestrian ramps and pedestrian signal features.

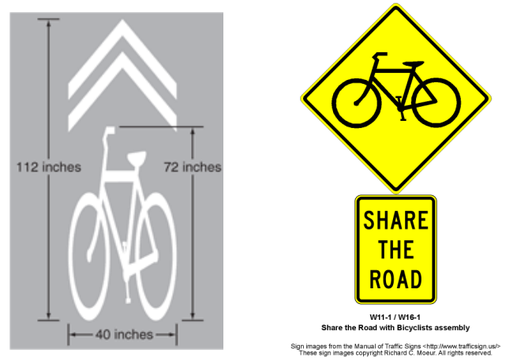
Other Recommendations

- » Maintain vegetation to keep shoulders clear.
- » At curb inlets, consider changing inlet type to narrower grate.

Refer to Priority Intersection Recommendations

** Refer to Transit Recommendations for stop improvements within road segment.*

SHARED LANE PAVEMENT MARKINGS & SIGNAGE EXAMPLES



Improvements for Individual Intersections along North Street from West to East:

PreEmption Road

Consider a roundabout at PreEmption Road. This could provide a gateway type treatment onto North Street. It would reduce travel speeds through this intersection and serve to calm traffic on the approaches to the intersection, making it less intimidating. It appears that, although tight, a roundabout could fit. If there is a significant number of trucks turning, a wider truck apron may be needed.

Slate Way

Consider advance stop lines and R1-5a signs (Stop here for pedestrians in crosswalk) on the approaches to the school crosswalk west of Slate Way.

Update S1-1 signs (school crossing) to current florescent green MUTCD standard signs.

Castle Street

If bike lanes are designated, they should be dotted on the approach to the signalized intersection at Castle Street.

Consider including pedestrian ramps and signal features at the signalized intersection with Castle Street.

Brook Street

If the shoulder is striped as a bike lane it should be terminated on the approach to Brook Street. This will prevent bicyclists from having to merge as they pass through the intersection.

See the priority intersection recommendations for the intersections of Brook Street and Carter Road.

From Brook Street to Exchange Street there appears to adequate width to provide bike lanes except at intersections with turn lanes. Consideration could be given to providing bike lanes at the midblock areas and shared lane markings through the areas not wide enough for bike lanes.

Railway Crossing

The available pictures of the railroad crossing show what appears to be construction at the crossing. Thus, while these comments may have been addressed already, detectable warnings are needed on the approach to the crossings and debris should be cleared from the approach sidewalks.

Exchange Street

See the priority intersection recommendations for the Exchange Street intersection.

Herbert Street to Crystal Street

Between Herbert Street and Crystal Street, on the north side of North Street, the Google aerial seems to show construction on the property. If the opportunity exists, the driveway should be better defined and the sidewalk offset from the roadway with a curb line. The sidewalk shown in the images has a significant side slope, much more than the 2% allowed by ADA.

At the same location, if the on-street parking was provided for the former business on the north side of the street, consider removing parking from this section. The remaining residences and businesses appear to have off-street parking. Therefore, consider conducting a parking study and, if appropriate, removing the parking and striping a bike lane.

East of Crystal Street there appears to be adequate space for bike lanes. Parking does not appear to be prohibited along this section. However, no parked cars are evident in Google aerials, Street View, or the Team's prior field review. A parking study could be conducted to determine the potential for providing bike lanes.

WASHINGTON STREET

Washington Street runs east-west through the southern half of the City. As a lower volume road running parallel to Routes 5 & 20, Washington Street is an important alternative for pedestrians and cyclists who wish to access businesses and services along this busy route, including Wegmans, Hobart and William Smith Colleges, and Jefferson Park. Washington Street is also an important connector for access to nearby West Street Elementary School. See ***Figure 17*** for more information.

Measures to improve pedestrian and bicycle safety along Washington Street include the following:

Traffic Calming

Throughout this section, traffic calming could be considered. This would include mini circles at some of the intersections, speed pillows at midblock locations, and speed tables at pedestrian crossings. Supplemental pedestrian crossings could be provided at additional locations.

Bicycle Safety and Comfort

If this roadway is being considered as a primary alternative route (parallel to Hamilton Street/Route 20) into and out of downtown, route signing should be provided to inform cyclists traveling along Hamilton Street of the route's presence. Distance and direction signs, as well as confirmation signs, should be installed at key intersections (Reed, West, and Pulteney Streets).

There are numerous sections where a positive barrier (curb and some separation) could be provided between the shoulders of Washington Street and the parking areas on adjacent properties without impacting parking on adjacent properties. This should be done where possible. Well defined driveways should be provided.

Pedestrian Safety and Comfort

Complete sidewalk connections on both the north and south side of Washington Street for the length of the section.

There are bus stops located along this roadway. Consider improving the bus stops with ADA compliant landings and shelters.

Improvements for Individual Intersections along Washington Street from West to East.

PreEmption Road

See the priority intersection recommendations for the PreEmption Road intersection.

Consider designating the shoulders between PreEmption Road and Reed Street as bike lanes.

Reed Street

East of Reed Street there appears to be adequate space for bike lanes. Parking does not appear to be prohibited along this section. However, few parked cars are evident in Google aerials, Street View, and field review. A parking study could be conducted to determine the potential for providing bike lanes.

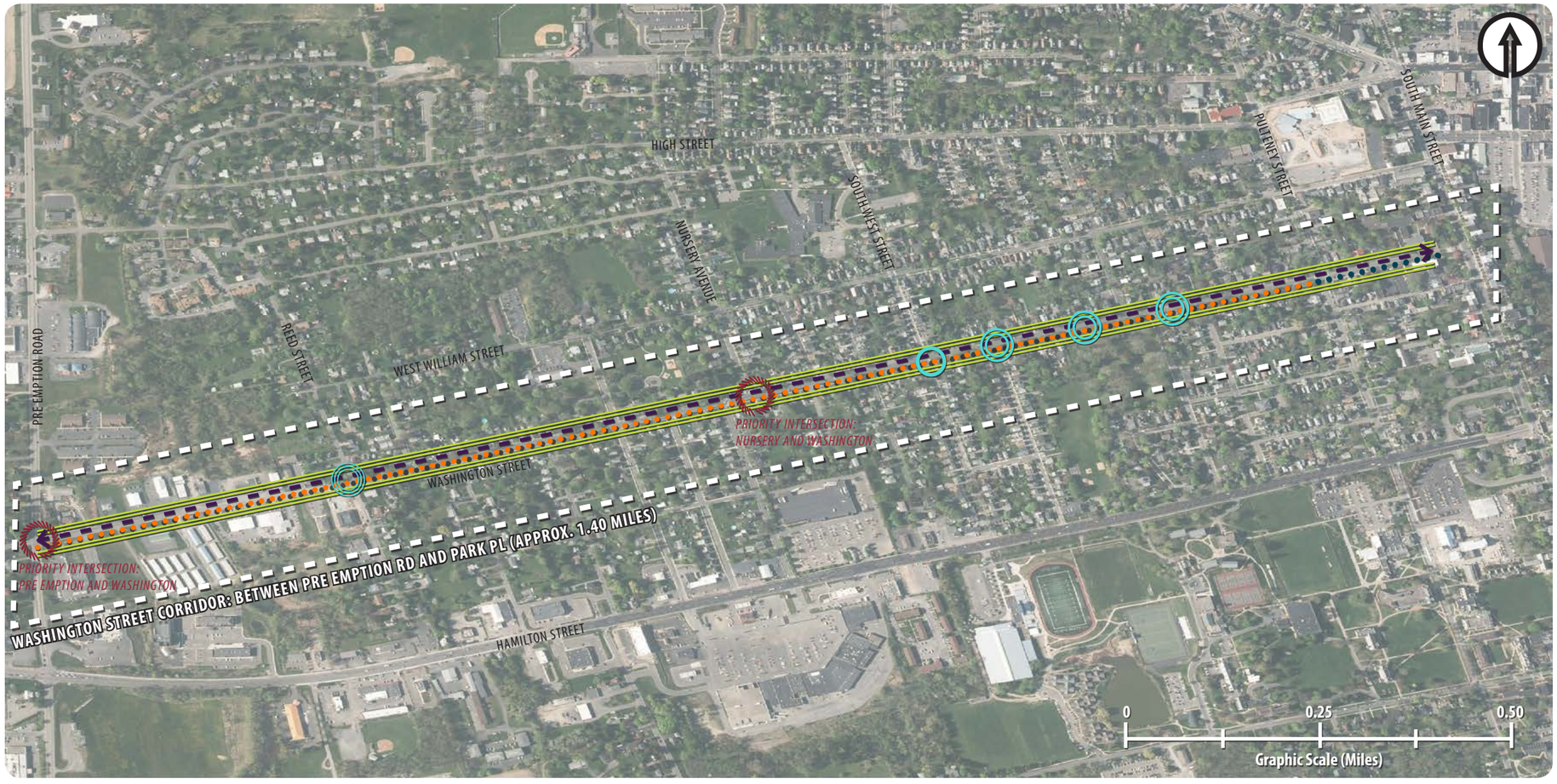
Norwood Avenue

West of Norwood Avenue there is an eastbound bike route sign. How Washington Street serves as a bike route to or from is not readily apparent. The route does not appear to continue to the west for eastbound bicyclists, nor does it appear to continue (or come from) Norwood Avenue. This sign should be removed or additional route signing provided along this or other roads to provide a contiguous route to and from somewhere.

Pulteney Street

On the eastbound approach to Pulteney Street there is a Bike Route sign with a supplemental left arrow facing the roadway of Washington Street. It is unclear for whom this sign is intended. One hypothesis is that the sign was twisted (although the support appears intact) and was intended to direct bicyclists onto northbound Pulteney Street; however, there is no confirmation sign on Pulteney Street. Alternatively, it could be to suggest bicyclists continue eastbound on Washington Street, but it is not oriented properly and no confirmation sign is present on Washington Street after the intersection.

If bike lanes are provided along Washington Street, they should be discontinued for eastbound bicycles at Pulteney Street and replaced with shared lane markings. There is 90° angle parking adjacent to the roadway on the south side and parallel parking taking place east of the 90° angle parking. Consider changing the 90° angle parking to back in angle parking. Properties east of the angle parking appear to have off-street parking; consider a parking study to remove parking and add a bike lane on this section.



GENEVA ACTIVE TRANSPORTATION

MOBILITY FOR ALL

FIGURE 17

WASHINGTON STREET ON STREET RECOMMENDATIONS

Existing Conditions

View east near Reed Street intersection

View east near Pulteney Street intersection

RECOMMENDED IMPROVEMENTS

Roadway and On-Street Bicycle Facility Improvements

- » Bicycle boulevard signage to inform cyclists traveling along Hamilton of the alternate route's presence (distance and direction signs should be installed at least at Reed, West and Pulteney Streets). Revise all existing bicycle route signage to show Washington as a Bicycle Boulevard.
- » Designate shoulders between Pre Emption Road and Reed Street as bike lanes, both directions.
- » Provide shared lane markings in more narrow areas, both directions. Opportunity for bicycle lanes east of Reed Street. Recommend performing parking demand study to determine potential for bicycle lanes.

Traffic Calming Measures

- » Mini circles
- » Speed pillows at midblock locations
- » Speed tables at pedestrian crossings

Sidewalk Improvements

- » Complete sidewalk connections on both north and south side of Washington Street.

Other Recommendations

- » Provide positive buffer (curb and separation) between the shoulders and adjacent parking areas.

Refer to Priority Intersection Recommendations

** Refer to Transit Recommendations for stop improvements within road segment*

BICYCLE BOULEVARD PAVEMENT MARKINGS & SIGNAGE

Park Place

The Yield sign is for Park Place is located a significant distance from the actual intersection.

One-way signs should be posted at the intersection with Park Place.

SOUTH MAIN STREET

Running through Downtown Geneva and along the waterfront, Main Street is the primary North-South axis for the City of Geneva. With beautiful views of Seneca Lake, and a vibrant downtown core, this street has a great deal of potential as an active transportation corridor. Improving active transportation opportunities along South Main Street will help to attract cyclists and pedestrians for a bustling Main Street and a thriving downtown. See *Figure 18* for more information.

Measures to improve pedestrian and bicycle safety along North Street include the following:

Traffic Calming

Consider curb extensions (bulb-outs) at intersections to reduce pedestrian crossing distances and to visually narrow the street.

Some traffic calming features – speed pillows, speed tables at crosswalks – should be considered to slow speeds along the corridor.

Improvements for Individual Intersections along South Main Street from North to South

Between Milton Street and Seneca Street, consider restriping to two through lanes and a two-way left turn lane. The volume on this section is well under the threshold for a road diet and the installation of bike lanes.

From Park Place to Jay Street there appears to be a significant demand for on-street parking. Demand should be evaluated to determine if parking is required on both sides of South Main or only on the west side adjacent to the college. If not, consider restriping and adding bike lanes. In the event parking on both sides is retained, consider shared lane markings along this section of roadway to promote bicyclists riding outside the door zone of parked cars.

PREEMPTION ROAD

From North Street to Hamilton Street

PreEmption Road runs from North to South along the Western Edge of the City of Geneva. Active transportation improvements to PreEmption Road would help pedestrians and cyclists cross the City quickly and easily. See *Figure 19* for more information.

RECOMMENDED IMPROVEMENTS

- Roadway and On-Street Bicycle Facility Improvements
  - » From Jay Street to Park Place, evaluate parking demand to determine if on-street parking is required on both sides of South Main or only on west side adjacent to the college. If the latter of those two is true, re-stripe to add bike lanes.
  - » Between Seneca Street and Milton Street, consider re-striping to two through lanes and a two-way left turn lane to create space for bike lanes.
  - » For the two existing midblock crossings, the existing signing is adequate (2 lane undivided road, an ADT of approximately 7,000 and a posted speed limit of 30mph). To enhance safety at these crossings, Rectangular Rapid Flashing Beacons could be installed.
- Traffic Calming Measures: Speed pillows
- Traffic Calming Measures: Speed tables at crosswalks

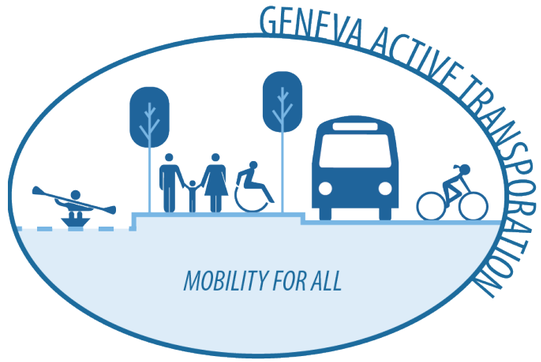


FIGURE 18
SOUTH MAIN STREET ON STREET RECOMMENDATIONS

Existing Conditions

View south near Lewis Street intersection

View north near Castle Street intersection

TRAFFIC CALMING EXAMPLES

SPEED PILLOWS

SPEED TABLES AT CROSSWALKS

Traffic Calming

This section includes numerous stretches of two-way left turn lanes on which there are few driveways. Raised medians with landscaping could be installed in these areas to provide a more constrained feel to the roadway, possibly lowering motor vehicle speeds.

Bicycle Safety and Comfort

Consider designating the shoulder as a bike lane through this section.

Throughout the section, consider narrowing lanes to 11 feet to provide wider bike lanes. This would provide more space within the bike lane around the drainage grates.

Place advance warning markings in advance of the drainage grates. Ensure the grates fit properly.

Pedestrian Safety and Comfort

Consider installing sidewalks along this section of PreEmption Road.

Improvements for Individual Intersections along PreEmption Road from North to South

North Street

As recommended in the review of North Street, consider a roundabout for the intersection of PreEmption Road and North Street.

Castle Creek Drive

North of Castle Creek Drive, consider widening PreEmption Road to provide space for bike lanes. Alternatively, the potential bike lane could be extended north to approximately Collier Drive by removing the two-way left turn lane and restriping to add bike lanes.

Where the bike lane is terminated, install a Bikes May Use Full Lane (R4-11) sign for northbound traffic.

Washington Street

See the priority intersection recommendations for the Washington Street intersection.

RECOMMENDED IMPROVEMENTS

Possible Roundabout

- This could provide a gateway type treatment onto Pre Emption Road; reducing travel speeds through this intersection and serving as calming on the approaches to the intersection, making it less intimidating.

Roadway and On-Street Bicycle Facility Improvements

- Designate shoulder as bicycle lane, both directions. Consider reducing lane width to 11' to better accommodate bicycle lanes.
- Where bicycle lane is terminated, install Bikes May Use Full Lane sign for northbound traffic (R4-11)
- Place advance warning markings in advance of drainage grates. Ensure grates fit properly.
- Install planted raised medians in sections where two-way left turns aren't necessary.

Sidewalk Improvements

- Install sidewalks along this section of Pre Emption Road.

Major Intersection Improvements

- Hamilton Street Intersection: Install pedestrian signal indications.
  - Verify visibility of signals and signs and improve if necessary.
  - Make pedestrian buttons accessible from sidewalks.
  - Improve sidewalks and ramps to be ADA compliant with landings.
  - Install two-stage left turn box to assist bicyclists turning left from Pre Emption Road onto Hamilton Street.

Refer to Priority Intersection Recommendations

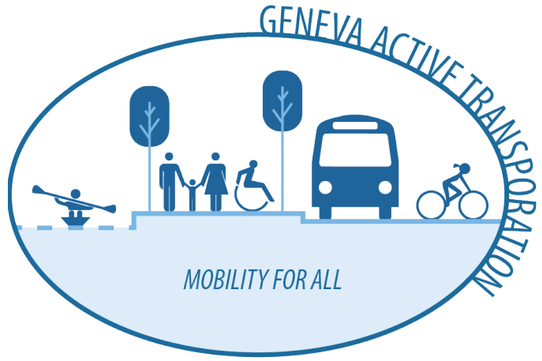


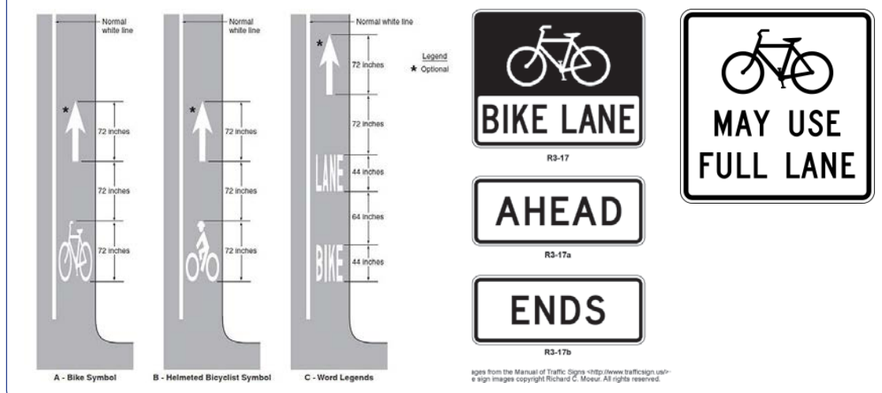
FIGURE 19
PRE EMPTION ROAD ON STREET RECOMMENDATIONS

Existing Conditions

View south near Reed Street Ext intersection

View south near Hamilton Street intersection

DESIGNATED BICYCLE LANE PAVEMENT MARKINGS & SIGNAGE



Hamilton Street

At the Hamilton Street intersection, install pedestrian signal indications. It appears the vehicular signal heads are not clearly visible from the corner because of the Left Turn Only sign assembly on the span wire. On the southeast and northwest corners the pedestrian buttons are not accessible from the sidewalk. Additionally, the ramps do not appear to be ADA compliant; they lack landings at the tops.

Two-stage left turn boxes could be installed to assist bicyclists turning left from PreEmption Road onto Hamilton Street.

On the north side of the Hamilton Street PreEmption intersection, consider narrowing the travel lanes to allow for the continuation of the bike lane through the intersection.

In the area with the striped median between Hamilton Street and Washington Street, restripe to provide full width bike lanes.

4.6 TRAIL OPPORTUNITIES

There are many opportunities to increase the use of active transportation in Geneva through trail construction. These could range from large scale destination trails connecting Geneva to other Finger Lakes communities and attracting tourists, to 'micro trails' that make essential connections between important resources within the community and facilitate everyday walking and cycling.

RAIL TO TRAIL OPPORTUNITIES

New York State has embraced rail to trail projects, with over 1,000 miles of converted trails, over 100 completed rail to trail projects, and 62 projects underway (Rails to Trails Conservancy). These new trails provide a host of benefits to the communities that build them from health benefits to economic benefits. See ***Appendix A*** for community benefits of trails.

There are many abandoned railways around Geneva. These include connections to regional destinations such as Montezuma National Wildlife Refuge and the Erie Canal Trail, and communities including Ithaca, Penn Yan, and Canandaigua. See ***Figure 20A***.

By encouraging trail development in and around Geneva, the community will be able to reap greater benefits from it's location at the heart of the Finger Lakes Region, and from the strong culture of trail tourism in upstate New York.

Design, engineering and construction of walking and bicycling facilities such as trails create more jobs per dollar than any other type of transportation infrastructure construction.

(Rails to Trails Conservancy)

GENEVA ACTIVE TRANSPORTATION

DRAFT

MOBILITY FOR ALL

FIGURE 20A

TRAIL OPPORTUNITIES

RAIL TO TRAIL OPPORTUNITIES

Active Railroads

Abandoned Railroads

Investigate opportunities to extend western New York trail network through Rails-to-Trails and Rails-with-Trails projects

Potential to increase tourism and recreation benefits for Geneva and throughout the Finger Lakes Region

Abandoned Railroads connect Geneva to communities and attractions including:

- Erie Canal Trail,
- Montezuma National Wildlife Refuge,
- Ithaca,
- Penn Yan,
- Canandaigua

0 5 10 15 20 MILES

Railroad Map Courtesy of NY Department of Transportation

Prepared by Barton & Loguidice, DPC and Sprinkle Consulting, Inc.

COMPLETING CONNECTIONS

The proposed Cayuga-Seneca Canal Trail is a 19 mile trail from Geneva to Seneca Falls, with plans to expand to Montezuma National Wildlife Refuge and the Erie Canal Trail. Some segments of the trail are already open including the 4.5 mile trail from Geneva to Waterloo.

The trail ends less than 200 feet from the eastern edge of Seneca Lake State Park. Unfortunately, Route 96A and the railroad separate the Cayuga-Seneca Canal Trail and the trail system in Seneca Lake State Park, which makes this 200 foot stretch challenging to navigate. The Cayuga Seneca Canal Trail appears to dead-end onto a high speed, high volume road with little space for cyclists or pedestrians.

A short section of new trailway, approximately 1,200 feet, along the railway inside Seneca Lake State Park, and a marked pedestrian intersection on Route 96A, would complete the connection, so that tourists and community members could freely travel by bike or foot from Geneva to Waterloo, and potentially all the way to Montezuma National Wildlife Refuge. See ***Figure 20B.***

MICROTRAILS

Within Geneva, there are several opportunities to create small scale trails with big connectivity impacts. Two of these opportunities are included in this section. Refer to ***Figure 20C***.

Bell Avenue Microtrail

One of these opportunities is a potential microtrail between Bell Avenue and Geneva Middle School and High School. A 500' trail between two sports fields, and a new gateway in an existing fence, would shorten the travel time for students coming from the east by .6 miles, or nearly fifteen minutes for pedestrians.

Pedestrian and cycling improvements to Bell Road, such as new sidewalks and share the road signage, could increase the impact of this new microtrail.

PreEmption and West North Street Microtrail

The corner of PreEmption Road and West North Street includes a patchwork of recreational and educational resources, including McDonough and Ridgewood Parks, the Finger Lakes Community College Viticulture and Wine Center, and New York and United States Agricultural Research Stations.

There are several different potential trail routes through this area that would allow pedestrians and cyclists to bypass PreEmption Road, and enjoy a sample of Geneva's agricultural heritage. Where possible, routes on publicly owned land have been selected. Recommended alignments are conceptual in nature and would be subject to further study, review and approvals from the land owners before advancing to design development and implementation.

GENEVA ACTIVE TRANSPORTATION

DRAFT

MOBILITY FOR ALL

FIGURE 20B

TRAIL OPPORTUNITIES

POSSIBLE IMPROVEMENTS

- Proposed Pedestrian Intersection Across 96A and Railroad
- Proposed Trail Connection

EXISTING CONDITIONS

- Existing Trails
- Existing Bike & Pedestrian Friendly Roads

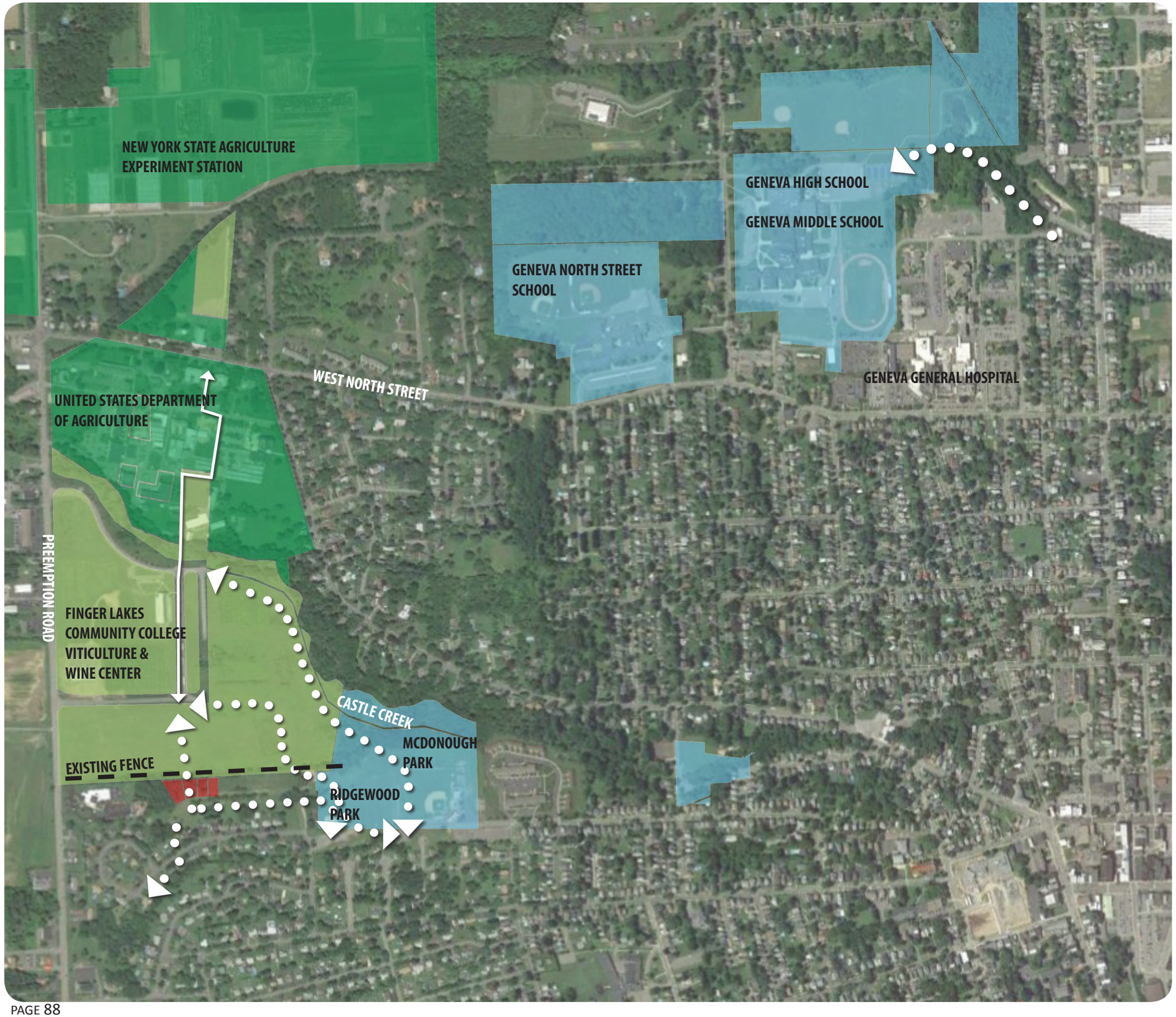
Complete trail connection between Geneva and Waterloo by connecting Seneca Lake State Park with Cayuga-Seneca Canal Trail. Project included in GTC Regional Trails Initiative.

Promote increased recreation and tourism opportunities

Develop trail alongside railway in Seneca Lake State Park

Develop pedestrian crossing across Route 96A and railroad at Cayuga-Seneca Canal Trailhead

Proposed Pedestrian Intersection is in Waterloo. Inter-municipal collaboration would be neccesary to advance project. The recommendations for improvements presented in this figure are conceptual in nature, and would be subject to further study, review and approvals before advancing to design development and implementation.



GENEVA ACTIVE TRANSPORTATION

DRAFT

MOBILITY FOR ALL

FIGURE 20C

TRAIL OPPORTUNITIES

POSSIBLE IMPROVEMENTS

EXISTING LOW VOLUME STREET
ADD BIKE-PEDESTRIAN SIGNAGE
FOR TRAIL CONNECTION

PROPOSED TRAIL ALTERNATIVES

PROPERTY OWNERSHIP

CITY OF GENEVA

CORNELL UNIVERSITY

NEW YORK STATE

PRIVATELY OWNED, UNDEVELOPED

Improve connections between recreation opportunities and educational resources

0.5 Miles from NYS Agriculture Experimental Station to Geneva City Schools

Allow pedestrians and cyclists to bypass PreEmption Road

0 500 1000 1500 2000 FEET

Prepared by Barton & Loguidice, DPC and Sprinkle Consulting, Inc.

5. FACILITY DESIGN GUIDANCE

The previous section identifies numerous recommended infrastructure improvements that are comprised of a variety of facility types. The design guidelines contained in this section are intended to support the recommendations presented in this Plan, and to serve as an ongoing reference for the Geneva community. They are not intended as comprehensive design standards. Rather, they reference existing design standards and provide clarification or supplemental information as necessary. There are eight primary sources of bicycle and pedestrian facility design information that were used to develop the guidelines provided in this section.

American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities – This document is intended to present information on how to accommodate bicycle travel and operations in most riding environments. It is the design guidance upon which most state and local design guidelines are based. In many jurisdictions this document is considered to set the minimum values for bicycle design.

AASHTO Guide for the Planning, Design, and Operations of Pedestrian Facilities – This document is intended to present information on how to accommodate pedestrian travel and operations in (primarily) roadway environments. It is the design guidance upon which most state and local design guidelines are based. In many jurisdictions this document is considered to set the minimum values for pedestrian design.

NY Department of Transportation Highway Design Manual Chapter 17 Bicycle Facilities Design – This document provides guidance for bicycle facilities that are included in Department of Transportation designs. Because of the scope of this document, its design criteria, while they are relevant to local projects, are not required to be met for local projects unless Federal Transportation Funds are used.

NY Department of Transportation Highway Design Manual Chapter 18 Pedestrian Facilities Design – This document provides guidance for pedestrian facilities that are included in Department of Transportation designs. Because of the scope of this document, its design criteria, while they are relevant to local projects, are not required to be met for local projects unless Federal Transportation Funds are used.

Institute of Transportation Engineers Designing Walkable Urban Thoroughfares: A Context Sensitive Approach This document's development was supported by the Federal Highway Administration (FHWA). Designing Walkable Thoroughfares helps designers understand the flexibility for roadway design that is inherent in the AASHTO guide **A Policy on the Geometric Design of Highways and Streets** with a focus on balancing the needs of all users.

Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) – The MUTCD is the national standard for signing, markings, signals, and other traffic control devices. New York State has also adopted a supplement to the MUTCD that provides New York specific standards.

Federal Highway Administration Separated Bike Lane Planning and Design Guidance - Outlines planning considerations for separated bike lanes (also sometimes called "cycle tracks" or "protected bike lanes") and provides a menu of design options covering typical one-way and two-way scenarios. To encourage continued development and refinement of techniques, the guide identifies specific data elements to collect before and after implementation to enable future analysis across facilities in different communities. It identifies potential future research, highlights the importance of ongoing peer exchange and capacity building, and emphasizes the need to create holistic ways to evaluate the performance of a separated bike lane.

National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide – FHWA has issued a memo supporting the use of this document to further develop non-motorized transportation networks, particularly in urban areas. Many of the designs in this document have been used successfully in urban areas. However, care should be exercised when applying the treatments described in this document to suburban or rural areas.

In this guidance section of the Geneva Active Transportation Plan the following facility types are discussed:

- Bike lanes;
- Shared Lane Markings;
- Bike routes;
- Bike boulevards;
- Shared use paths;
- Sidewalks;
- Curb ramps;
- Mid-block crossings,
- Paved shoulders;
- Bike parking facilities;
- Transit stops

See *Appendix G* for Bicycle and Pedestrian Facility Design Flexibility.

5.1 BIKE LANES

A bike lane is a portion of the roadway that has been designated for preferential or exclusive use by bicyclists by striping, signing and pavement markings (the MUTCD does not require signs, but in New York the legal definition of a bike lane requires signs). Bike lanes are intended for one-way travel, usually in the same direction as the adjacent travel lane. Bike lanes should be designed for the operation of bicycles as vehicles, encouraging bicyclists and motorists to interact in a safe, legal manner. Bike lanes should be designated with bike lane markings, arrows, and bike lane signs.

WIDTH

The AASHTO Guide for the Development of Bicycle Facilities provides guidance on the width of bike lanes. The following points summarize this guidance:

- Under most circumstances the minimum recommended width for bike lanes is 5 feet;
- For roadways with no curb and gutter and no on-street parking, the minimum width of a bike lane is 4 feet;
- Along sections of roadway with curb and gutter, a usable width of 4 feet measured from the longitudinal joint to the center of the bike lane line is recommended (this means that 4 feet of pavement is sufficient when coupled with the gutter pan; it is also conceivable to interpret the guidance as meaning that even narrower pavement can be used as long as a total of 5 feet of ride-able surface is maintained);
- Additional width is desirable on higher speed roadways.

INTERSECTIONS

At intersections, bike lanes must be designed to encourage legal movements at the intersection; this includes proper positioning of bicyclists and motorists. Bike lane stripes should be dashed on the approaches to intersections without right turn lanes. Where there are right-turn lanes, through bike lanes must be placed to the left of the right turn lane. Right-turn only lanes should be as short as possible in order to limit the speed of cars in the right turn lane. Fast moving traffic on both sides can be uncomfortable for bicyclists (NACTO). Section 4.8 of the AASHTO Guide for the Development of Bicycle Facilities (2012) provides numerous graphics illustrating bike lane markings at intersections. Bike lanes should be continuous through intersections. For example, if a bike lane is provided to the intersection, a receiving bike lane should be provided on the departure side of the intersection.

BUFFERED BIKE LANES

A buffered bike lane is a bike lane that is separated from adjacent through lanes by a striped out buffer area. In some locations it may be desirable to use less than the full space available for a bike lane. Such locations include sections of roadway where a wide bike lane might be perceived as on-street parking or another travel lane. In these locations a buffered bike lane may be considered. A buffered bike lane may also be considered where a bike lane of six or more feet is being provided to meet a minimum level of accommodation.

At mid-block locations the buffered bike lane is separated from the travel lanes by a chevroned buffer. The width of the buffer will vary depending upon such conditions as motor vehicle speed, percent heavy vehicles, roadway cross slopes, and desired level of accommodation of bicycles. At intersections, buffered bike lanes must be striped to allow for right turning motorists. Typically this is done by eliminating the buffer on the approach to intersections and striping the area as one would a regular bike lane.

5.2 MULTI-USE PAVED SHOULDERS

In terms of Bicycle Level of Service, designating bike lanes is secondary to simply providing delineated space that can be used by bicyclists. Roads with paved shoulders where no other active transportation facilities exist are shared by more than one type of user (bicyclists, pedestrians, in-line skaters and vehicles for emergency use). Design of new or retrofit of existing paved shoulders should comply with AASHTO standards; "on uncurbed cross sections with no vertical obstructions immediately adjacent to the roadway, paved shoulders should be at least 4 ft wide to accommodate bicycle traffic. Shoulder width of 5 ft is recommended from the face of a guardrail, curb, or other roadside barrier to provide additional operating width…" Areas with expected higher bicycle use should have increased shoulder widths as necessary in addition to areas where motor vehicle speeds exceed 50 mph or are used by trucks and buses.

SIGNING ROADWAYS WITH PAVED SHOULDERS

Geneva may want to sign some roadways with paved shoulders to either guide bicyclists to destination or to alert motorists to the presence of bicyclists. The sign would be supplemental to simply providing space for bicyclists within the shoulder. If the subject roadway is along a designated bicycle route, then bike route guidance signs can be used to alert bicyclists to the presence of the interregional or state route.

If the City or Town, or others based on the jurisdiction of the road, determines it is appropriate to warn motorists of the potential presence of bicyclists along a section of roadway with paved shoulders, then special signing, if approved by NYSDOT, would be required. The Bicycle Warning sign (W11-1) alone could be used as it is to alert road users to locations where unexpected entries into the roadway by bicyclists could be expected.

The NYSDOT MUTCD section 1A.03 Design of Traffic Control Devices states:

Option 03A Highway agencies may develop word message signs to notify road users of special regulations or to warn road users of a situation that might not be readily apparent. Unlike symbol signs and colors, new word message signs may be used without the need for experimentation.

Standard 03B Any change to a word message sign that can be considered more than a minor modification (see next Option) shall be approved by the New York State Department of Transportation before it is implemented.

Option 03C With the exception of symbols and colors, minor modifications in the specific design elements of a device may be made provided the essential appearance characteristics are preserved. Such minor revisions may include making a word plural or singular; changing the hours listed on a sign; word deviations such as "road" for "street" on a sign; etc. Although the standard design of symbol signs cannot be modified, it may be appropriate to change the orientation of the symbol to better reflect the direction of travel.

5.3 SHARED LANE MARKINGS

Traffic lanes are often too narrow to be shared side by side by bicyclists and passing motorists. Where parking is present, bicyclists wishing to stay out of the way of motorists often ride too close to parked cars and risk being struck by a suddenly opened car door (being "doored"). Where no parking is present bicyclists wishing to stay out of the way of motorists often ride too close to the roadway edge, where they run the risks of:

- Being run off the road;
- Being clipped by motorists who do not see them off to the side or misjudge passing clearance; or
- Encountering drainage structures, poor pavement, debris, and other hazards.

Riding further to the left avoids these problems, and is legally permitted where needed for safety (Consolidated Laws of New York, Vehicles and Traffic, § 1234 (a). However, this practice can run counter to motorist expectations. A Shared Lane Marking (SLM) is a pavement symbol that indicates it is legal and appropriate for bicyclists to ride away from the right hand edge of the roadway, and cues motorists to pass with sufficient clearance.

Research suggests that SLMs

- Alert motorists to the lateral location bicyclists are likely to occupy within the traveled way,
- Encourage safe passing of bicyclists by motorists,
- Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane,
- Reduce the incidence of wrong-way bicycling, and
- Where on-street parking exists, to assist bicyclists with lateral positioning in a shared lane with on-street parallel parking to reduce the chances of a bicyclist impacting the open door of a parked vehicle.

SLMs are not to be used on shoulders or in designated bike lanes. MUTCD guidance suggests SLMs not be placed on roadways that have a speed limit above 35 mph. While this does not preclude the use of SLMs on higher speed roadways, no research is available as yet to suggest how effective they may be on such roadways.

SLMs encourage good lane positioning by bicyclists, and discourage them from riding too close to the pavement edge, curb, or parked cars. Riding away from the road edge allows bicyclists to avoid road edge hazards like drainage structures, poor pavement, and debris. It also places the bicyclist more directly in the motorist's field of vision which, along with proper SLM treatments, encourages the safe passing of bicyclists by motorists.

Consequently, on roadways with on-street parking, the MUTCD requires that SLMs be placed with the centers of the markings at least 11 feet from the face of curb. On other roadways, the centers of the markings are required to be placed at least four feet from the edge of pavement. On December 9, 2013, the New York State Department of Transportation's Office of Traffic Safety & Mobility approved a Shared Lane Marking (SLM) Policy (TSMI 13-07) which requires SLMs to be placed in the middle of the travel lane. According to the NYSDOT policy:

- SLMs should only be used to indicate the presence of a narrow lane; a narrow lane is a lane that is less than 14' wide… In a narrow lane, motorists and bicyclists must travel one after the other rather than side by side, and a motorist must leave the lane to safely pass the bicyclist.
- SLMs are sometimes used at the ends of bike lanes or shoulders to inform motorists that bicyclists no longer have a separate space and will be sharing the main travel lane.
- SLMs should be installed strategically and judiciously to ensure that their value is not reduced by overuse. When used, SLMs should be placed after each intersection and then periodically on spacings not exceeding 250 feet between markings.

The previously referenced NYSDOT Shared Lane Marking (SLM) Policy includes a Narrow Lane sign assembly. It is a Bicycle Warning sign (W11-1) and an "In Lane" plaque (NYW5-32P). When used, the Narrow Lane assembly should be placed with the first SLM, then repeated as deemed appropriate within the section. It is neither necessary nor desirable to supplement every SLM with a sign assembly.

5.4 BIKE ROUTES

Bike routes are not an actual facility type. A bike route is a designation of a facility, or collection of facilities, that links origins and destinations that have been improved for, or are considered preferable for, bicycle travel. Bike routes include a system of route signs that provide at least the following basic information:

- Destination of the route
- Distance to the route's destination, and
- Direction of the route.

Bike routes can be designated in two ways: General Routes and Number Routes. General Routes are links tying specific origins to specific destinations. Number Routes form a network of bike routes that do not necessarily connect specific destinations, but serve as general travel routes through an area.

General Routes connect users to destinations within a community. Typical destinations include the following:

- Attraction Areas (i.e. libraries, parks, etc.)
- Neighborhood Areas (i.e. historic neighborhoods, etc.)
- Trail Networks or Trailheads (Seneca Lake Wine Trail)

Bicycle Guide (the D11 series in the MUTCD) signs may be provided along designated bicycle routes to inform bicyclists of bicycle route direction changes and to confirm route direction, distance, and destination. Typical signs that convey the basic way-finding information for general routes can be designed for Geneva. The MUTCD provides a number of different types of signs that can be used to provide guidance along bike routes. Some communities implement bike routes with unique designations (numbers or names). These routes should be designated using Bike Route signs. Shared use paths have design criteria for many of the same parameters as roadways. These include widths, horizontal clearances, design speed, horizontal alignment, stopping sight distance, cross slopes, grades, vertical clearance, drainage, and lighting. The AASHTO Guide for the Development of Bicycle Facilities should be consulted for design values.

5.5 BIKE BOULEVARDS

A bike boulevard is a local street or series of contiguous street segments that have been modified to provide enhanced accommodation as a through street for bicyclists while discouraging through automobile travel.

Bike boulevards usually make use of low volume, very low speed local streets. Often, streets are made more accommodating for bicyclists by significantly keeping motorists' speeds and volumes low. Often bike boulevards include bicycle friendly traffic calming treatments (speed pillows, mini traffic circles, chicanes with bike bypass lanes, etc.) to reduce speeds of motor vehicles along the roadway. While local motor vehicle traffic is maintained along the bike boulevard, motor vehicle traffic diverters may be installed at intersections to prevent through motor vehicle travel while having bypasses for bicyclists to continue on along the bike boulevard. Bike boulevards can be facilitated by connecting the ends of cul-de-sac roadways with shared use paths. At intersections the bicycle boulevard should be given priority over side streets.

Because of low motor vehicle speeds and volumes, bike lane markings are often not necessary along bike boulevards. SLMs may be used along bike boulevards. Alternatively, larger than normal bike symbols supplemented with the text **BIKE BLVD** have been used to designate bike boulevards.

In some communities, bike boulevard networks begin as a "one-off" system of bike ways. When a primary arterial roadway cannot be improved to a point where most cyclists feels safe and comfortable using the facility, a parallel roadway - often one street off the main road (or "one-off") - may be improved with bicycle facilities and traffic calming features to provide an enhanced cycling street. By paralleling the main road, the "one-off" network provides access to the businesses along the arterial using a pleasant cycling roadway. A "one-off" roadway can be improved in stages: initially with signage and shared lane markings and then into a bike boulevard by instituting more substantial features such as traffic calming and diverters.

Since bike boulevards typically serve as bike routes, wayfinding signage should be provided. This signage should include destination, direction,and distance (or travel time) information to attractors throughout Geneva. Wayfinding adds to the utility of bike boulevards because it educates cyclists that there are safe, comfortable ways of accessing Geneva by bike.

5.6 BIKE PARKING FACILITIES

It is recommended that bicycle parking is provided at major destinations throughout Geneva. Bicycle parking, at its most basic level, encourages people to ride. Bicycle parking should be provided on a firm stable surface with convenient connections that are ADA accessible.

Parking should be available throughout Geneva in centralized parking clusters. Parking requirements should follow Leadership in Energy and Environmental Design (LEED) design standards for Sustainable Sites.

Well designed and properly executed bicycle parking can provide the benefits below.

- Bicycle parking not only invites cyclists in, but shows the business values sustainability, which is an increasingly important factor in the decisions of consumers.
- Good bike parking benefits the disabled. By providing adequate, well-planned bike parking, business owners or property managers can ensure that hand rails and ramps intended for accessibility purposes are not clogged with bicycles looking for a bike parking spot.
- Pedestrians also benefit when orderly and aesthetic bike parking is provided. Not only does it improve the appearance of the area, it ensures that sidewalks and benches intended for pedestrians are not cluttered by bikes that do not have a designated parking space.
- In this way, bike parking can also prevent damage to other street furniture like garbage cans, posts, benches and trees.
- Covered shelters: provide protection from weather, promoting year round use.

Covered Bicycle Parking Shelters at RIT

5.7 SHARED USE PATHS

Shared use paths are facilities separated from motor vehicle traffic by an open space or barrier and either within the highway right-of-way or an independent right-of-way. They are open to many different user types and are often used by bicyclists, pedestrians, skaters, wheelchair users, joggers, and other non-motorized users. Motor vehicles are not allowed on shared use paths except for maintenance and emergency vehicles in specific circumstances. Most shared use paths are two-way facilities.

Shared use paths have design criteria for many of the same parameters as roadways. These include widths, horizontal clearances, design speed, horizontal alignment, stopping sight distance, cross slopes, grades, vertical clearance, drainage, and lighting. The AASHTO Guide for the Development of Bicycle Facilities should be consulted for design values.

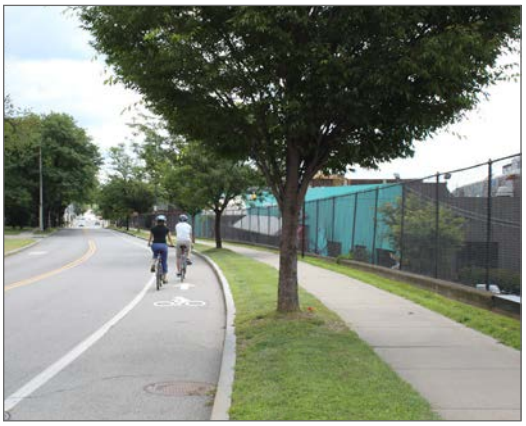
The MUTCD provides the standards for signing, striping, and markings shared use paths. In most cases, the signs and markings use on shared use paths are smaller versions of those used on roadways. Many shared use paths are separated from the roadway network. Consequently, street name signs should be provided at intersecting roadways to help users orient themselves to the roadway network. Wayfinding signs should be used on paths and to potential destinations along the path such as locations where users can access water fountains and restrooms. At trailheads and rest areas, the distance and direction to the next trail head should be posted.

Most shared use path projects will be paved. Asphalt and Portland cement concrete are the two most common surfaces for shared use paths. In areas where path use is expected to be primarily recreational, unpaved surfaces may be acceptable for shared use paths. Materials should be chosen to ensure the ADA requirements for a firm, stable, slip resistant surface are met. Even when meeting ADA criteria, some users such as in-line skaters, kick scooters, and skateboarders may be unable to use unpaved shared use paths.

The geometric and operational design of shared use paths is quite similar to that of roadways. However, additional considerations such as aesthetics, rest areas, amenities, and personal security are also important to ensure the maximum number of potential users are encouraged to use the path for both utilitarian and recreational purposes. Sometimes local resistance to implementing shared use paths and other trail facilities exists because of perceived potential negative impacts to neighboring communities, usually in terms of property values and crime or vandalism. A valuable resource in discussions of these matters is a summary of national research conducted for a state department of transportation. The studies cited collectively suggest that property values frequently increase following the construction of shared use paths while crime rates are sometimes found to decrease. See ***Appendix A*** Community Impacts of Trails.

5.8 SIDEWALKS

For the purposes of design, the term sidewalk means a smooth, paved, stable and slip-resistant, exterior pathway intended for pedestrian use along a vehicular way. All sidewalks constructed within the City and Town of Geneva must be compliant with the Americans with Disabilities Act Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (July 26, 2001) or most recent ADA standards for public rights of way. Sidewalks should be provided on both sides of all public roadways.



City of Rochester, New York

SIDEWALK WIDTH

The preferred minimum sidewalk width is 5 feet. AASHTO's A Policy on the Geometric Design of Highways and Streets and the AASHTO Guide for the Planning, Design, and Operations of Pedestrian Facilities recommend sidewalks at the back of curb be at least 6 feet wide.

LOCATION OF SIDEWALKS

On roadways with curb and gutter, sidewalks should be located six feet from the back of curb. This minimizes the encroachment of curb ramps and driveway cuts into the sidewalk width. On roadways without curb and gutter sidewalks should be separated from the roadway as shown by the following criteria, which are given in a sequence of desirability:

- At or near the right-of-way line (ideally, 3 feet of width should be provided behind the sidewalk for access, construction, and maintenance),
- Outside of the minimum required roadway clear zone, or
- As far from the edge of the driving lane as practical.

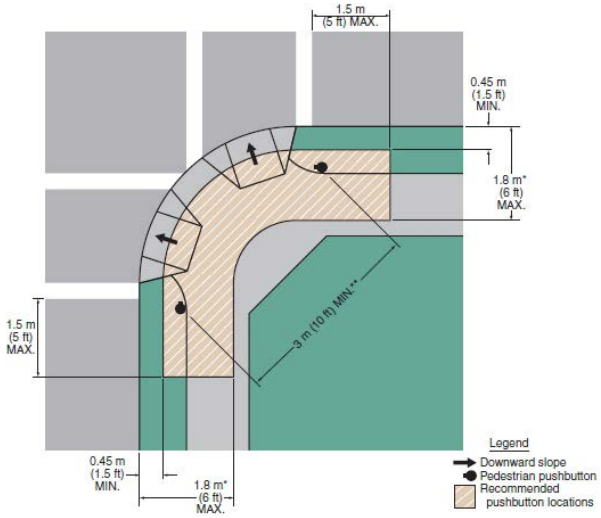
Sidewalk alignments, which are set back from the roadway, should taper for alignment closer to the roadway at intersections. This will allow for coordinated placement of crosswalks and stop bars.

SIDEWALK SLOPES

The maximum cross slope on a sidewalk is 2%. This maximum cross slope must be maintained across driveways and crosswalks. Sidewalks may follow the grade of the adjacent roadway. However, on new structures the grade of the sidewalk cannot exceed 5%. If a grade of more than 5% is required on a new structure, an ADA compliant ramp must be provided.

5.9 CURB RAMPS

A curb ramp is a ramp that cuts through or is built up to the curb. A blended transition is a relatively flat area where a sidewalk meets a roadway. Curb ramps and blended transitions are primarily used where a sidewalk meets a roadway or driveway at a pedestrian crossing location. Blended transitions include raised pedestrian street crossings, depressed corners, or similar connections between pedestrian access routes at the level of the sidewalk and the level of the pedestrian street crossing that have a grade of 5%or less. Accessibility requirements for blended transitions serve two primary functions. First, they must alert pedestrians that have vision impairments to the fact that they are entering, or exiting, the vehicular area. Second, they must provide an accessible route for those using wheelchairs or other assistive devices. Ideally, a separate ramp should be provided for each crossing of the roadway.



MUTCD, Figure 4E-2

After review of Geneva's codes and standards, the following recommendation is provided. Curb ramp comments are based upon the 2010 ADA Standards for Accessible Design. It is assumed that these are the standards adopted by the City of Geneva because the allowable cross slopes of 1:48; the 2011 Notice of Proposed Rule-making is more stringent requiring 1:50 (although it is our understanding that the as yet unpublished rule will allow 1:48). FHWA has suggested that either the 2010 ADA Standards for Accessible Design or the 2011 Notice of Proposed rule-making can be used by agencies. Whichever is chosen, the chosen standards must be applied in its entirety – no mixing and matching of standards. This is most important in terms of ramps. The 2010 ADA standards do not provide an exception allowing the running slope to follow the grade of an existing roadway.

5.10 MIDBLOCK CROSSINGS

Intersections are generally the best and most direct place for pedestrians to cross a roadway and are the most common pedestrian crossing locations. Still, more than 70 percent of pedestrian fatalities occur away from intersections, so it is critical to design midblock crossings that both increase drivers' awareness of the crossing and expectation of encountering pedestrians and encourage pedestrians to cross in the designated location. While drivers may not expect to encounter pedestrians at midblock locations as much as they do at intersections, midblock crossings have fewer conflict points between vehicles and pedestrians which is an important safety advantage over crossings at intersections.

Midblock crossings are different from intersection crossings in three important ways: there are many more potential crossing locations at midblock than at intersections, motorists are less likely to expect pedestrians crossing at midblock, and pedestrians with visual impairments have fewer audible clues for determining the best time to cross.

Each of these differences leads to important design considerations for midblock crossings:

- Make the crossing location convenient for pedestrians - Midblock crossings are provided in locations where crossings at intersections are not available or are inconvenient for pedestrians to use. Midblock crossings must be placed in convenient locations to encourage pedestrians to use them rather than other, more convenient, unmarked midblock locations.

- Make pedestrians aware of the opportunity to cross - Provide aids for pedestrians with visual impairments to recognize the presence of a midblock crossing and the best opportunities for crossing. Auditory and tactile information should be provided for pedestrians with visual impairments since clues present at an intersection crossing are not always available at a midblock crossing (such as the sound of traffic stopping and starting).

- Make drivers and pedestrians aware of their responsibilities and obligations at the crossing and provide opportunities to meet these responsibilities/ obligations - Use MUTCD guidance to establish a legal crossing. Vehicle approach, pedestrian approach, and traffic control design should provide pedestrians with clear messages about when to cross and drivers about where to yield. Where necessary, a refuge area should be provided for pedestrians to complete the crossing in stages. Traffic control devices can be used to create gaps in traffic for pedestrians to cross.

National Association of City Transportation Officials (NACTO)

- Make drivers aware of the crossing as they approach it - Drivers should be warned of the pedestrian crossing in advance of the crossing location, and the midblock crossing should be highly visible to approaching drivers. Drivers should have clear lines of sight to the crossing so that pedestrians at the crossing are visible. The approach to the crossing should encourage drivers to reduce their speeds prior to the crossing. Drivers should be given plenty of time to recognize the presence of a pedestrian and stop in advance of the crossing.

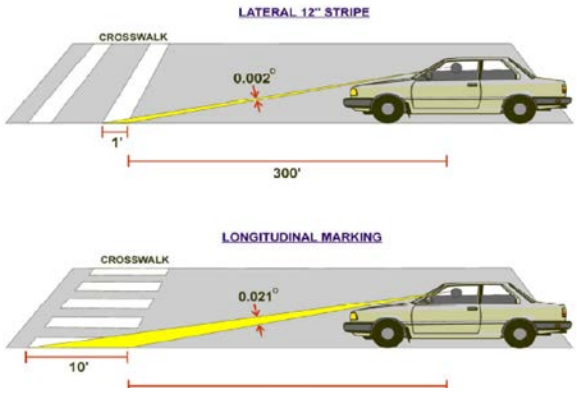
PEDESTRIAN APPROACH (SIDEWALK/CURB LINE)

The pedestrian approach is the area near the crossing where pedestrians wait on the side of the roadway and away from traffic until they are able to cross. It is often part of the sidewalk, if the sidewalk is adjacent to the curb line, or an extension or spur of the sidewalk that provides a path from the sidewalk to the crossing, if the sidewalk is not immediately adjacent to the curb. The pedestrian approach design should accomplish the following:

- Encourage pedestrians to cross at the marked crossing. The approach design should discourage pedestrians from crossing away from the marked crossing. The path to the crossing should be as direct and easy to navigate as possible.
- Keep pedestrians visible to approaching drivers and oncoming vehicles visible to pedestrians. Pedestrian furniture, traffic control devices, planters, and other objects should be located so they do not block pedestrians from the sight of approaching drivers. Also, on-street parking should be restricted near the crossing so that parked vehicles do not limit sight lines.
- In areas with high volumes of pedestrians, there should be sufficient space for pedestrians to queue as they wait for an appropriate time to cross. Pedestrian storage should be designed to prevent crowds of pedestrians from spilling onto the roadway. Pedestrian storage area design can be especially important at bus stops, and care should be taken so that children can wait a safe distance from the roadway while waiting for a school bus. Midblock curb extensions are a common and effective treatment at midblock locations and have many benefits.
- Make pedestrians, especially those with visual impairments, aware of the crossing location. In complex pedestrian environments, wayfinding signs may be appropriate to guide people to their desired destination. Auditory and tactile cues can be provided with traffic control devices adjacent to and in the sidewalk to direct pedestrians toward the crossing.
- Direct pedestrians to the proper location to activate a pedestrian signal (if present) and wait for an appropriate time to cross. Pedestrian-activated traffic control devices should be accessible to pedestrians with visual impairments and those using wheelchairs, scooters, and walkers. The approach design should make clear where pedestrians should stand while waiting to cross.

MOTORIST APPROACH

As noted in the discussion about locating a midblock crossing, care should be taken to avoid locations where horizontal or vertical alignment of the roadway limit drivers' sight distance, view of the pedestrian approach to the crossing, or view of the crossing itself. Consideration should be given to how trees, shrubs, poles, signs, and other objects along the roadside might limit a driver's view of the crossing. On-street parking should be prohibited near the crossing using either signs and markings or physical barriers such as a curb extension, since a pedestrian who steps out into the road between parked cars can be blocked from the view of oncoming drivers.



Umbs, R. (2010) Raised Right Turn Islands FHWA

Signing and markings on and along the motor vehicle approach to a midblock crossing should be designed in such a way as to make drivers aware of the crossing in time to notice and react to the presence of a pedestrian, and to enhance the visibility of the crossing. Advanced warning signs should indicate any special traffic control used at the pedestrian crossing. Refer to the AASHTO Guide for the Development of Bicycle Facilities for examples of midblock control treatments for shared use paths.

Traffic calming devices and other measures to prevent high vehicle speeds should be considered along routes with midblock pedestrian crossings. More than 80% of pedestrians die when struck by vehicles traveling at greater than 40 mph versus less than 10% when cars are traveling at 20 mph or slower. In addition, vehicles traveling at lower speeds require less distance to come to a complete stop when braking.

5.11 TRANSIT STOPS

Improving transit stops can increase convenience, comfort, and attractiveness, thus potentially increasing ridership and supporting transit oriented development. Transit stops provide opportunities to utilize sustainable design and construction strategies, improve storm water quality with green infrastructure, and improve the streetscape aesthetics by incorporating Complete Streets policies. Both new and existing bus stops need to be ADA accessible. To be accessible, the following details need to be considered during design and construction:

- A firm, stable surface when new bus stop pads are constructed at bus stops where a lift or ramp is to be deployed;
- A minimum clear length of 96" (measured from the curb or vehicle roadway edge) and a minimum clear width of 60" (measured parallel to the vehicle roadway) to the maximum extent allowed by legal or site constraints;
- Connections to streets, sidewalks or pedestrian paths by an accessible route;
- The slope of the pad parallel to the roadway should be the same as the roadway, and for water drainage, a maximum slope of 1:50 (2%) perpendicular to the roadway;
- New or replaced bus shelters should be installed or positioned so as to permit a wheelchair or mobility aid user to enter from the public way and to reach a location, having a minimum clear floor area of 30" x 48", entirely within the perimeter of the shelter;
- Shelters should be connected by an accessible route to the boarding area; and
- All new bus route identification signs should be appropriate in finish and contrast, character height and proportion.

Public Transit and Active Transportation are closely related and mutually supportive. Every ride on a bus starts and ends with walking. Nationwide, 29 percent of those who use transit were physically active for 30 minutes or more each day, solely by walking to and from public transit stops. Similarly, transit users took 30 percent more steps per day and spent 8.3 more minutes walking per day than did people who relied on cars.

- Robert Wood Johnson Foundation 2009

Sources: ***http://www.adata.org/adaportal/Facility_Access/ADAAG/Special_Occupancies/ADAAG_10.html***

6. OUTREACH AND EDUCATION RECOMMENDATIONS

A successful bicycle and pedestrian network depends on users' being able to safely, appropriately and frequently utilize the network. To assist in creating an effective, safe bicycle and pedestrian network, outreach, education, and zoning enhancements will be necessary. Educating roadway users (bicyclists, pedestrians, and motorists) about the rules of the road and safe bicycling and walking behavior is essential, while at the same time, encouraging more people to get out and walk and ride their bikes. See ***Appendix H*** for Bicycle and Pedestrian Supportive Code Language and ***Appendix I*** for a Planning Board Mobility Checklist.

The outreach and education recommendations in this section aim to increase the number of bicyclists and pedestrians while improving safe and appropriate behavior by bicyclists, motorists, and pedestrians. The network will attract users of different skill levels and ages, as well as provide opportunities for interaction with motorists and pedestrians. Education and outreach programs must consider all of these different user groups. The 1999 version of AASHTO's Guide for the Development of Bicycle Facilities recommended that an education plan address the following four groups:

- Young bicyclists;
- Adult bicyclists;
- Parents of young bicyclists; and
- Motorists.

This Plan recommends that the following groups be addressed as well:

- Senior pedestrians and bicyclists;
- Low income pedestrians and bicyclists;
- Visiting pedestrians and bicyclists; and
- School-age pedestrians and bicyclists.

IMPORTANT INFORMATIONAL ELEMENTS

It is important to make sure each group is addressed in multiple and suitable ways. For example, programs for young bicyclists should use age-appropriate curriculum and language to explain concepts and issues. In addition, Geneva is home to people of many different backgrounds. Language barriers should be considered as educational materials are developed. Geneva should seek partnerships that bridge cultural boundaries. Such partnerships would provide a valuable channel for distribution of educational materials and for general promotion of bicycling and walking in under-served communities. The City and Town should ensure that all parts of Geneva, not only geographically, but also demographically, have equal access to active transportation information and facilities. *Table 6* at the end of this Plan section provides a thorough summary of existing active transportation-related education and outreach programs and partnerships.

"Bicyclists and motorists together must better learn to Share the Road, to operate defensively, to understand each other's behaviors, and to be alert to any unanticipated actions or movements. By working together, we can achieve the joint goals to increase bicycle ridership while reducing the number of bicycle crashes, injuries and fatalities."

- New York State Department of Transportation (NYSDOT)

One of the key things to keep in mind when planning outreach and education efforts is not to "reinvent the wheel". Many successful programs, campaigns and resources are available. Locally, there are already many efforts underway. Other communities throughout the U.S. and Canada have already developed tools that can be adapted and modified for the City and Town of Geneva. This adaptation is important in order to effectively localize the educational campaigns. Locally created campaigns that include materials with a local feel have been shown to have a more noticeable influence on motorist and bicyclist behaviors than generic FHWA-produced materials.

Bike and pedestrian education and outreach are vitally important in light of the growing number of distracted pedestrians. Much attention has rightly been focused on distracted drivers. But a recent National Highway Traffic Safety Administration reported that pedestrian fatalities rose by 4.2 percent in 2010 over the previous year, and injuries were up 19 percent, even though overall traffic deaths declined.

"1,152 pedestrians were treated in emergency rooms after being injured while using a cellphone or some other electronic device in 2010 — and the number had doubled since the year before."

- US Consumer Product Safety Commission

As we look around us every day, pedestrians are being distracted by their handheld devices. Researchers believe that the number of injured pedestrians is actually much higher than these results suggest, since police don't always collect that data. A recent survey by Liberty Mutual suggests 60 percent of 1,000 people surveyed routinely read and send texts and emails, talk on their cell or smartphones, and listen to music while walking. Current trends, such as this, are important factors in designing bicycle/pedestrian safety, education and outreach programs. The framework for these recommendations was crafted with all this in mind.

6.1 RECOMMENDATION 1

Connect partners to maximize the effectiveness of existing resources, programs, and materials. A list of potential partners has been developed, and their existing programs and partnerships have been inventoried to identify opportunities for new partnerships and enhanced use of resources. Some of these partners are already working together, but there are new partnerships that can be nurtured and developed, and new ways for existing educational materials to be used. Not all of the potential partners are specifically focused on bicycle/pedestrian-related issues, but may still be useful partners because of their ability to communicate with certain parts of the population. Some examples of education and outreach programs are suggested here:

Coordinate safety education with the ***Geneva School District*** (Geneva High School, Geneva Middle School, West Street School, and North Street School).

Learn from successful outreach and education examples in other ***active transportation-friendly communities***. Many successful programs, campaigns and resources are already available. Other communities throughout the U.S. and Canada have already developed tools that can be adapted and modified for the Geneva area.

May is ***National Bike Month*** - Recognize those who commute by bike and encourage people to become new bicycle commuters or increase their trips by bike during the season when spring has sprung and new beginnings abound. This program features a month long calendar of events that offers organized rides for different ages and abilities, bike handling skills and maintenance workshops, and a Bike to Work Day Commuter Challenge. The program is most successful when led by a community-based organization with financial support from the City or Town and the greater business community.

Bicycle Ambassadors - A team of at least two ambassadors encourages an increase in bicycling by engaging the general public to answer questions about bicycling and teach bicycle skills and rules of the road. Ambassadors attend community-based events throughout peak cycling season to offer helmet fits, route planning, bike rodeos and commuting 101 workshops. Community members also may request an appearance by a team of ambassadors at businesses, schools or a conflict zone location along the bikeway system.

Bike Light Campaign - With shorter days, when it gets dark before commuters head home from the office, fall is a good time of year to remind cyclists that proper equipment is required when riding at night. A bike light campaign also offers the opportunity to introduce cyclists to bicycle shops and strengthen partnerships between the City, Town, and retailers. This program could offer discounts on bicycle headlights and rear red reflectors and lights. It is recommended that the campaign be rolled out in September with the return of university as well as K-12 students to school. The campaign should expire before peak holiday season when bike shops are busy and less interested in offering discounts.

League of American Bicyclists: Bicycle Friendly Community status - ***The Bicycle Friendly Community (BFC)*** program created by the League of American Bicyclists (LAB) offers the opportunity to be recognized for achievements in supporting bicycling for transportation and recreation. It also serves as a benchmark to identify improvements yet to be made.

League Certified Instructor training course scholarships - The League of American Bicyclists offers certification courses to train those interested in teaching others to ride their bike safely and legally as a form of transportation. ***League Certified Instructors (LCIs)*** are a valuable asset to the community and can offer a variety of workshops for adults lacking confidence to ride in traffic as well as children learning to ride for the first time. LCI training courses require a two and a half day commitment and are offered through the LAB. To facilitate a cadre of cyclists to become LCIs, this program coordinates with the LAB to schedule training course offerings in the community and provide scholarships.

Conduct ***public safety announcements*** on following the rules of the road. For motorists, this campaign could address the need to look left prior to turning right, and provide clear passing space. For bicyclists, this campaign could address bicycle lights and lack of visibility when not riding in the road, and laws about bicycling including mandatory bicycle bells. For pedestrians, this campaign could address crossing at designated crossing facilities, and walking on the sidewalk in all seasons.

Walk Friendly Communities is a national recognition program developed to encourage towns and cities across the U.S. to establish or recommit to a high priority for supporting safer walking environments. The WFC program will recognize communities that are working to improve a wide range of conditions related to walking, including safety, mobility, access, and comfort.
www.walkfriendly.org/

Distribute a ***Bike Map*** – The Genesee Transportation Council has created a regional bike map that includes bicycle suitability ratings, extensive safety information for bicyclists, a listing of area bicycle shops and repair services, location of bicycle lockers and how to obtain access to use them, information about how to use the bike racks that are provided on all RTS buses, and a listing of multi-use trails in the region. The map is free and can be provided upon request. This map could be used as a model for a Geneva bike map. Another excellent example is the map and info guide produced by the City of Vancouver, British Columbia that illustrates bicycle and pedestrian routes in the city, and utilizes a compact, folded-into-wallet-size (Z-card) format.

Institute a ***"Sunday Parkways"*** ride once per month - In Madison, WI, Sunday Parkways are times set aside on weekends and holidays for traffic-free biking and walking on a network of selected streets.

Create an ***active transportation wayfinding*** program that includes identification of routes and signing plans (destination, distance, direction) as well as assessments of potential improvements along the proposed routes.

Monroe County Pedestrian Safety videos review the rules of pedestrian safety utilizing age appropriate videos for PreK-1, Grade 2-3, Grade 3-6 and three adult safety review videos. These videos could be incorporated into school district curriculum and shown at City or Town events, or serve as models for Ontario County specific videos.
www2.monroecounty.gov/safety-trafficsafety.php.

Adapt Oregon program ***"Bike Wheels to Steering Wheels."*** The program helps youth better understand the relationship between bicycle/ pedestrian safety and motion, and ultimately gives students a better understanding of safety when traveling by all modes of transportation, in which the laws of physics are applied without exception. The concepts are learned through normal math, science, or physics curriculum in schools.

Consider ***Colorful Sidewalks and Crosswalks*** at unsignalized intersections around the Geneva School Districts per HealthiKids Coalition, an initiative of the Finger Lakes Health Systems Agency. ***http://www.healthikids.org***

OTHER POSSIBLE EXAMPLES:

Commuter of the Year Contest - This contest recognizes those who choose to bike, walk, or ride transit. An aim is to encourage others to reduce their drive alone motor vehicle trips. Nominated by their peers, contestants may be employees, residents, or students in the community and could be asked to provide an inspirational story about their transportation choice and habits. Based on nominations, categories could recognize Youth, Student, Senior, and Family Commuters. Winners also should be encouraged to serve as role models and participate in events throughout the year to mentor others and help them set goals to reduce their drive alone trips.

Business Pool Bike Program - Offering employees the opportunity to check out and ride a bike to meetings, lunch or run errands is a great benefit. Pool bikes are a form of bike sharing where an employer manages a fleet of bikes for this purpose. This program offers subsidies for the purchase and on-going maintenance of bikes as part of an agreement to track use and achieve the goal of reducing vehicle miles traveled and greenhouse gases. Employees sign up, make reservations and log their trips using a web-based management tool.

Conduct ***pedestrian and bicycle counts*** on a seasonal basis to track whether there is an increase in pedestrian and bicycle activity, exploring new methods as suggested by the public, FHWA, and the League of American Bicyclists. Refer to Follow-on Activities presented later in this plan for more information.

Bicycle Rodeo Kits - Children learning to ride should be confident with their bike-handling skills before riding in traffic. A Bike Rodeo is an interactive and controlled environment where cyclists practice a new skill at a series of stations. The number and difficulty of skills can be tailored based on attendance and number of instructors available to staff the event. This initiative will create a self-service bicycle rodeo kit that can be reserved by League Cycling Instructors (LCIs), Bike Ambassadors and community members. It contains instructions, diagrams and props necessary to host a bike rodeo. A programmatic collaboration with Ontario County Traffic Safety should be explored.

Participate in an ***annual meeting of all bicycle/pedestrian planners and engineers in the region***. An annual meeting should be held to allow local communities and organizations to communicate their plans and programs, as well as share best practice information. Note: City and Town officials may not want to facilitate such a meeting, but it would be useful to participate if some other entity were to organize the event.

AARP Network of Age-Friendly Communities Toolkit can be adapted by municipal and local governments, non-profit organizations, community partners and volunteers to guide and support age-friendly initiatives that make 'Livable Communities" great places for all ages. ***www.aarp.org/livable-communities/network-age-friendly-communities***

Identify proper ***enhanced visibility clothing*** for bicyclists and pedestrians, and advise the local active transportation community of the associated safety benefits.

As part of a larger roadway safety campaign, develop an educational campaign to eliminate bicycle and pedestrian fatalities. In Minnesota, ***"Toward Zero Deaths"*** is a statewide partnership involving federal, state, county and academic partners. The mission is to create a culture in which traffic fatalities and serious injuries are no longer acceptable through the integrated application of education, engineering, enforcement, and emergency medical and trauma services.

6.2 RECOMMENDATION 2

Appoint a ***public bicycle/pedestrian committee*** to promote non-motorized transportation and to actively engage with citizens, planning committees, and boards to expand commuting and recreational paths for walkers and cyclists. Such a committee could:

- Promote safe routes to school, greenways and connected corridors with adjacent towns,
- Publish and maintain cycling and walking maps,
- Review proposed development for active transportation considerations,
- Recommend amenities to enhance safe walking and cycling.

6.3 RECOMMENDATION 3

Coordinate an ongoing ***public information and enforcement campaign*** regarding safe sharing of the roadways for pedestrians, bicyclists and motorists.

Pedestrians - Law enforcement departments can take a leading role in improving public awareness of existing traffic laws and ordinances for motorists (e.g. obeying speed limits, yielding to pedestrians when turning, traffic signal compliance, and obeying drunk-driving laws) and pedestrians (e.g. crossing the street at legal crossings and obeying pedestrian signals). Many local law enforcement agencies have instituted annual pedestrian awareness weeks when they issue tickets to motorists who disregard pedestrian laws and warn pedestrians to follow the laws as well.

Bicyclists - A campaign should be designed keeping in mind the League of American Bicyclists' recommendation that communities make connections between the bicycling community and law enforcement. Sporadic enforcement will not result in significant improvements to bicyclist behavior and will likely result in resentment of law enforcement personnel. Those behaviors to be targeted should be determined at the outset of the law enforcement campaign. The following behaviors should be targeted consistently:

- Riding at night without lights;
- Violating traffic signals;
- Riding on sidewalks; and
- Riding against traffic on the roadway.

The **5 E's**: Essential elements for communities to become great places for bicycling:

Engineering: Creating safe and convenient places to ride and park
Education: Giving people of all ages and abilities the skills and confidence to ride
Encouragement: Creating a strong bike culture that welcomes and celebrates bicycling
Enforcement: Ensuring safe roads for all users
Evaluation & Planning: Planning for bicycling as a safe and viable transportation option

(The League of American Bicyclists)

These four behaviors were chosen for two reasons. First, they represent particularly hazardous behaviors which result in many crashes. Secondly, and very importantly, the enforcement of these behaviors is easy to justify to the public. When coupled with (and in fact preceded by) a large-scale education campaign, the public will understand the importance of the campaign and consequently will accept the enforcement activity.

In addition to the need to educate bicyclists, pedestrians, and motorists, some targeted training of law enforcement may also be appropriate. Some questions that could be covered in this training include:

- When is it acceptable for bicyclists to 'claim the lane?'
- What width constitutes 'traffic lanes too narrow for a bicycle and a vehicle to travel safely side-by-side within the lane?'
- Why is it important for a bicyclist to use headlamps and tail lamps?
- Why is riding against traffic such a problem?

By answering these and other similar questions, and discussing what infractions are most likely to lead to bike crashes, cities can encourage law enforcement to help promote bike safety by targeting those behaviors most likely to result in crashes. Some communities educate local law enforcement through the enforcement agency's standing roll-call meetings, while others send officers to the League of American Bicyclists' Traffic Skills 101 courses.

6.4 RECOMMENDATION 4

Schedule ***regular maintenance and facility improvements to keep bike lanes and walkways well-marked and free of snow and debris***. The availability of bicycle and pedestrian facilities is one of the components that can lead to increased riding and walking in a community. However, facility improvements do not end at construction; facilities also need to be maintained to be useful. Maintenance needs require planning and budgeting. Sample maintenance activities include keeping roadways and bike lanes clean and free of debris, identifying and correcting roadway surface hazards, keeping signs and pavement markings in good condition, maintaining adequate sight distance, and keeping shared-use trails in good condition. Maintenance is an area where planning and attention can provide significant benefits for bicyclists and pedestrians at relatively modest additional cost.

Identification of maintenance needs and institutionalization of good maintenance practices for active transportation facilities are key elements for providing safe bicycle and pedestrian facilities. The importance of good planning and initial design cannot be overstated with respect to long-term maintenance needs. It is easier to obtain outside funding for facilities construction than for on-going maintenance, so planning and building correctly at the outset will reduce future maintenance problems and expense. Winter snow removal and year-round debris removal will be key maintenance concerns in the City and Town of Geneva. Residents and businesses can be engaged in clean-up days, or help with snow removal.

6.5 PROGRAM EFFECTIVENESS MEASURES

Program effectiveness measures can be used to determine if the recommended strategies meet their objectives, discover any areas that need change, justify funding, and provide guidance for similar programs. Baseline data is required prior to implementing recommendations. The City and Town could observe the outcomes or contract with a consultant to measure effectiveness on their behalf. Observable outcomes include: number of crashes, injuries, and fatalities; behaviors; number of citations issued; number of people walking or bicycling; knowledge, opinions and attitudes; changes in organizational activity; traffic volumes; and traffic speeds. The effort to enforce the traffic laws as they relate to bicycle and pedestrian safety should be addressed in an overall, county wide, coordinated enforcement campaign. Targeted enforcement initiatives result in everyone following the rules of the road.

Table 6: Existing Active Transportation Education and Outreach Programs and Partnerships

	Existing Programs					Existing Partnerships					Highlights
Partner Name	Bicycle Safety	Community Health	Environmental Concerns	Transportation Equity	Neighborhood Livability	Bicycle Safety	Community Health	Environmental Concerns	Transportation Equity	Neighborhood Livability	Programs or Partnerships of Note
AARP		✚			✚						Age Friendly Communities programs.
Boys & Girls Clubs of Geneva, NY	✚	✚		✚		✚	✚				Cyclopedia - connects bicycling to online documentation.
Finger Lakes Health Systems Agency		✚									Various health and wellness initiatives.
Genesee Land Trust			✚		✚		✚	✚		✚	
Genesee Regional Off-Road Cyclists (GROC)	✚	✚				✚	✚				Singletrack Academy to teach bicycle handling skills.
Genesee Transportation Council	✚	✚	✚	✚	✚	✚	✚	✚	✚	✚	Funds studies addressing key issues. Helmet brochure, bike map.
Injury Free Coalition for Kids	✚	✚									Kohl's Pedal Patrol provides bike rodeos and helmets.
Geneva General Hospital		✚			✚	✚	✚				
Ontario County Public Health Department		✚			✚		✚				
Ontario County Traffic Safety Board	✚					✚					
Ontario County Planning Department			✚	✚	✚			✚	✚	✚	
Ontario County/Geneva Public Libraries					✚						Venue for education/outreach programs and distribution of materials.
Geneva YMCA	✚	✚			✚	✚	✚			✚	
Regional Transit Service									✚		
Fingerlakes Cycling Club	✚			✚					✚		Dedicated to promoting cycling for health and well being.
Treadhead Cycling Club	✚					✚					Dedicated to promoting cycling for health and well being.
Hobart and William Smith Colleges	✚	✚	✚	✚		✚	✚	✚	✚		
Geneva City School District		✚	✚			✚	✚	✚			
Wegmans	✚	✚	✚	✚	✚	✚	✚	✚	✚	✚	Passport to Wellness.

7. FUNDING AND IMPLEMENTATION STRATEGY

Those responsible for implementing this Plan's recommendations should monitor capital improvement plans to identify specific opportunities, coordinate the available outreach and education programs identified in the previous section, coordinate improvements with adjoining municipalities, and identify and follow through on relevant grant opportunities. In addition to these strategies, the Town of Irondequoit has historically funded, and will continue to fund, sidewalks and other active transportation projects using the following techniques:

- New development projects requesting incentive zoning may be required to install and/or fund sidewalks as an amenity.
- New developments or redevelopments may be required to provide sidewalk easements and/or construct sidewalks as a condition of Planning Board approval.

In general, however, most large sidewalk construction projects are funded by state and federal grants. In addition, the costs associated with constructing the bicycle and pedestrian facilities recommended in this Plan exceed available Town resources.

To help alleviate this deficiency, this section identifies and discusses the numerous sources which can be used to provide monetary assistance for bicycle and pedestrian facilities and programs. Many of these funding sources are available on the federal level, as dictated in the new transportation legislation, Fixing America's Surface Transportation Act, or the "FAST" Act. Many of these federal programs are administered by the New York State Department of Transportation (NYSDOT). Additionally, there are other state and regional funding sources which can be used to help achieve the goals and objectives of this Plan. Finally, a number of private funding sources exist which can be used by local governments to implement bicycle and pedestrian-related programs. The following quick-reference table (*Table 7*) includes all of the funding sources that are described subsequently in greater detail.

Table 7: Funding Sources

Funding Source	Category	Relevant Project Types
National Highway Performance Program (*https://www.fhwa.dot.gov/fastact/factsheets/nhppfs.cfm*)	Federal	Bicycle transportation facilities and pedestrian walkways adjacent to highways in the National Highway System, including interstates (Section 207)
Highway Safety Improvement Program (*https://safety.fhwa.dot.gov/hsip/*)	Federal	Intersection safety improvement, pavement and shoulder widening; bicycle/pedestrian/disabled person safety improvements; traffic calming; installation of yellow-green signs at pedestrian and bicycle crossings and in school zones; transportation safety planning; road safety audits; improvements consistent with FHWA publication "Highway Design Handbook for Older Drivers and Pedestrians"; safety improvements for publicly owned bicycle and pedestrian pathway or trail
Congestion Management and Air Quality (CMAQ)	Federal	Funding to reduce vehicle emissions and traffic congestion in areas where air quality does not meet National Ambient Air Quality Standards. Eligible projects include bicycle and pedestrian facility improvements; transit improvements; rideshare programs; alternative fueling facilities/clean vehicle deployment
Transportation Alternatives	Federal funding administered by NYS DOT	On and off road bicycle and pedestrian facilities; projects that improve non-driver safety, access to transportation and enhanced mobility; conversion of abandoned railroad corridors into non-motorized trails; projects that enable/encourage children to walk/bike to school; construction of turnouts, overlooks and viewing areas; planning, designing or constructing boulevards in former divided highway right-of-ways
Transportation Investment Generating Economic Recovery (TIGER) (*https://www.transportation.gov/tiger*)	Federal funding administered by NYSDOT	Awards focus on capital projects that generate economic development and improve access to reliable, safe and affordable transportation for communities, both urban and rural.
Recreational Trails Program (*https://www.fhwa.dot.gov/environment/recreational_trails/index.cfm*)	Federal funding administered by NYSOPRHP	Develop and maintain trails for both motorized and non-motorized uses, including hiking, bicycling, in-line skating, equestrian use, cross-country skiing, snowmobiling, off-road motorcycling, all-terrain vehicle riding, four-wheel driving, or other off-road motorized vehicles; develop trailhead facilities; purchase/lease of maintenance equipment; acquisition of easements/property

State and Community Highway Safety Grants (***http://www.ghsa.org/about/federal-grant-programs/402***)	Federal	Federal Safety-related programs and projects (Section 402)
HUD Community Development Block Grants (***https://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs***)	Federal	Public facilities and improvements, such as streets, sidewalks, sewers, water systems, community and senior citizen centers, recreational facilities, and greenways
Urbanized Area Formula Grants, Capital Investment Grants and Loans, and Formula Program for Other than Urbanized Area (***https://www.transit.dot.gov/funding/grants/urbanized-area-formula-grants-5307***)	Federal (FTA)	Bicycle access to public transportation facilities, shelters and parking facilities, bus bicycle racks
National Park Service Land and Water Conservation Fund (LWCF) Grants (***https://www.nps.gov/subjects/lwcf/index.htm***)	Federal	A variety of parks and recreation facilities, including trails and greenways.

CHIPS (Consolidated Local, State, and Highway Improvement Program) (*www.dot.ny.gov/programs/chips*)	State	Bike lanes and wide curb lanes; sidewalks
New York State's Consolidated Funding Application (CFA) (*https://apps.cio.ny.gov/apps/cfa/*)	State	A streamlined resource through which applicants can access multiple financial assistance programs made available through various state agencies including: • Environmental Protection Fund's (EPF) Municipal Grant Program • EPF Recreational Trails Program • Department of State's Local Waterfront Revitalization Program • Environmental Facilities Corporation's Green Innovation Grant Program.
The Green Innovation Grant Program GIGP (*http://www.efc.ny.gov/*)	State	Projects that improve water quality and demonstrate green stormwater infrastructure in New York State.
The Community Development Block Grant (CDBG) (*https://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs*)	Regional	Sidewalks
The Greater Rochester Health Foundation (*http://www.thegrhf.org/*)	Regional	Community health and prevention projects and programs

People for Bikes (***http://www.peopleforbikes.org/pages/community-grants***)	Private	Bicycle facilities; end-of-trip facilities; trails; advocacy projects such as Ciclovias
National Trails Fund (***www.americanhiking.org/our-work/national-trails-fund***)	Private	Hiking trails
Global ReLeaf Program (***www.americanforests.org/our-programs/global-releaf-projects/global-releaf-grant-application/global-releaf-project-criteria***)	Private	Trail tree plantings
Robert Wood Johnson Foundation (general) (***www.rwjf.org/grants***)	Private	Various
The Conservation Alliance Fund (***www.conservationalliance.com/grants/grant_criteria***)	Private	Land Use
Surdna Environment/ Community Revitalization (***www.surdna.org/grants/grants-overview.html***)	Private	Community revitalization and environment, including greenway trail design

8.1 FEDERAL FUNDING SOURCES: FAST FUNDED PROGRAMS

The adoption of the FAST Act generally continues the bicycle and pedestrian funding mechanisms of its legislative predecessor, Moving Ahead for Progress for the 21st Century (MAP-21) with minor modifications and at slightly higher funding levels. The most significant structural change, which does not equate to a significant practical difference, is that the MAP-21 Transportation Alternatives Program (host to many of the Federal non-motorized transportation funding opportunities), is eliminated. Instead, transportation alternatives funding is a set-aside component of the Surface Transportation Block Grant (STBG) program, which is the successor to prior legislations' Surface Transportation Program (STP). Safe routes to school projects and recreational trail projects are among the activities that now fall under this program set-aside. These and other funding opportunities governed by the FAST Act are briefly described in this section. It is worth noting that some FAST Act changes related to transportation alternatives funding apply only to urbanized areas with populations greater than 200,000, and therefore may not be applicable to the Town of Irondequoit as an individual applicant. It is also worth noting that the FAST Act introduces some non-motorized transportation changes, such as language related to Complete Streets concepts, which are not strictly related to funding.

Several of the following resources provide additional information on relevant aspects of the FAST Act:

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/legislation/sec217.cfm
http://www.fhwa.dot.gov/fastact/factsheets/transportationalternativesfs.pdf
http://www.bikeleague.org/content/what-know-about-fast-act

National Highway Performance Program. Funds may be used to construct bicycle transportation facilities and pedestrian walkways on land adjacent to any highway in the National Highway System, including Interstate highways.

Highway Safety Improvement Program. Funds may be used for bicycle- and pedestrian-related highway safety improvement projects on a public road that are consistent with a State strategic highway safety plan. Highway Safety Improvement Program funds bicycle- and pedestrian-related highway safety improvement projects, strategies and activities on a public road as long as the project is consistent with a State strategic highway safety plan.

Congestion Mitigation and Air Quality (CMAQ) Improvement Program. Established in 1991 and continued in the FAST Act, CMAQ provides funding for transportation projects that help State and local governments reduce vehicle emissions and traffic congestion in areas where air quality does not meet or did not previously attain the National Ambient Air Quality Standards. Projects require a 20 percent local match and the minimum grant amount is $250,000. GTC is no longer receiving a CMAQ set aside. CMAQ funds will be dispersed at the discretion of the NYSDOT main office in Albany.

Transportation Alternatives (TAP). This program helps communities deliver safe, transformative and innovative projects of value to the public that contribute to the revitalization of local and regional economies by funding programs and projects defined as transportation alternatives. Projects are expected to improve mobility, accessibility, and the community's transportation character such that the street network is more vibrant, walkable and safer for all transportation mode users, in particular pedestrians, bicyclists, transit users and drivers. Originally established under MAP-21, TAP now includes funding for what previously comprised three separate programs (Transportation Enhancements, Safe Routes to School, and Recreational Trails). Projects require a 20 percent local match and the minimum grant amount is $250,000. Eligible activities include:

- On and off Road bicycle and pedestrian facilities;
- Safety related infrastructure projects for improving non-driver access to public transportation and enhanced mobility
- Conversion and use of abandoned railroad corridors for trails for non-motorized transportation users
- Safe routes to school projects
- Projects for planning, designing or constructing boulevards or other roadways largely in the right of way of former divided highways
- Eligible secondary project activities include community improvement and environmental mitigation
- Construction of turnouts, overlooks and viewing areas;
- Community improvement activities and environmental mitigation are eligible only if they are part of a project that is eligible under one of the above categories

The Recreational Trails Program. This program is administered by NYSOPRHP. Funds may be used for all kinds of trail projects. Of the funds apportioned to a state, 30 percent must be used for motorized trail uses, 30 percent for non-motorized trail uses, and 40 percent for diverse trail uses (any combination). Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, cross-country skiing, snowmobiling, off-road motorcycling, all-terrain vehicle riding, four-wheel driving, or using other off-road motorized vehicles.

Highway Safety Section 402 Grants. A State is eligible for these Section 402 grants by submitting a Performance Plan (establishing goals and performance measures for improving highway safety) and a Highway Safety Plan (describing activities to achieve those goals). Research, development, demonstrations, and training to improve highway safety (including bicycle and pedestrian safety) are carried out under the Highway Safety Research and Development (Section 403) Program.

Highway Safety Section 405 Grants. Under this new NHTSA program, states in which more than 15% of traffic fatalities are bicyclists and pedestrians (including New York) are eligible for non-motorized safety funding. Eligible activities include safety education and awareness activities and programs, safety enforcement (including police patrols), and training for law enforcement on pedestrian- and bicycle-related safety laws.

8.2 OTHER FEDERALLY FUNDED PROGRAMS

Community Development Block Grants (CDBG). Through the U.S. Department of Housing and Urban Development (HUD), the CDBG program provides eligible metropolitan cities and urban counties (called "entitlement communities") with annual direct grants that they can use to revitalize neighborhoods, expand affordable housing and economic opportunities, and/or improve community facilities and services, principally to benefit low- and moderate-income persons. Eligible activities include building public facilities and improvements, such as streets, sidewalks, sewers, water systems, community and senior citizen centers, and recreational facilities. Several communities have used HUD funds to develop greenways.
http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

Transportation Investment Generating Economic Recovery (TIGER). The highly competitive TIGER grant program was created in 2009 and has funded numerous multi-modal and multi-jurisdictional projects since its inception. This is an annually administered discretionary grant program distinct from the FAST Act and typically provides grants to projects difficult to fund through traditional federal programs. Awards focus on capital projects that generate economic development and improve access to reliable, safe and affordable transportation for communities, both urban and rural.

Title 49 USC allows the Urbanized Area Formula Grants (Section 5307), Capital Investment Grants and Loans (Section 5309), and Formula Program for Other than Urbanized Area (Section 5311) transit funds to be used for improving bicycle and pedestrian access to transit facilities and vehicles. Eligible activities include investments in "pedestrian and bicycle access to a mass transportation facility" that establishes or enhances coordination between mass transportation and other transportation.

National Park Service Land and Water Conservation Fund (LWCF) Grants. This federal funding source was established in 1965 to provide "close-to-home" parks and recreation opportunities to residents throughout the United States. Money for the fund comes from the sale or lease of nonrenewable resources, primarily federal offshore oil and gas leases, and surplus federal land sales. LWCF grants can be used by communities to build a variety of parks and recreation facilities, including trails and greenways. LWCF funds are distributed by the National Park Service to the states annually. Communities must match LWCF grants with 50 percent of the local project costs through in-kind services or cash. All projects funded by LWCF grants must be used exclusively for recreation purposes, in perpetuity. Projects must be in accordance with each State's Comprehensive Outdoor Recreation Plan.

8.3 STATE AND REGIONAL FUNDING SOURCES

CHIPS (Consolidated Local, State, and Highway Improvement Program). Funds are administered by NYSDOT for local infrastructure projects. Eligible project activities include bike lanes and wide curb lanes (highway resurfacing category); sidewalks, shared use paths, and bike paths within highway right-of-way (highway reconstruction category), and traffic calming installations (traffic control devices category). CHIPS funds can be used for TAP grant program local match requirements.

New York State's Consolidated Funding Application (CFA) is a streamlined resource through which applicants can access multiple financial assistance programs made available through various state agencies. The CFA offers the opportunity for local governments (and other eligible applicants) to submit a single grant application to state agencies that may have resources available to help finance a given proposal. All submitted CFAs are also reviewed by the applicant's Regional Economic Development Council, which may elect to endorse the proposal as a regional priority project. Several grant resources have been made available that may be appropriate funding opportunities for implementation of active transportation efforts, including the following:

- Environmental Protection Fund's (EPF) Municipal Grant Program
- EPF Recreational Trails Program
- Department of State's Local Waterfront Revitalization Program
- Environmental Facilities Corporation's Green Innovation Grant Program.

The Greater Rochester Health Foundation administers a competitive grant program to implement community health and prevention projects. While grant focus topics and cycles may vary from year to year, bicycle- and pedestrian-related projects and programs may frequently be well suited for these opportunity grants.
http://www.thegrhf.org/

8.4 PRIVATE FUNDING SOURCES

There are a number of for and non-profit businesses that offer programs that can be used to fund bicycle and pedestrian related programs and projects. Nationally, groups like Bikes Belong fund projects ranging from facilities to safety programs. Locally, Wegmans and Excellus have a strong track record of supporting health-based initiatives and may be resources for partnership or sponsorship.

PeopleForBikes. The PeopleForBikes Community Grant Program strives to put more people on bicycles more often by funding important and influential projects that leverage federal funding and build momentum for bicycling in communities across the U.S. Most of the grants awarded to government agencies are for trail projects. The program encourages government agencies to team with a local bicycle advocacy group for the application. Applications for accepted bi-annually for grants of up to $10,000 each (with potential local matches).
http://www.peopleforbikes.org/pages/community-grants

American Hiking Society National Trails Fund. The American Hiking Society's National Trails Fund is the only privately funded national grants program dedicated solely to hiking trails. National Trails Fund grants have been used for land acquisition, constituency building campaigns, and traditional trail work projects. Since the late 1990s, the American Hiking Society has granted nearly $200,000 to 42 different organizations across the US. Applications are accepted annually with a summer deadline. ***http://www.americanhiking.org/NTF.aspx***

The Global ReLeaf Program. The Global ReLeaf Forest Program is American Forests' education and action program that helps individuals, organizations, agencies, and corporations improve the local and global environment by planting and caring for trees. The program provides funding for planting tree seedlings on public lands, including trailsides. Emphasis is placed on diversifying species, regenerating the optimal ecosystem for the site and implementing the best forest management practices. This grant is for planting tree seedlings on public lands, including along trail rights-of-way. ***http://www.americanforests.org/global_releaf/grants/***

The Robert Wood Johnson Foundation. The Robert Wood Johnson Foundation seeks to improve the health and health care of all Americans. One of the primary goals of the Foundation is to "promote healthy communities and lifestyles." Specifically, the Foundation has an ongoing "Active Living by Design" grant program that promotes the principles of active living, including non-motorized transportation. Other related calls for grant proposals are issued as developed, and multiple communities nationwide have received grants related to promotion of trails and other non-motorized facilities. ***http://www.rwjf.org/grants/***

Conservation Alliance. The Conservation Alliance is a group of outdoor businesses that supports efforts to protect specific wild places for their habitat and recreation values. Before applying for funding, an organization must first be nominated by a member company. Members nominate organizations by completing and submitting a nomination form. Each nominated organization is then sent a request for proposal (RFP) instructing them how to submit a full request. Proposals from organizations that are not first nominated will not be accepted. The Conservation Alliance conducts two funding cycles annually. Grant requests should not exceed $35,000 annually.
http://www.conservationalliance.com/

Surdna Foundation. The Surdna Foundation seeks to foster just and sustainable communities in the United States, communities guided by principles of social justice and distinguished by healthy environments, strong local economies and thriving cultures. ***http://www.surdna.org***

8. PILOT PROJECTS & FOLLOW ON ACTIVITIES

The Geneva Active Transportation Plan helps chart a course toward a fully inclusive and accessible Active Transportation System for the community. The project was driven by a consistent and comprehensive flow of input from residents and stakeholders.

The final report highlights a wide range of needed improvements that were identified by residents. Follow-on activities are future endeavors that will help advance the overall objectives of the Active Transportation Plan.

Follow-on activities can be placed into three general categories:

- Next steps to advance infrastructure improvements recommended in the Plan;
- On-going coordination and communication to support Active Transportation; and
- Additional plans and studies to advance community objectives.

As a master plan, the Geneva Active Transportation Plan does not identify all of the specifics needed to construct every recommended project. Some work still remains to be done. This includes, but is not limited to:

- Additional study and operational analysis is required for each recommended project prior to implementation.
- Consultation with - and agreement from - facility owners is required prior to implementation.
- Detailed corridor studies are needed in order to provide on-street bicycle facilities in select corridors.
- Design development and construction documentation will be necessary for any construction-related projects, such as trails, sidepaths, and other infrastructure improvements.
- Regulatory approvals and permitting will be necessary for many of the recommended projects.
- Environmental permits may be required for some projects. Some of the program and policy recommendations do not require regulatory approvals. However, changes to City code will need review and approval by the appropriate municipal boards and would be subject to the State Environmental Quality Review Act (SEQRA) process.

During the planning process, several possible projects emerged that would be beneficial follow-on activities:

PEDESTRIAN AND BICYCLE COUNTS

Collecting reliable data on pedestrian and bicycle usage and travel patterns will provide an important tool for advancing Active Transportation in Geneva. Without accurate and consistent demand and usage figures, it is difficult to measure the positive benefits of investments in these modes, especially when compared to the other transportation modes such as the private automobile.

A good follow-on project would be to implement bike and pedestrian counts in selected locations, based on protocols provided by the National Bicycle and Pedestrian Documentation Project (NBPD), and the FHWA Traffic Monitoring Guide. ***http://bikepeddocumentation.org/***

BICYCLE FRIENDLY COMMUNITY APPLICATION

The Bicycle Friendly Community (BFC^{SM}) program provides a road-map to improve conditions for bicycling and the guidance to make your distinct vision for a better, bike-able community a reality. Applying to be a BFC would support Geneva's principles of welcoming bicyclists by providing safe accommodations for bicycling and encouraging people to bike for transportation and recreation. Making bicycling safe and convenient are keys to improving public health, reducing traffic congestion, improving air quality and improving quality of life. Additional follow-on activities should include future infrastructure upgrades and re-applications to gradually improve the City or Town's BFC award level. ***http://www.bikeleague.org/community***

WALK FRIENDLY COMMUNITY APPLICATION

Walk Friendly Communities (WFC) is a national recognition program developed to encourage towns and cities across the U.S. to establish or recommit to a high priority for supporting safer walking environments. The WFC program recognizes communities that are working to improve a wide range of conditions related to walking, including safety, mobility, access, and comfort. Applying for and receiving the "Walk Friendly" title would mean that Geneva is being recognized for its success in working to improve a wide range of conditions related to walking, including safety, mobility, access, and comfort. ***www.walkfriendly.org***

RE-EVALUATE PEDESTRIAN SIGNAL CROSSING TIMES AT INTERSECTIONS

Check the signal timing to ensure that the maximum walk time is allowed for the crossings. Pedestrian signals are designed to direct and protect the pedestrian at street crossings. The MUTCD provides both mandatory and permissive warrants. When applying the warrants, consideration should be given to any significant concentrations of young, elderly, or persons with disabilities using the project site. Pedestrian-activated signals should be considered when vehicular signal timing is not sufficient to properly accommodate pedestrians. Coordinate with OCDOT on-going signal updates. Refer to **NYSDOT Highway Design Manual, sections 18.7.9 and 18.7.10**.
https://www.dot.ny.gov/divisions/engineering/design/dqab/hdm

ON-GOING COORDINATION WITH NYSDOT AND OCDOT

There are possible opportunities to collaborate with agencies conducting existing highway/street reconstruction projects to include upgrades to bicycle and pedestrian infrastructure. Coordination at the beginning of the reconstruction project will help to ensure bicycle and pedestrian facilities are studied as part of the inventory phase and carried through construction. Maintain regular communication with NYSDOT and OCDOT regarding implementation of plan recommendations.

ON-GOING COORDINATION WITH HOBART & WILLIAM SMITH COLLEGES

Hobart and William Smith Colleges recently completed HWS 2015, a Master Plan Update. Like coordinating with NYSDOT and OCDOT, coordinating with Hobart and William Smith Colleges would create efficiencies and provide opportunities for encouraging active transportation.

APPENDIX

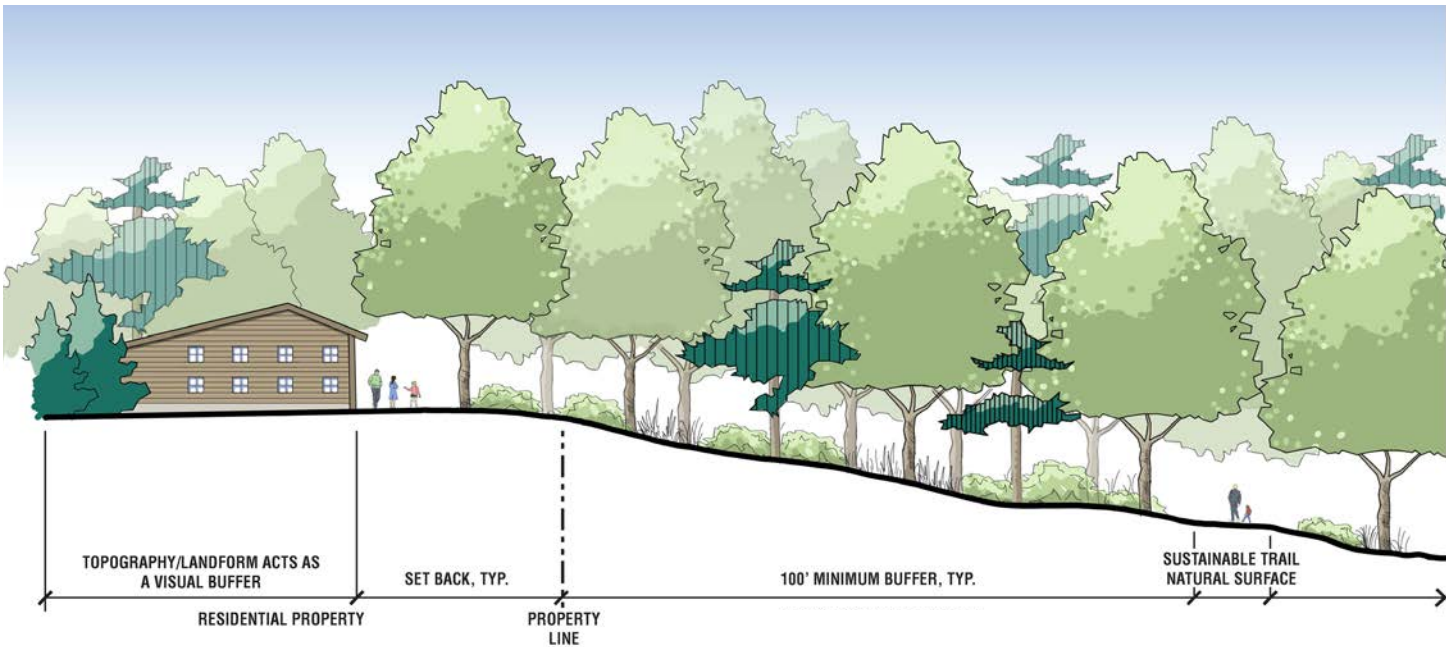
A. COMMUNITY IMPACTS OF TRAILS

Irondequoit Bay Park West, Irondequoit NY

Erie Canalway Trail, Brighton NY

El Camino Trail, Rochester NY

Corbetts Glen, Brighton NY



COMMUNITY IMPACT OF TRAILS

Understanding the impact of public trails

Prepared by Barton & Loguidice, DPC

STUDIES OF EXISTING TRAILS AND SHARED USE PATHS

https://linkingtheloop.files.wordpress.com/2014/08/studies-of-existing-trails-crime-and-properties-value.pdf

Source: Multiple

Subject: Trail Safety and Real Estate Values

Findings: "There are many misconceptions about the safety of bicycle paths/trails and their relationship to property values/the real estate market. Below is a collection of excerpts from various resources that provide information on the often-misunderstood nature of bicycle paths/trails and their effect on the community."

Figure 1: Comparison of Major Crime Rates between Rail Trails and the Nation (rates per 100,000 population, Source: Rails to Trails Conservancy

CRIME	URBAN		SUBURBAN		RURAL	
	1995 National[1]	Rail-Trails[2]	1995 National[1]	Rail-Trails[2]	1995 National[1]	Rail-Trails[2]
Mugging	335	0.53	102	0.00	19	0.00
Assault	531	0.58	293	0.02	203	0.01
Forcible Rape	43	0.04	29	0.00	26	0.01
Murder	11	0.04	4	0.01	5	9.01

1. Rates per 100,000 Population. FBI Uniform Crime Reports for 1995.
2. Rates per 100,000 users, RTC survey results.

THE CORRELATION OF NATURE TRAILS AND CRIME

http://www.parkpride.org/get-involved/community-programs/park-visioning/content/correlationbetweennaturetrailsandcrime.pdf

Source: Multiple

Subject: Trail Safety and Real Estate Values

Findings:

- "The results showed that in most incidences the trails were perceived to be positive to both quality of life and property value.
- Single family home residents adjacent to a trail: 29% believed that the location of the trail would increase selling price, 7% felt that the trail would make the home easier to sell, 57% of these residents lived in their homes prior to construction of the trail, 29% of those surveyed were positively influenced by the trail in their decision to buy the home
- Town homes, apartments, and condominium residents: 0% thought the trail would decrease selling price, 42% thought it would increase the selling price.

NEIGHBORHOODS AND TRAILS: WHY TRAILS?

http://www.sfct.org/trails/neighborhoods

Source: Santa Fe Conservation Trust

Subject: Crime, Privacy and Noise, Property Values, Ecological Destruction, Habitat Degradation, Land Acquisition and Property Rights

Findings:

- "Burglary near trails was extremely rare, more so than other crimes. Only 4 burglaries were reported in homes adjacent to 7,000 miles of rail trails in 1996 and 3 of those 4 were reported in rural areas. There's no evidence that these 4 crimes were a result of the nearby trail."
- "In Santa Rosa (California), a similar survey found that 64% of the residents near a trail felt their quality of life had improved; 33% said their home would be easier to sell while the remainder felt the trail had no effect on values." [Webel, 2007 using data collected in 1992]
- "A careful count of bird species along urban and rural rail trails showed no significant difference. Generally, there were more birds in woody urban and rural areas in spring and summer and more birds near urban trails in the fall and winter. [Poague, 2000]
- "For example, a release from liability can be useful, but homeowners and agency administrators may be reluctant to sign anything. Municipal "umbrella" policies are helpful and claims virtually unknown." [Eyler, 2008, p. 423]

RAIL-TRAILS AND SAFE COMMUNITIES

http://safety.fhwa.dot.gov/ped_bike/docs/rt_safecomm.pdf

Source: Rails-to-Trails Conservancy

Subject: Economic Impacts of Trails

Findings: *"The trail has not caused any increase in the amount of crimes reported and the few reported incidents are minor in nature...We have found that the trail brings in so many people that it has actually led to a decrease in problems we formerly encountered such as underage drinking along the river banks. The increased presence of people on the trail has contributed to this problem being reduced."* [Charles R. Tennant, Chief of Police, Elizabeth Township, Buena Vista, PA]

Figure 2: Comparison of Incidence Rate of Minor Crimes on Rail-Trails to U.S. Crime Rates & Percentages of Trails Reporting Types of Crime in 1995

CRIME	URBAN		SUBURBAN		RURAL	
	National[1]	Rail-Trails[2]	National[1]	Rail-Trails[2]	National[1]	Rail-Trails[2]
Burglary	1,117	0.00%	820	0.01%	687	0.01%
Trespassing	N/A	5%	N/A	3%	N/A	4%
Graffiti	N/A	26%	N/A	17%	N/A	12%
Littering	N/A	24%	N/A	24%	N/A	25%
Sign Damage	N/A	22%	N/A	22%	N/A	23%
Motorized Use	N/A	18%	N/A	14%	N/A	23%

1. Rates per 100,000 Population. FBI Uniform Crime Reports for 1995 for burglary.

2. Rates per 100,000 users, RTC survey results for burglary. Results for other crime types reported as percentage of trails experiencing that type of crime.

ECONOMIC IMPACTS OF TRAILS

http://www.americantrails.org/resources/economics/GreenwaySumEcon.html

Source: American Trails

Subject: Economic Impacts of Trails

Findings: "In the vicinity of Philadelphia's 1,300 acre Pennypack Park, property values correlate significantly with proximity to the park. In 1974, the park accounted for 33 percent of the value of land 40 feet away from the park, nine percent when located 1,000 feet away, and 4.2 percent at a distance of 2,500 feet." Hammer, Coughlin and Horn, 1974]

IMPACTS OF TRAILS AND TRAIL USE

http://www.americantrails.org/resources/adjacent/sumadjacent.html

Source: American Trails

Subject: Impacts of Trails and Trail Use

Findings: "A 1978 study of property values in Boulder, Colorado, noted that housing prices declined an average of $4.20 for each foot of distance from a greenbelt up to 3,200 feet. In one neighborhood, this figure was $10.20 for each foot of distance. The same study determined that, other variables being equal, the average value of property adjacent to the greenbelt would be 32% higher than those 3,200 feet away."

PROPERTY VALUE/DESIRABILITY EFFECTS OF BIKE PATHS ADJACENT TO RESIDENTIAL AREAS

http://128.175.63.72/projects/DOCUMENTS/bikepathfinal.pdf

Source: University of Delaware

Subject: Property Value Near Bike Paths

Findings: "The analysis indicates that the impact of proximity to a bike path on property prices is positive, controlling for the number of bedrooms, years since sale, acres, land, buildings, total number of rooms, total assessment. The properties within 50m of the bike paths show a positive significance of at least $8,800 and even higher when controlled for specific variables."

BICYCLE PATHS: SAFETY CONCERNS AND PROPERTY VALUES

http://www.greenway.org/pdf/la_bikepath_safety.pdf

Source: Los Angeles County, Metropolitan Transportation Authority

Subject: Home sales near trails

Findings:

- "Home sales were examined in the seven Massachusetts towns through which the Minuteman Bike way and Nashua River Rail Trail run. Statistics on list and selling prices and on days on the market were analyzed. The analysis shows that homes near these rail trails sold at 99.3% of the list price as compared to 98.1% of the list price for other homes sold in these towns. The most significant feature of home sales near rail trails is that these homes sold in an average of 29.3 days as compared to 50.4 days for other homes." [Home Sales Near Two Massachusetts Trails, Jan. 25, 2006. Craig Della Penna]

TABLE 1: HOME SALES NEAR RAIL TRAILS

TOWN	NO. OF PROPERTIES SOLD	AVERAGE LIST PRICE	AVERAGE SALE PRICE	RATIO OF SALE TO LIST	DAYS ON MARKET
Arlington	10	$513,750	$509,690	99.2%	27.1
Lexington	10	$906,090	$907,040	100.1%	18.5
Bedford	3	$511,600	$500,833	97.9%	55.3
Ayer	1	$329,900	$317,500	96.2%	47.0
Groton	2	$689,900	$675,000	97.8%	22.0
Dunstable	1	$695,000	$685,000	98.6%	20.0
Pepperell	3	$385,833	$376,333	97.5%	48.3
AVERAGE		$643,180	$638,377	99.3%	29.3

TABLE 2: HOME SALES NEAR RAIL TRAILS

TOWN	NO. OF PROPERTIES SOLD	AVERAGE LIST PRICE	AVERAGE SALE PRICE	RATIO OF SALE TO LIST	DAYS ON MARKET
Arlington	119	$558,775	$556,327	99.6%	28.3
Lexington	166	$871,533	$849,470	97.5%	54.4
Bedford	38	$633,912	$624,289	98.5%	42.4
Ayer	30	$344,677	$340,155	98.7%	73.0
Groton	53	$605,198	$584,689	96.6%	80.4
Dunstable	12	$587,946	$578,965	98.5%	83.2
Pepperell	57	$384,818	$379,482	98.6%	80.2
AVERAGE		$645,607	$633,072	8.1%	50.4

- "Realizing the selling power of greenways, developers of the Sheperd's Vineyard housing development in Apex, North Carolina added $5,000 to the price of 40 homes adjacent to the regional greenway, those homes were still the first to sell." [Economic Benefits of Trails and Greenways, Rails-to-Trails Conservancy, 2004]
- "The average price for all homes sold in greenway corridors was nearly 10 percent higher than the average price for all homes. Similarly, the average sale price was 11 percent higher than for all homes that sold in 1999," [Public Choices and Property Values: Evidence from Greenways Indianapolis, Center for Urban Policy and the Environment, December 2003]
- "A study of property values near greenbelts in Boulder, Colorado, noted that...other variables being equal, the average value of property adjacent to the greenbelt would be 32 percent higher than those 3,200 feet away." [Economic Impacts of Rivers, Trails and Greenways: Property Values. Resource Guide published by the National Parks Service, 1995]
- "A study completed by the Office of Planning in Seattle, Washington, for the 12 mile Burke-Gilman trail was based upon surveys of homeowners and real estate agents. The survey of real estate agents revealed that property near, but not immediately adjacent to

the trail, sells for an average of 6 percent more." [Economic Impacts of Rivers, Trails and Greenways: Property Values. Resource Guide published by the National Parks Service, 1995]

- "In a survey of adjacent landowners along the Luce Line rail-trail in Minnesota, 61 percent of the suburban residential owners noted an increase in their property value as a result of the trail. New owners felt the trail had a more positive effect on adjacent property values than did continuing owners. Appraisers and real estate agents claimed that trails were a positive selling point for suburban residential property." [Economic Impacts of Rivers, Trails and Greenways: Property Values. Resource Guide published by the National Parks Service, 1995]
- "A survey of Denver residential neighborhoods by the Rocky Mountain Research Institute shows the publics increasing interest in greenways and trails. From 1980 to 1990, those who said they would pay extra for greenbelts and parks in their neighborhoods rose from 16 percent to 48 percent." [Economic Impacts of Rivers, Trails and Greenways: Property Values. Resource Guide published by the National Parks Service, 1995]
- "Recognizing what had happened, the realty companies decided to restructure the pricing of future lots located along the Mountain-Bay Trail. Thus, in the addition of Highridge Estates, the average lot located along the rail was priced 26 percent higher than slightly larger lots not located along the trail." [Perceptions of How the Presence of Greenway Trails Affects the Value of Proximate Properties. Journal of Park and Recreation Administration, Fall 2001. John L. Crompton.]

APPENDIX
B. PUBLIC INPUT SUMMARY

PROJECT STEERING COMMITTEE MEETING

Geneva City Hall
47 Castle Street
January 20, 2016
5:45 pm – 7:45 pm

Attendees:

- *Sage Gerling* — *City of Geneva*
- *Bill McAdoo* — *Code Enforcement*
- *Bernie Lynch* — *Business Owner, City Resident*
- *Charles King* — *City Resident*
- *Julia Hoyle* — *City Resident*
- *Saul Shama* — *High School Teacher, City Resident*
- *David Strickland* — *City Resident*
- *Jennifer Grant* — *Town Resident*
- *Mark Venuti* — *Supervisor, Town Resident*
- *Mark Palmieri* — *Councilman, Town Resident*
- *Karen English* — *Town Resident*
- *Noah Lucas* — *Town Resident*
- *Seamus Hogan* — *Student, Town Resident*
- *Bob Torzynski* — *GTC*
- *Nicole Cleary* — *Barton & Loguidice (B&L)*
- *Tom Robinson* — *Barton & Loguidice (B&L)*
- *Peyton McLeod* — *Sprinkle Consulting (by phone)*

Meeting Format

1. Introductions
2. Project Objectives
3. Project Tasks and Preliminary Schedule
4. Steering Committee Meetings and Participation
5. Public Meetings
6. Next Steps
7. Questions/Discussion

Comments and Questions Received

1. Introductions
    a. Members of the committee were asked to identify their main concerns and goals for the project as they introduced themselves. Below is a list of concerns and/or goals that were received.
        i. Safer biking facilities.
        ii. Safer biking and walking facilities to encourage tourism.
        iii. Incorporating all levels of riders into the design of new facilities.
        iv. Improving confidence of riders and walkers.
        v. Enhancing Town and City linkages.
        vi. Addressing resident's concerns for the Town Greenway Trail concept.
        vii. Improving access to biking and walking facilities.
        viii. Improving trails and connectivity.
        ix. Improving visibility of crosswalks.
        x. Safer pedestrian and bicycle accommodations at the Intersection of Hamilton and Pulteney.

xi. Address walking around the City and Town. Northeast neighborhoods (specifically Carter Rd and North St) have a large population of walkers.

2. Project Objectives
    a. Improve Geneva's sense of place. Take pride in materials and standards. Enhance transportation systems to support community character.
    b. Plan and design for an inclusive system.
    c. Include City and Town destinations for connectivity.
3. Project Tasks and Preliminary Schedule
    a. Question was asked by the committee about how focus roadways are chosen.
        i. Focus on major roadways for the Level of Service analysis due to the available to traffic data. Due to the compact network for this study, there will be some flexibility. Project team will finalize the roadway study network to include key local roadways.
    b. Project will need to focus on connections to the North and Northeast neighborhoods. These areas mostly contain local roads and should not be neglected in the study.
    c. Data collection: some committee members will be willing to help. The team will plan on notifying committee members via email prior to going out.
    d. Available data: committee members involved in the Town comprehensive plan will share the data collected during that project with the Team.
    e. Design Connect, a group of students from Cornell, is a great group to connect with for this project.
    f. Crossing guards may be one of our best resources. Seamus might be able to chat with some of them to get some information.
    g. The Active Transportation plan will be coordinated with the pending Pulteney Street reconstruction project.
4. Steering Committee Meetings and Participation
    a. The bike and/or walk tours could go between Geneva's schools. Charles and Noah are willing to help lead the tours.
5. Public Meetings and Outreach
    a. Public outreach: in order to be inclusive, the Team will need the committee's help spreading the word about the project (specifically related to upcoming meetings).
    b. Printed hard copies of the survey could be made available to the schools by Saul and Seamus.
6. Next Steps
    a. Priority intersection selection: the project scope includes investigating up to six priority intersections and making recommendations for improvements. Meeting attendees marked up maps with areas of concern. Priority intersections discussed are below:
        i. Pulteney and Hamilton
        ii. Exchange and North
        iii. West Washington and Pre-Emption
        iv. Carter and North
        v. Hamilton, White Springs, Spring St
        vi. Lewis and N Main
        vii. High and Nursery
        viii. Washington and Nursery

        B&L/Sprinkle will review data and recommend a short-list of priority intersections for approval by the committee.
7. Questions/Discussion
    a. In general, there aren't very many direct routes for cars through Geneva.
    b. Geneva's lakefront and downtown areas need improved connectivity.
    c. Education and outreach on safe crossing methods for pedestrians and vehicles.
    d. Public transit will be considered as an integral piece of the Active Transportation Plan.
    e. Need a formalized trail on west side of tunnel for the Waterfront Trail.
    f. Crossing Hamilton to get to the little league fields is a conflict.
    g. Crosswalks on Main, south of Hamilton, are conflict points. Visibility of crosswalks at dusk is

difficult. Typical comment for most crosswalks. Also, pedestrian crossing signs located within the roadway in these areas causes a conflict – too narrow of a roadway for these signs.

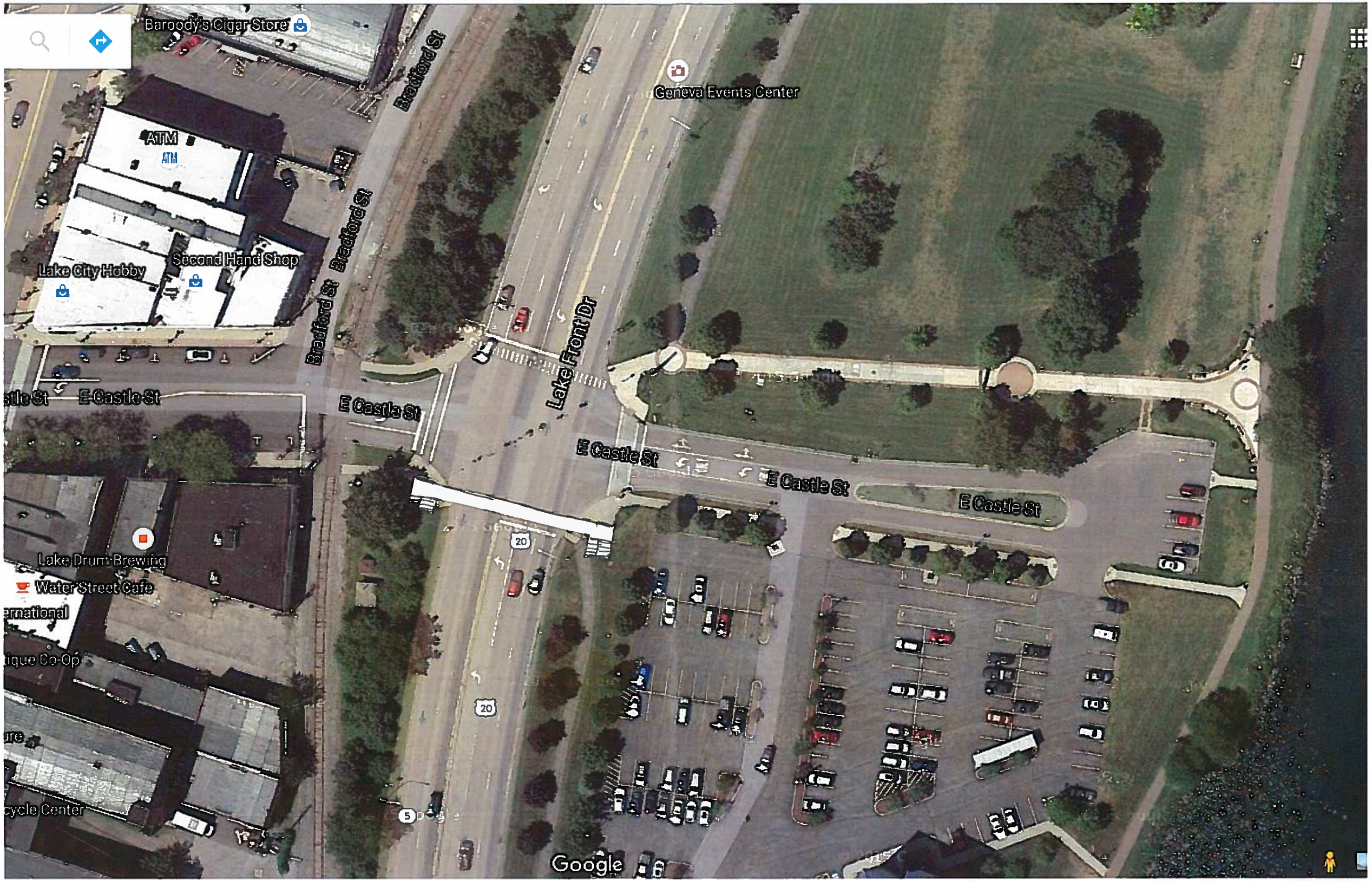
h. Concern for right turn from Exchange onto Castle – right turn arrow, vehicles speeding through turn, sight line issues.

Next Steps

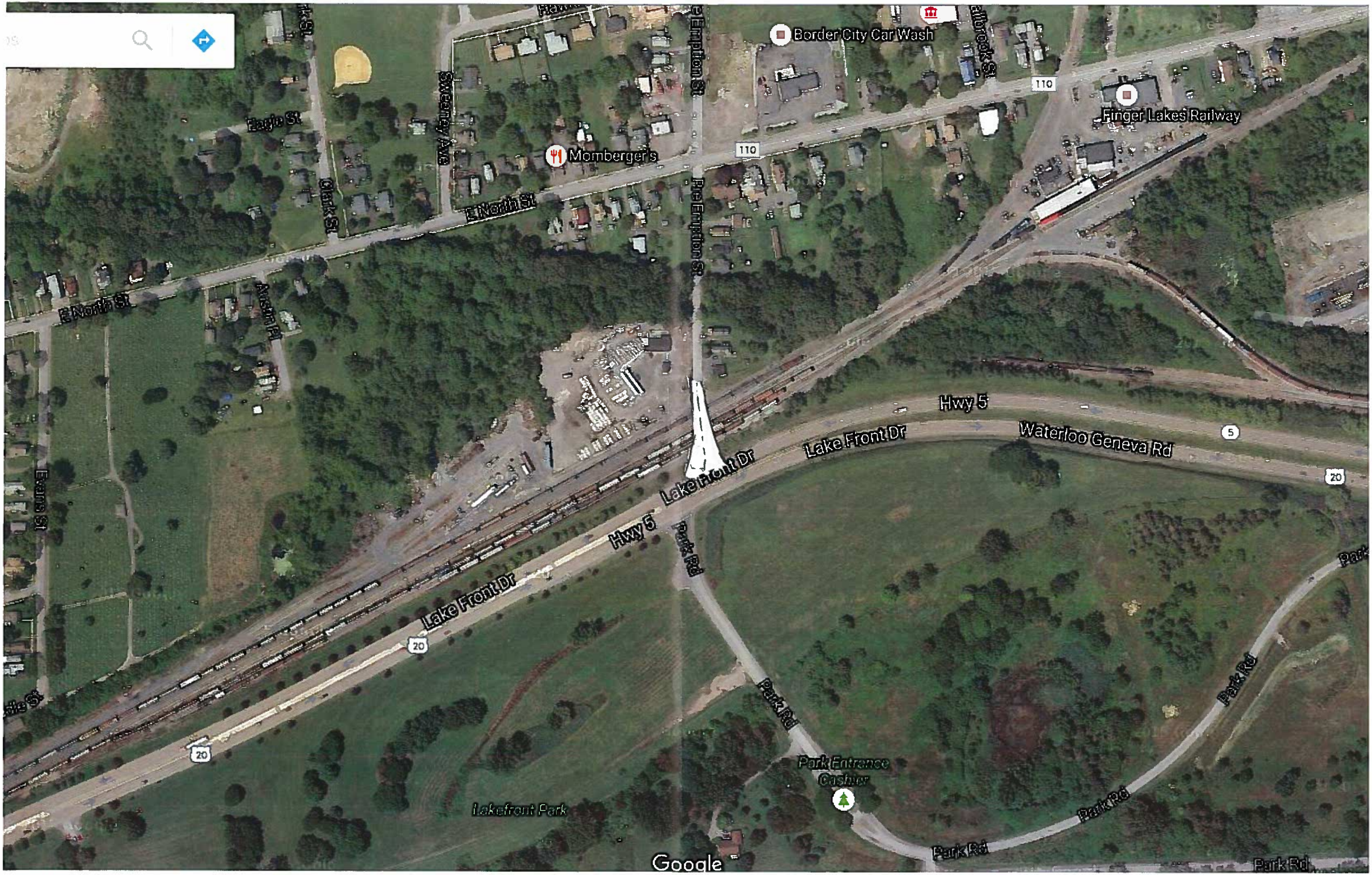
- B&L and Sprinkle compile and review existing plans and documents
- B&L and Sprinkle will begin the inventory of existing and planned conditions.
- B&L and Sprinkle will review priority intersection list and make recommendations for the top 6 candidates. This will be sent to the committee for review.
- B&L will work with the City and committee to schedule the Bike and/or Walk Tours, proposed for March 2016.

These meeting minutes were prepared by Nicole Cleary of Barton & Loguidice. Please contact with any discrepancies.
ncleary@bartonandloguidice.com


Geneva Lakefront
Childcare Center
Five Star Bank
Karizma Salon
Scott LaFaro Dr
S Exchange St
Franklin St
Park Pl
S Main St
Pulteney Park
Long Pier
New York State
Department of Labor
Hamilton St
Park Ave
Geneva Recreation
Ice Skating
Waterfront Trail
Google


Baroody's Cigar Store
Bradford St
Geneva Events Center
ATM
ATM
Lake City Hobby
Second Hand Shop
Bradford St
Bradford St
Lake Front Dr
E Castle St
E Castle St
E Castle St
E Castle St
E Castle St
20
20
5
Lake Drum Brewing
Water Street Cafe
Google


1907 Bragdon House
Bed and Breakfast
Trinity Church
Geneva Historical Society
N Cloverleaf Dr
S Main St
Hamilton St
S Cloverleaf Dr
Finger Lakes Institute
Google

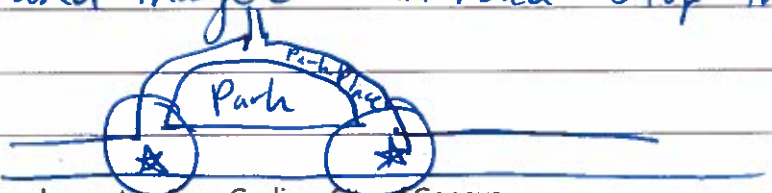

Border City Car Wash
Momberger's
Finger Lakes Railway
E North St
Sweeney Ave
Clark St
Austin Pl
Eagle St
E Emption St
Pre Emption St
Hwy 5
Lake Front Dr
Waterloo Geneva Rd
Park Rd
Park Entrance Cashier
Lakefront Park
Evans St
110
20
5
Google

COMMENTS

Please share any additional comments or feedback you have related to the Geneva Active Transportation Plan.

★ Walking from Wegman's to the Plaza
- Difficult to cross at Copeland & St 20
- No sidewalk at Wegman's light (mid-block) leaving Wegman's. Planted median makes difficult to cross

★ At Pulteney Park (on S. Main St.) need pedestrian signage and maybe - in road - stop for pedestrians



Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

Please share any additional comments or feedback you have related to the Geneva Active Transportation Plan.

SIDEWALK GAPS DON'T ENCOURAGE WALKING

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

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Bus/rail and/or rail access between Geneva and nearby communities as well as better bus network within Geneva. Not easy to travel without a car.

Lack of taxi's locating/congregating where people might gather (i.e. near bus stops downtown)

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

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CROSSING S&20 (BRIDGE OR RAISED CROSSWALK?)

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

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Crossing S. Main St can be difficult, perhaps almost more dangerous at the painted crosswalks at campus. Many cars don't stop, some do and others from other direction don't, etc. Safest to stand back and wait until all clear. Some walkers just walk out into the street at the crosswalk w/out looking at all.

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

Please share any additional comments or feedback you have related to the Geneva Active Transportation Plan.

Hank Pearson - dancingcongaman@yahoo.com
(Arbors & ATP)

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

Please share any additional comments or feedback you have related to the Geneva Active Transportation Plan.

Winston - wsnice@hotmail.com -add to general interest d ATP

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

COMMENTS

Please share any additional comments or feedback you have related to the Geneva Active Transportation Plan.

NMC NOTES

- IDENTIFY STATE BIKE ROUTE
- NORTH & CARTER (AFFECTS HIGH SCHOOL STUDENTS TOO)
-

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us

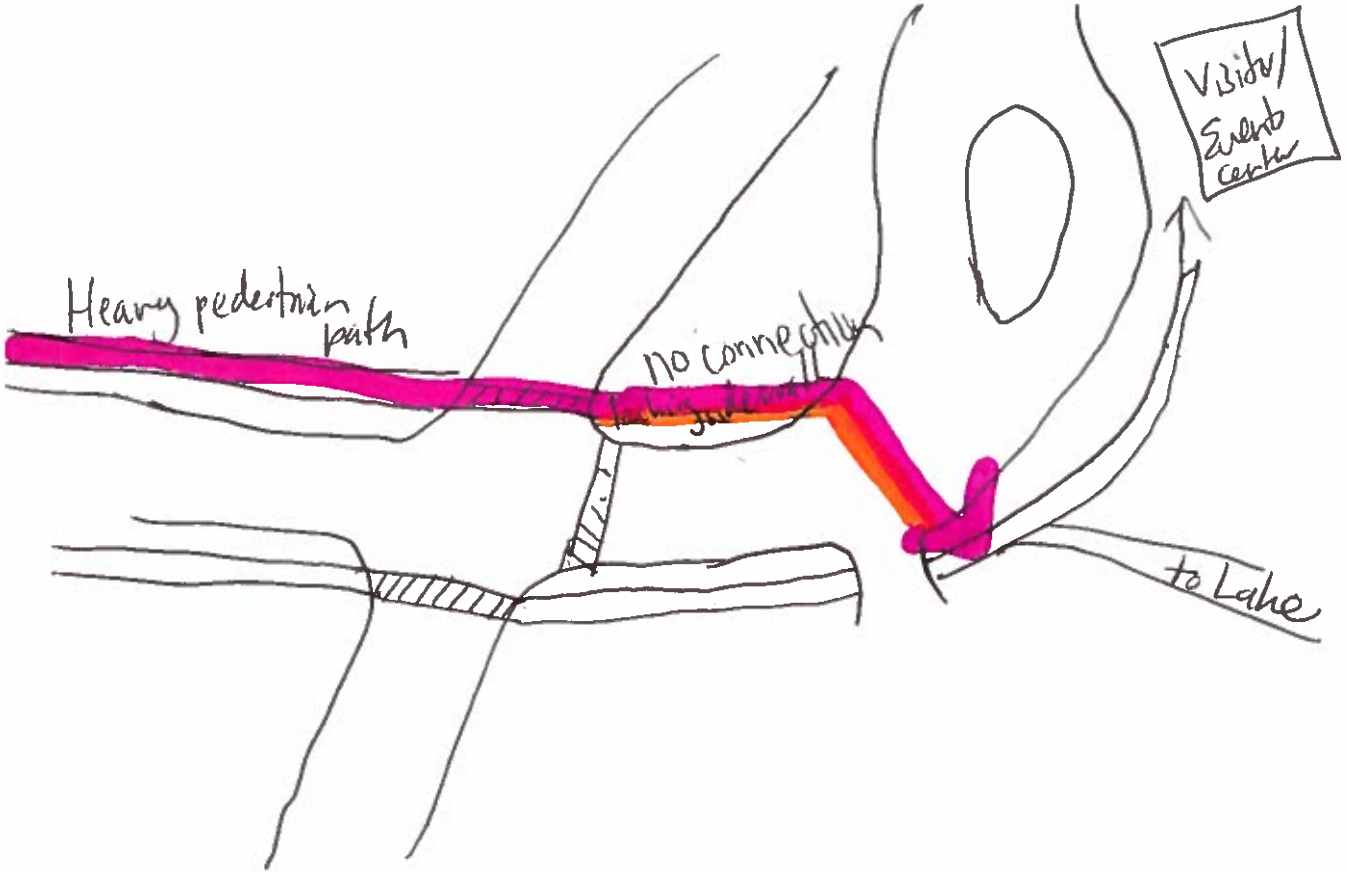
COMMENTS

Please share any additional comments or feedback you have related to the Geneva Active Transportation Plan.

Handicap access to Lafayette Circle (N. Brook St/ Lafayette Ave)
then can use grass

Brook St. Park - ADA @ across Brook St blw tennis & main side

Additional comments may be sent to Sage Gerling, City of Geneva:
sgerling@geneva.ny.us


Heavy pedestrian path
No connection
Visitor/ Events center
to Lake

GENEVA **ACTIVE TRANSPORTATION PLAN**

Project Committee Meeting
City Hall
Tuesday March 7th, 2017
5:30pm - 7:00pm

MEETING AGENDA

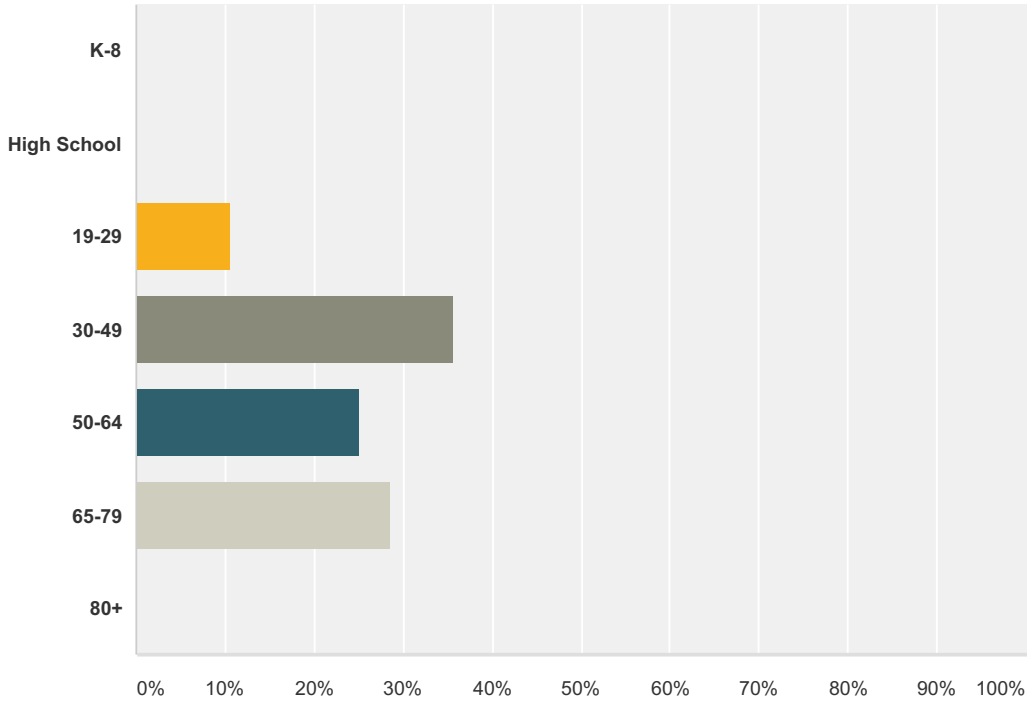
1. Project status update

2. Presentation of draft Geneva Active Transportation Plan
    a. Introduction and summary
    b. Public input
    c. Existing conditions evaluations
    d. Facility recommendations
        1. Sidewalk gaps
        2. City-to-Lake connectivity
        3. Trail opportunities
        4. Bicycle boulevards
        5. On-street recommendations
        6. Priority intersections
        7. Zoning code review

3. Next Steps
    a. Revise documents based on committee feedback
    b. Public meeting #2, date TBD
    c. Revise and compile final Plan documents
    d. Prepare final Plan

Q1 Age Group (select one)

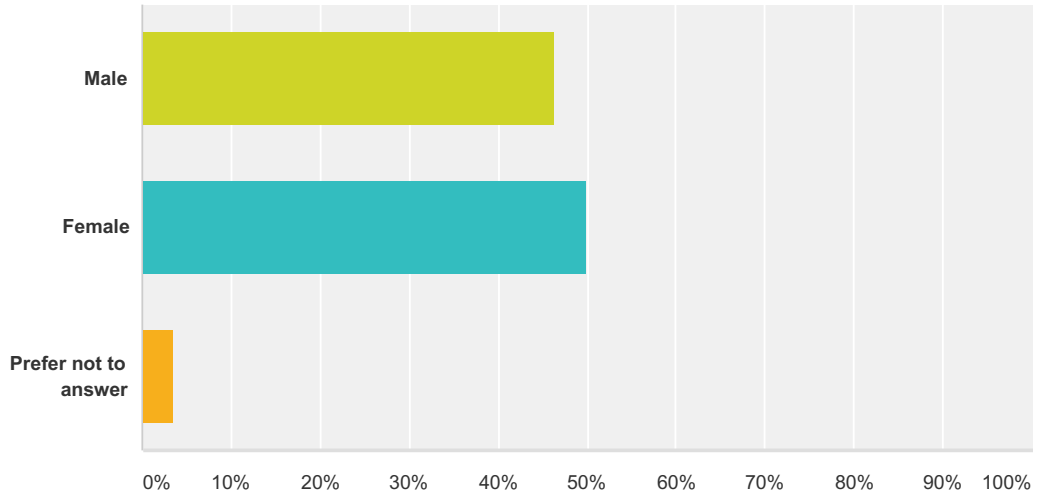
Answered: 28 Skipped: 0



Answer Choices	Responses	
K-8	**0.00%**	0
High School	**0.00%**	0
19-29	**10.71%**	3
30-49	**35.71%**	10
50-64	**25.00%**	7
65-79	**28.57%**	8
80+	**0.00%**	0
Total		**28**

Q2 Gender

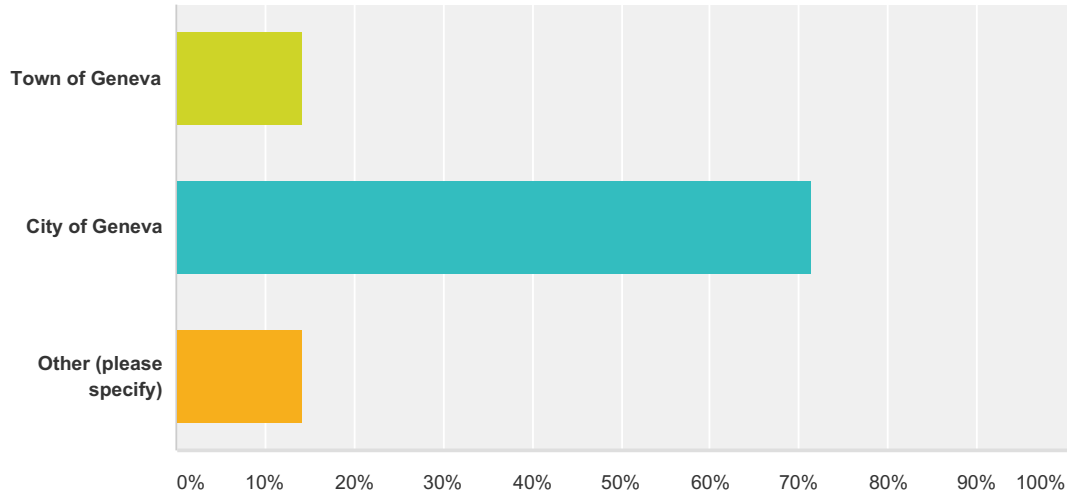
Answered: 28 Skipped: 0



Answer Choices	Responses	
Male	**46.43%**	13
Female	**50.00%**	14
Prefer not to answer	**3.57%**	1
Total		**28**

Q3 Where do you live?

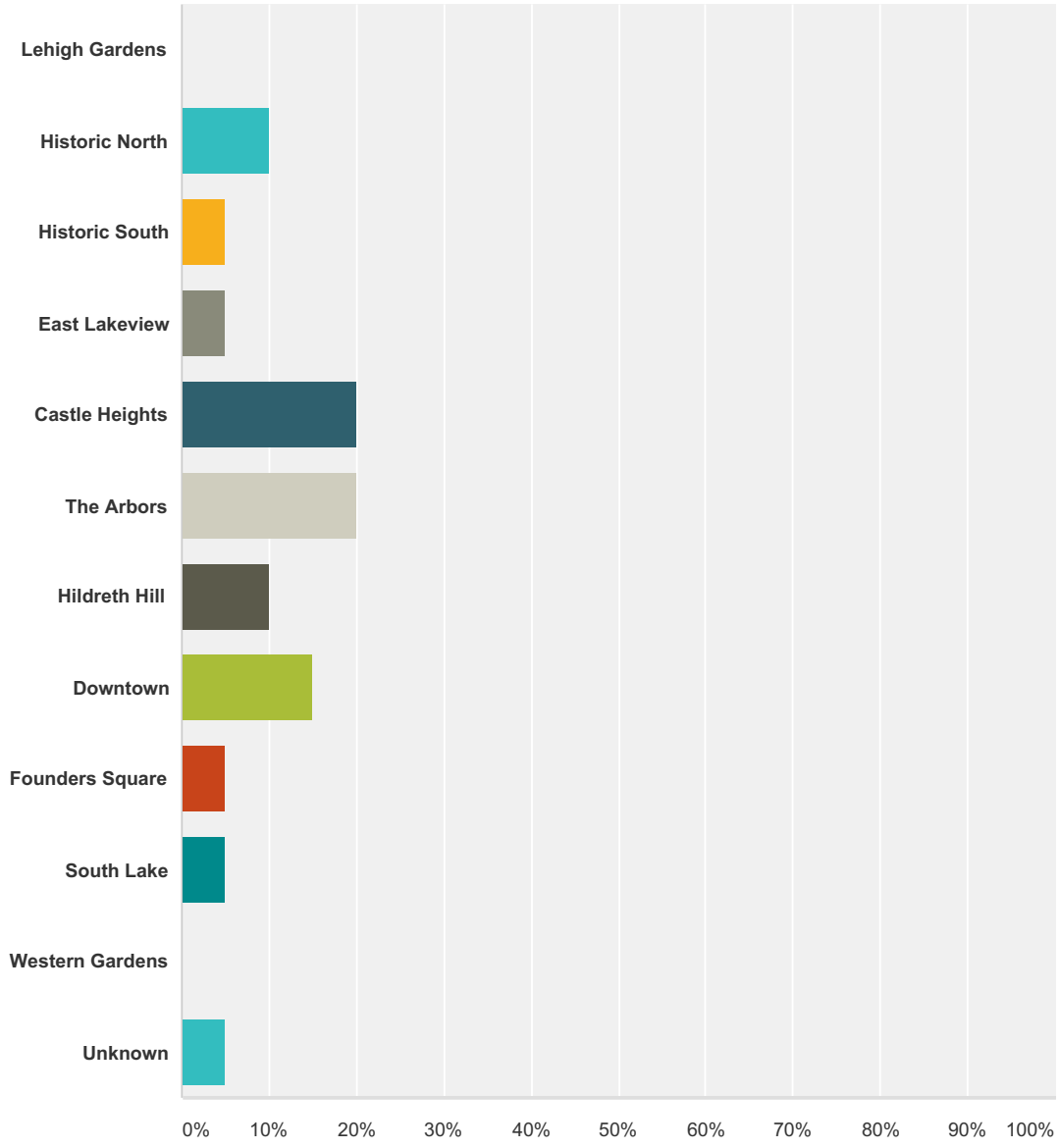
Answered: 28 Skipped: 0



Answer Choices	Responses	
Town of Geneva	**14.29%**	4
City of Geneva	**71.43%**	20
Other (please specify)	**14.29%**	4
Total		**28**

Q4 If you live in the City of Geneva, which neighborhood do you live in?Geneva Neighborhoods Map (Click Here)

Answered: 20 Skipped: 8

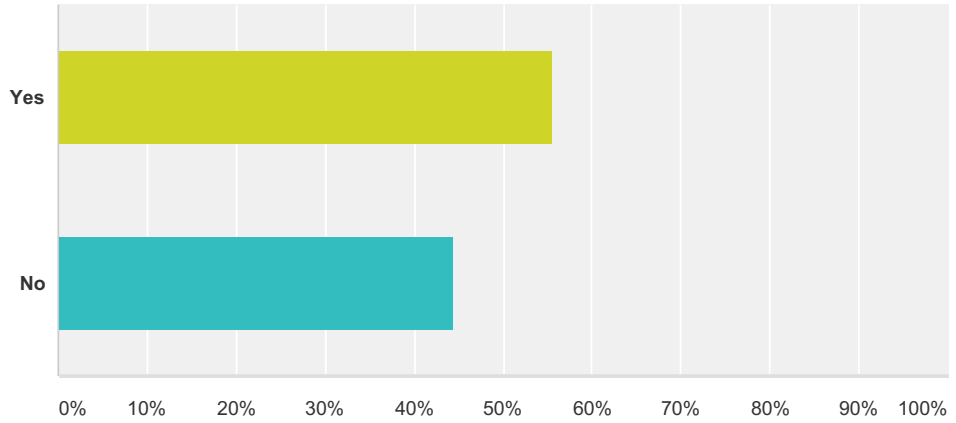


Answer Choices	Responses	
Lehigh Gardens	**0.00%**	0
Historic North	**10.00%**	2

Historic South	**5.00%**	1
East Lakeview	**5.00%**	1
Castle Heights	**20.00%**	4
The Arbors	**20.00%**	4
Hildreth Hill	**10.00%**	2
Downtown	**15.00%**	3
Founders Square	**5.00%**	1
South Lake	**5.00%**	1
Western Gardens	**0.00%**	0
Unknown	**5.00%**	1
Total		**20**

Q6 Do you work in Geneva?

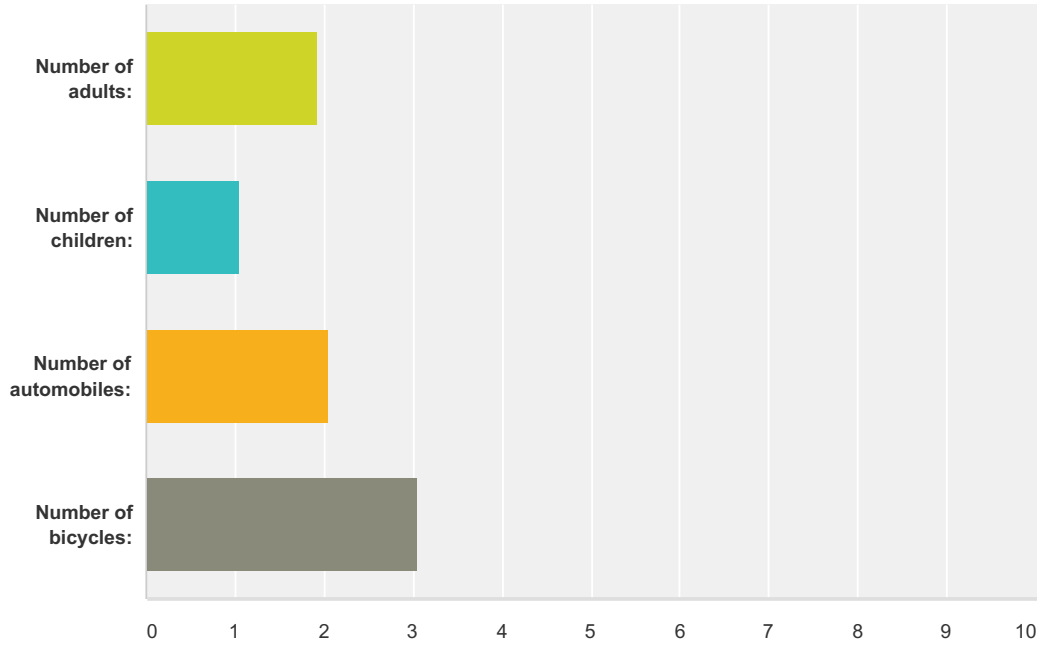
Answered: 27 Skipped: 1



Answer Choices	Responses	
Yes	**55.56%**	15
No	**44.44%**	12
Total		**27**

Q8 Please tell us about your household:

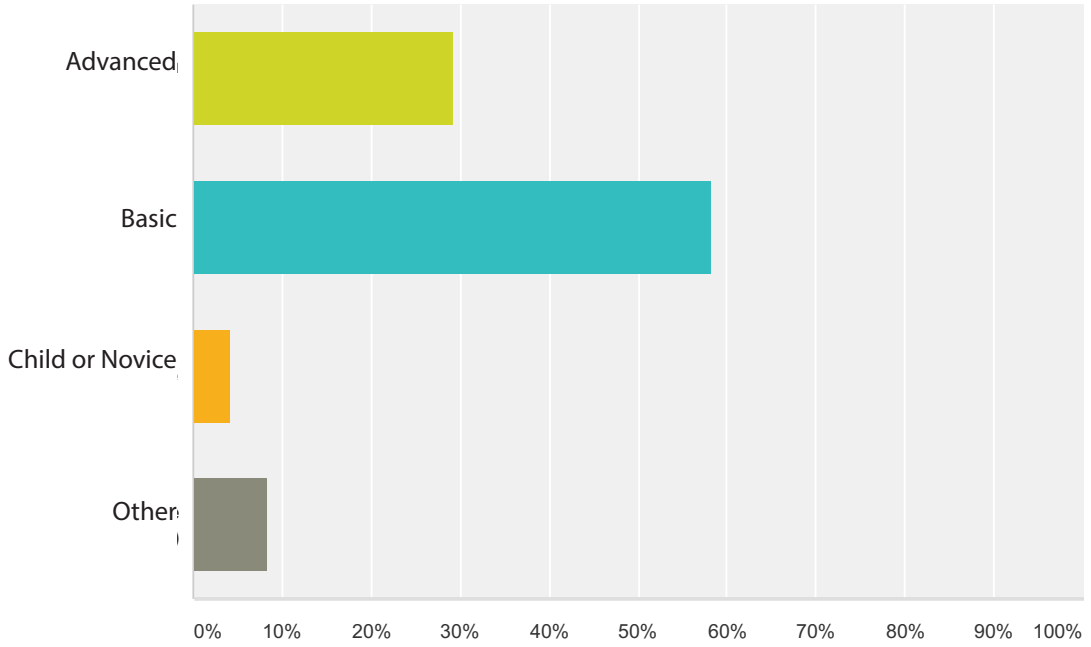
Answered: 27 Skipped: 1



Answer Choices	Average Number	Total Number	Responses
Number of adults:	2	52	27
Number of children:	1	21	20
Number of automobiles:	2	53	26
Number of bicycles:	3	76	25
Total Respondents: 27			

Q9 Indicate which of the following best describes your personal bicycling experience?

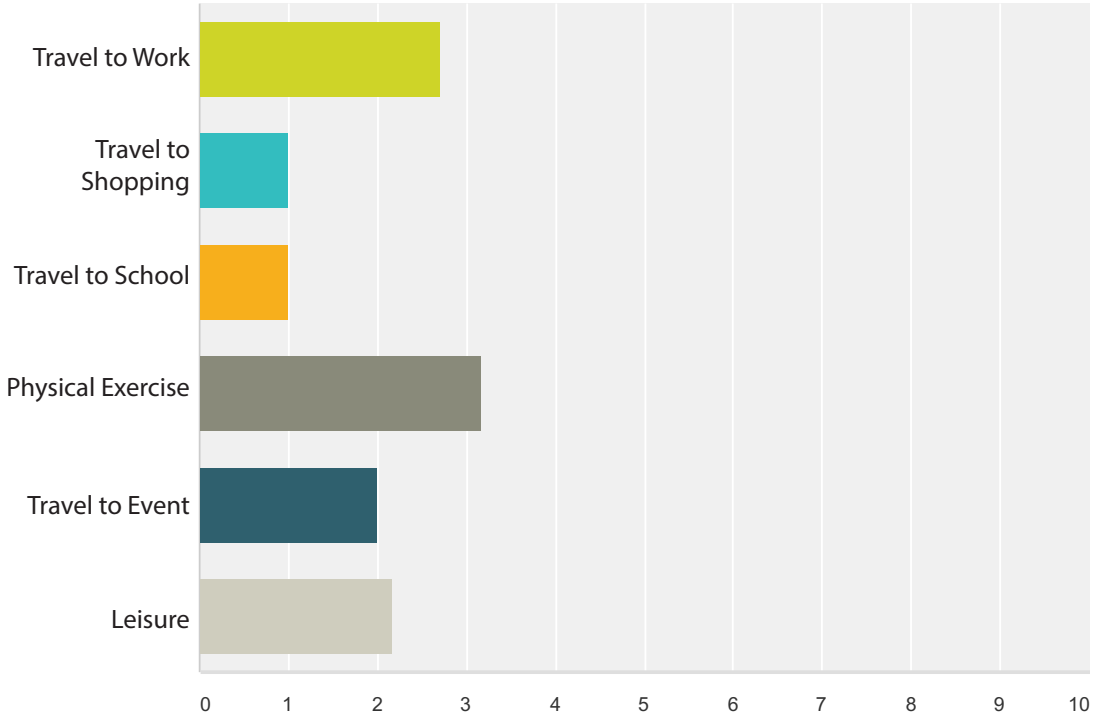
Answered: 24 Skipped: 4



Answer Choices	Responses	
Advanced (you use a bicycle as you would a motor vehicle)	**29.17%**	7
Basic (you prefer not to ride on roads with busy and fast motor vehicle traffic)	**58.33%**	14
Child or novice	**4.17%**	1
Other (please specify)	**8.33%**	2
Total		**24**

Q10 If you ride, tell us about how often and why you ride a bike:In a typical week of the past year, how often have you ridden a bicycle for the following reasons?

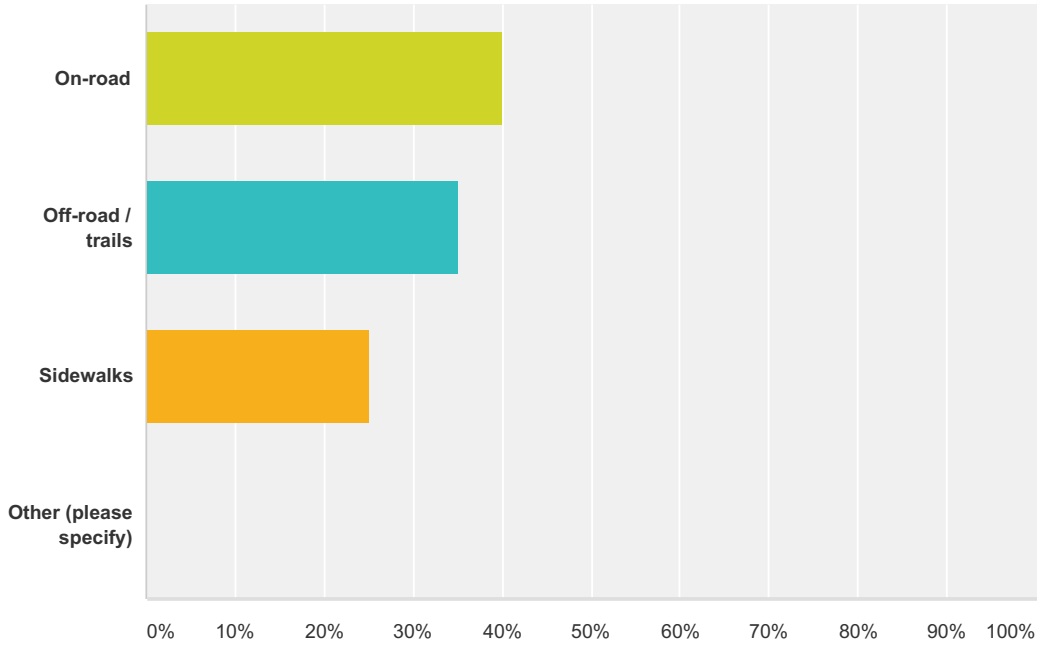
Answered: 16 Skipped: 12



	1 day/week	2 days/week	3 days/week	4 days/week	5 days/week	6 days/week	7 days/week	Total	Weighted Average
Travel to Work	**28.57%** 2	**14.29%** 1	**42.86%** 3	**0.00%** 0	**0.00%** 0	**14.29%** 1	**0.00%** 0	7	2.71
Travel to Shopping	**100.00%** 5	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	5	1.00
Travel to School	**100.00%** 1	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	1	1.00
Physical Exercise	**25.00%** 3	**0.00%** 0	**41.67%** 5	**8.33%** 1	**16.67%** 2	**8.33%** 1	**0.00%** 0	12	3.17
Travel to Event / Social Destination	**80.00%** 4	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**20.00%** 1	**0.00%** 0	5	2.00
Leisure (no specific destination)	**41.67%** 5	**33.33%** 4	**8.33%** 1	**8.33%** 1	**0.00%** 0	**8.33%** 1	**0.00%** 0	12	2.17

Q12 Where do you currently prefer to ride?

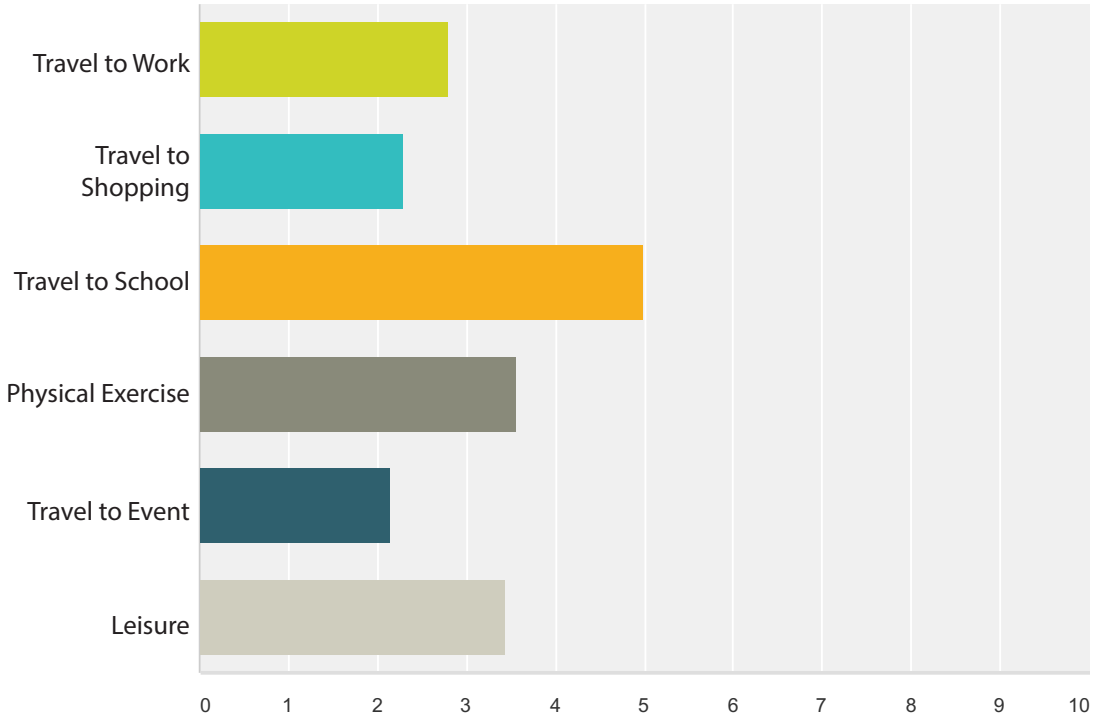
Answered: 20 Skipped: 8



Answer Choices	Responses	
On-road	**40.00%**	8
Off-road / trails	**35.00%**	7
Sidewalks	**25.00%**	5
Other (please specify)	**0.00%**	0
Total		**20**

Q13 If you walk, tell us about how often and why you walk:In a typical week of the past year, how often have you walked for the following reasons?

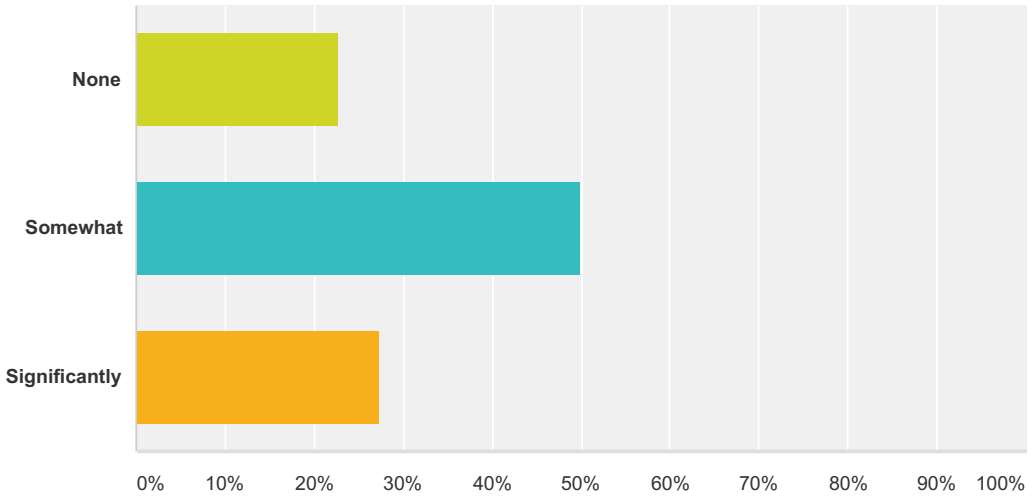
Answered: 23 Skipped: 5



	1 day/week	2 days/week	3 days/week	4 days/week	5 days/week	6 days/week	7 days/week	Total	Weighted Average
Travel to Work	**40.00%** 2	**20.00%** 1	**0.00%** 0	**0.00%** 0	**40.00%** 2	**0.00%** 0	**0.00%** 0	5	2.80
Travel to Shopping	**14.29%** 1	**57.14%** 4	**14.29%** 1	**14.29%** 1	**0.00%** 0	**0.00%** 0	**0.00%** 0	7	2.29
Travel to School	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**100.00%** 1	**0.00%** 0	**0.00%** 0	1	5.00
Physical Exercise	**11.11%** 2	**16.67%** 3	**33.33%** 6	**16.67%** 3	**5.56%** 1	**0.00%** 0	**16.67%** 3	18	3.56
Travel to Event / Social Destination	**14.29%** 1	**57.14%** 4	**28.57%** 2	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	7	2.14
Leisure (no specific destination)	**9.09%** 1	**27.27%** 3	**18.18%** 2	**18.18%** 2	**18.18%** 2	**0.00%** 0	**9.09%** 1	11	3.45

Q14 To what degree does your walking activity vary by season:

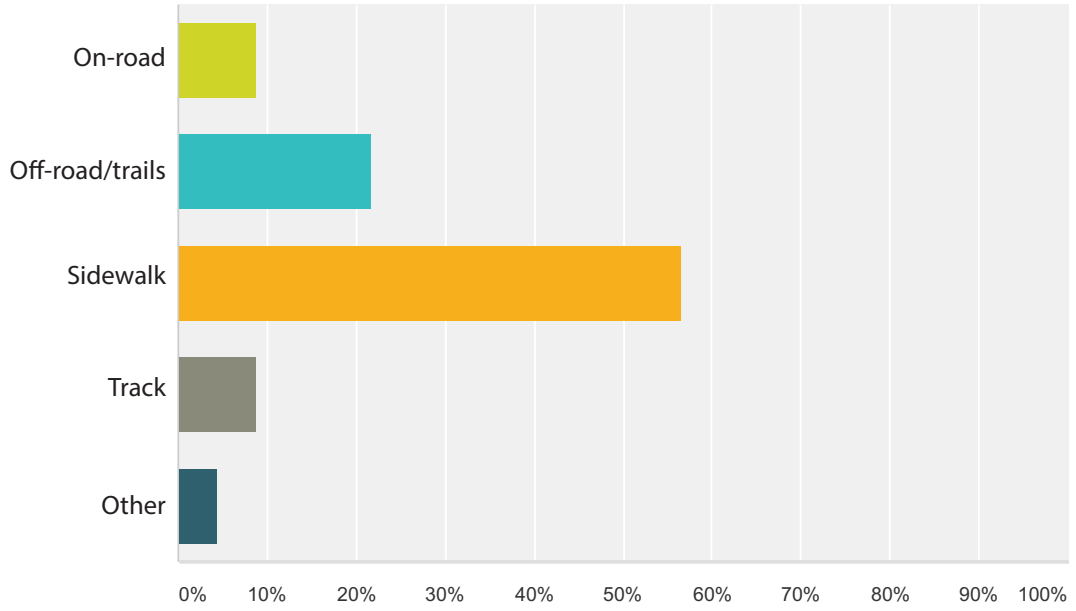
Answered: 22 Skipped: 6



Answer Choices	Responses	
None	**22.73%**	5
Somewhat	**50.00%**	11
Significantly	**27.27%**	6
Total		**22**

Q15 Where do you currently prefer to walk?

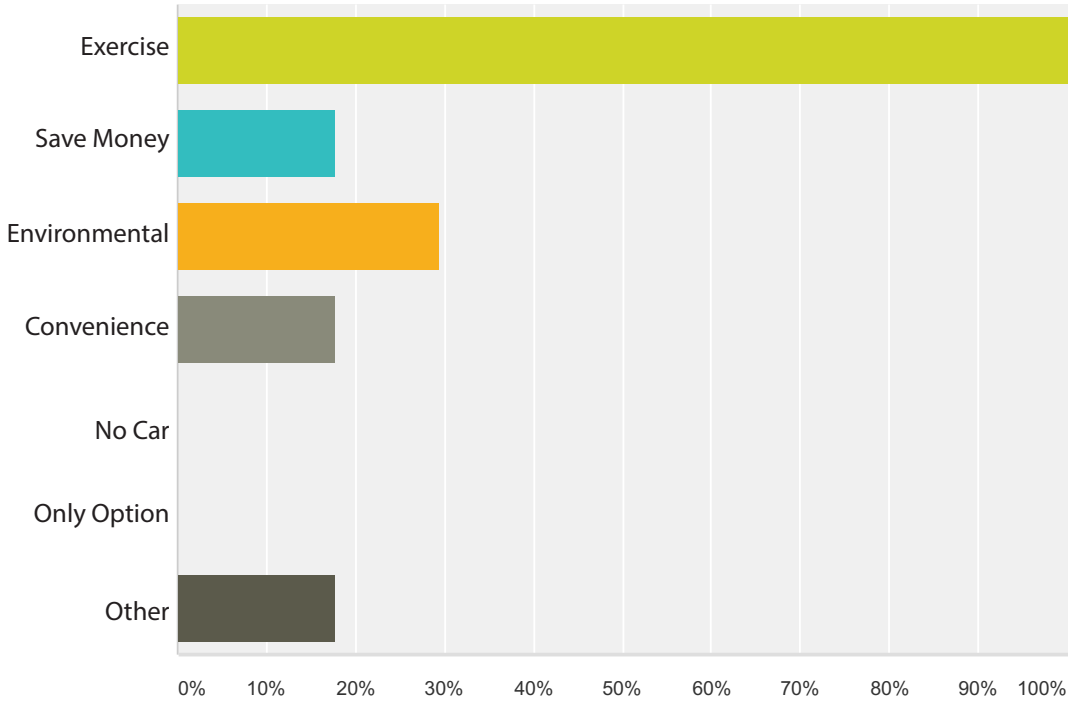
Answered: 23 Skipped: 5



Answer Choices	Responses	
On-road	**8.70%**	2
Off-road / trails	**21.74%**	5
Sidewalks	**56.52%**	13
Track/Fieldhouse/Recreational Facility	**8.70%**	2
Other (please specify)	**4.35%**	1
Total		**23**

Q16 For which of the following reasons do you choose to ride a bicycle (choose all that apply):

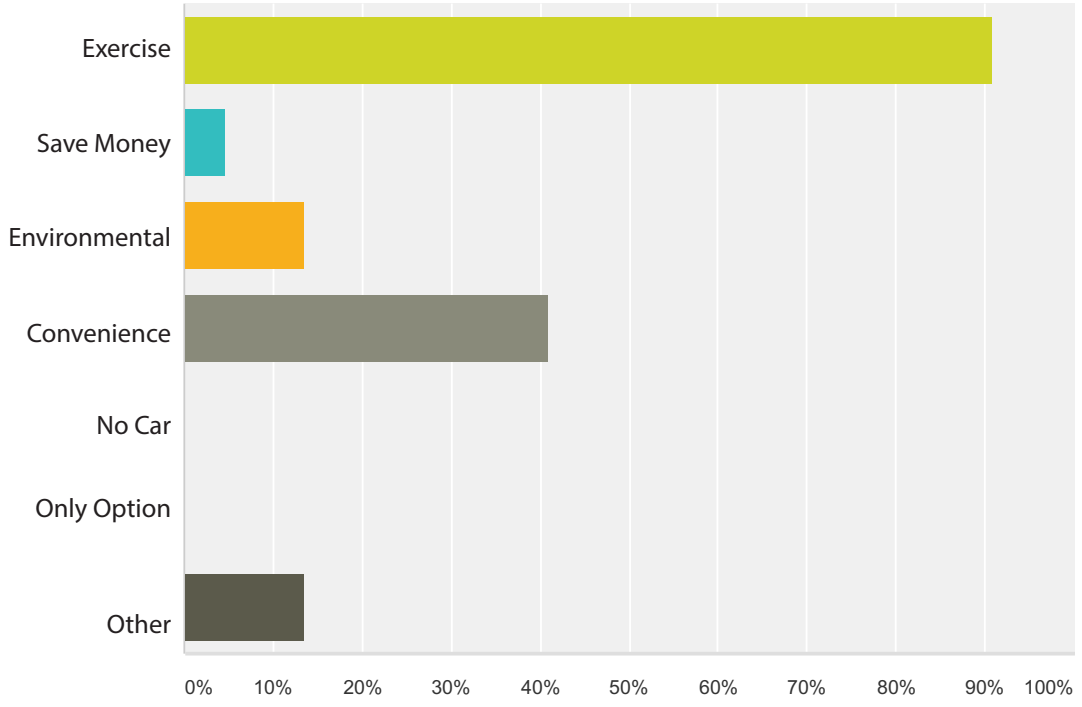
Answered: 17 Skipped: 11



Answer Choices	Responses	
Exercise / Personal Health	**100.00%**	17
Save Money	**17.65%**	3
Environmental Consciousness	**29.41%**	5
Convenience	**17.65%**	3
Do Not Own or Cannot Drive a Car	**0.00%**	0
Only Option	**0.00%**	0
Other (please specify)	**17.65%**	3
Total Respondents: 17		

Q17 For which of the following reasons do you choose to walk (choose all that apply):

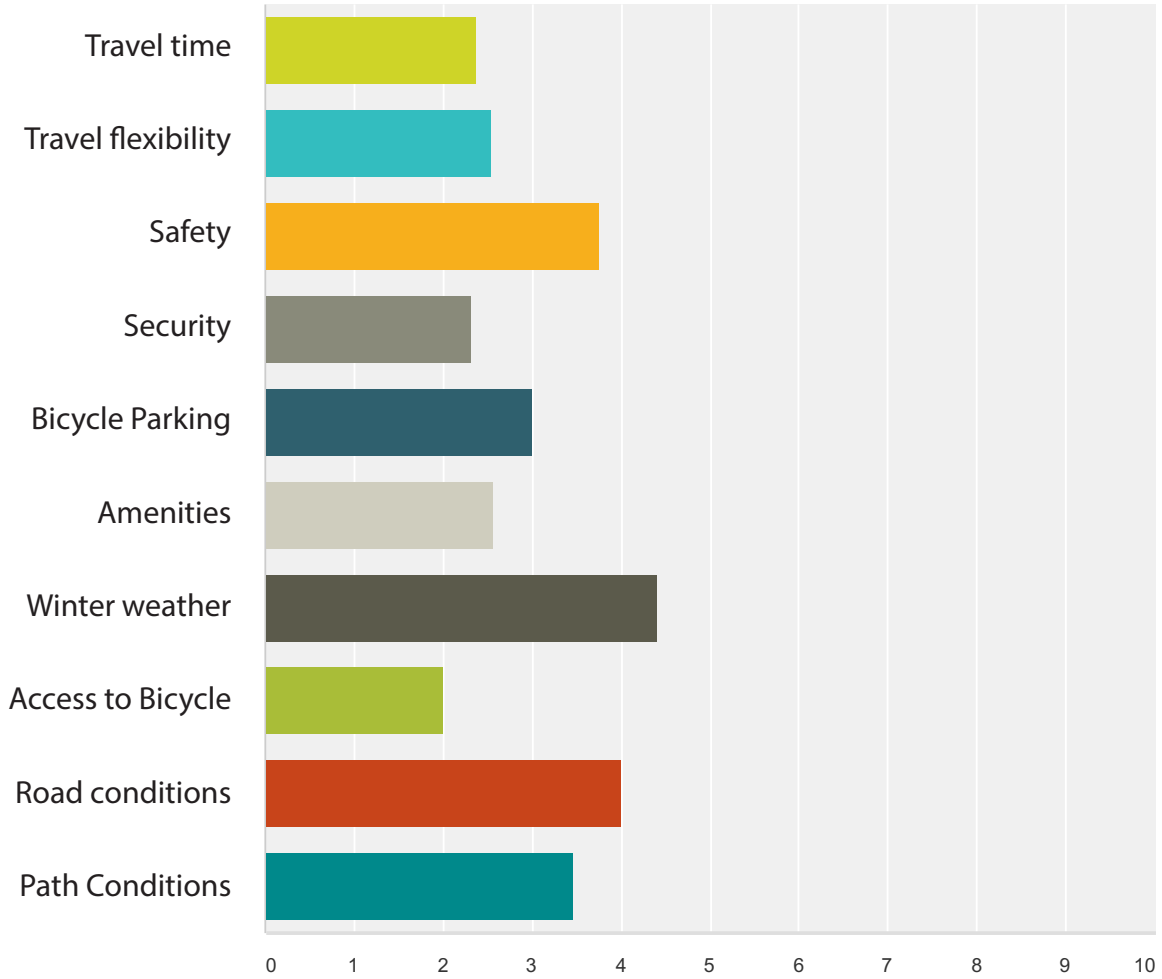
Answered: 22 Skipped: 6



Answer Choices	Responses	
Exercise / Personal Health	**90.91%**	20
Save Money	**4.55%**	1
Environmental Consciousness	**13.64%**	3
Convenience	**40.91%**	9
Do Not Own or Cannot Drive a Car	**0.00%**	0
Only Option	**0.00%**	0
Other (please specify)	**13.64%**	3
Total Respondents: 22		

Q18 What do you consider to be the primary barriers to bicycling in Geneva that keep you from bicycling more often? On a scale of 1 to 5, with 1 meaning no barrier and 5 meaning significant barrier, rate the following issues that could affect your ability and / or willingness to bike in Geneva.

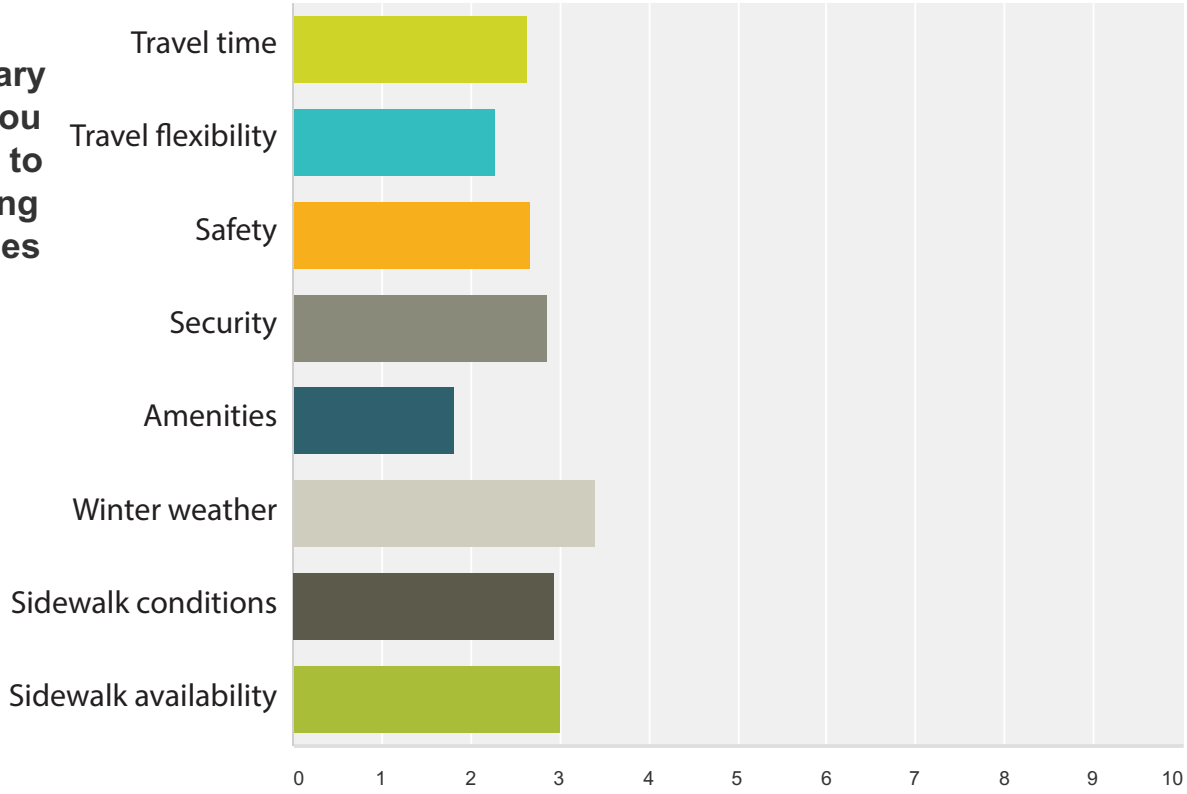
Answered: 18 Skipped: 10



	1	2	3	4	5	N/A	Total	Weighted Average
Travel time	**37.50%** 6	**12.50%** 2	**6.25%** 1	**12.50%** 2	**12.50%** 2	**18.75%** 3	16	2.38
Travel flexibility	**12.50%** 2	**25.00%** 4	**18.75%** 3	**6.25%** 1	**6.25%** 1	**31.25%** 5	16	2.55
Safety (with respect to motor vehicle traffic)	**5.56%** 1	**5.56%** 1	**27.78%** 5	**22.22%** 4	**33.33%** 6	**5.56%** 1	18	3.76
Personal security	**23.53%** 4	**29.41%** 5	**29.41%** 5	**11.76%** 2	**0.00%** 0	**5.88%** 1	17	2.31
Availability of secure, weather-protected bicyde parking	**23.53%** 4	**11.76%** 2	**29.41%** 5	**11.76%** 2	**23.53%** 4	**0.00%** 0	17	3.00
Availability of end-of-trip amenities (showers, lockers, etc.)	**35.29%** 6	**5.88%** 1	**23.53%** 4	**23.53%** 4	**5.88%** 1	**5.88%** 1	17	2.56
Winter weather conditions	**0.00%** 0	**5.56%** 1	**11.11%** 2	**16.67%** 3	**61.11%** 11	**5.56%** 1	18	4.41
Possession of / access to a bicycle	**64.71%** 11	**0.00%** 0	**0.00%** 0	**5.88%** 1	**17.65%** 3	**11.76%** 2	17	2.00
Road conditions (street obstacles, potholes, storm drains, etc.)	**5.88%** 1	**0.00%** 0	**29.41%** 5	**11.76%** 2	**47.06%** 8	**5.88%** 1	17	4.00
Path conditions (path obstacles, drainage issues, etc.)	**5.88%** 1	**11.76%** 2	**29.41%** 5	**17.65%** 3	**23.53%** 4	**11.76%** 2	17	3.47

Q19 What do you consider to be the primary barriers to walking in Geneva that keep you from walking more often? On a scale of 1 to 5, with 1 meaning no barrier and 5 meaning significant barrier, rate the following issues that could affect your ability and / or willingness to walk in Geneva.

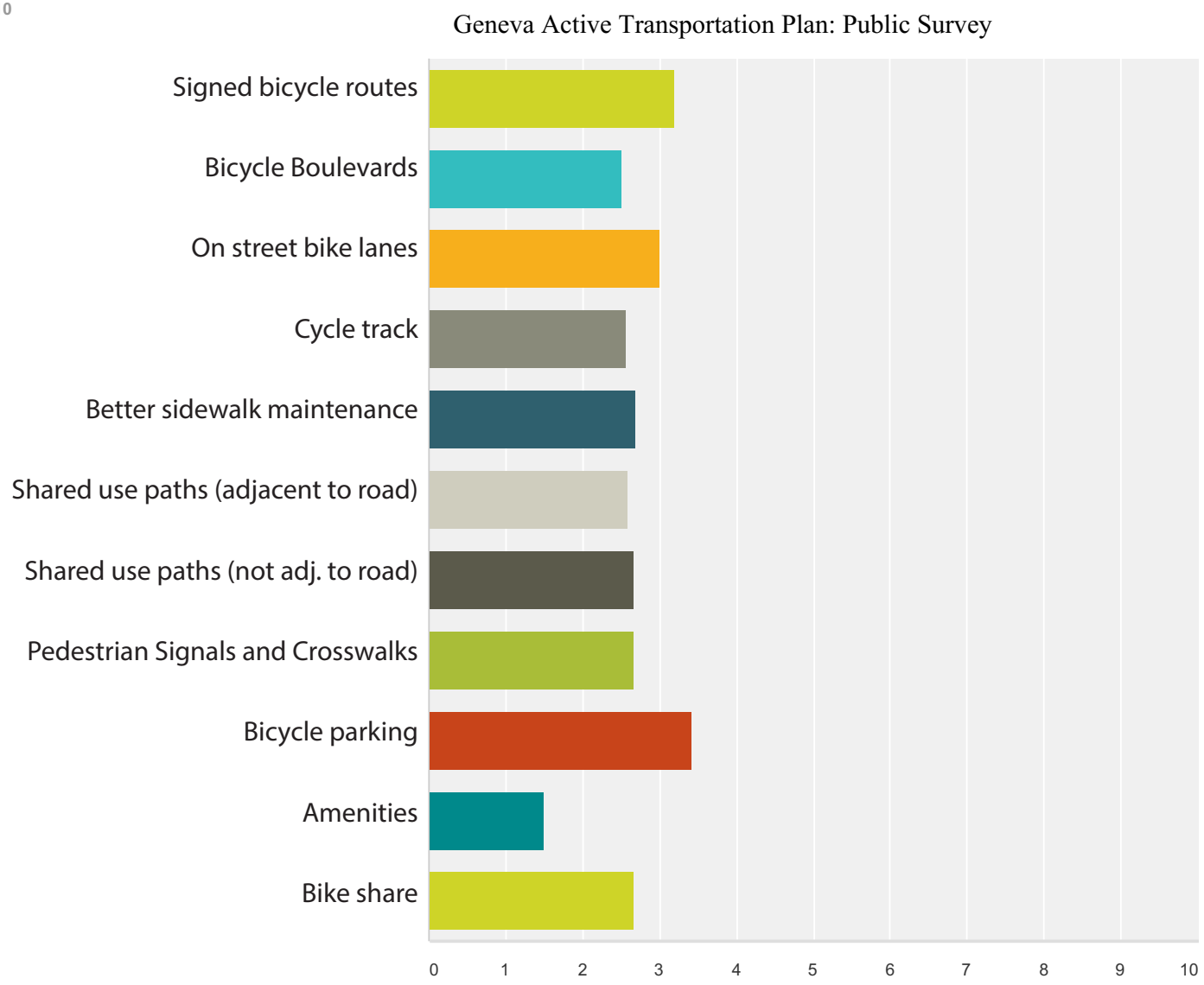
Answered: 21 Skipped: 7



	1	2	3	4	5	N/A	Total	Weighted Average
Travel time	**29.41%** 5	**17.65%** 3	**23.53%** 4	**5.88%** 1	**17.65%** 3	**5.88%** 1	17	2.63
Travel flexibility	**35.29%** 6	**23.53%** 4	**11.76%** 2	**5.88%** 1	**11.76%** 2	**11.76%** 2	17	2.27
Safety (with respect to motor vehicle traffic)	**26.32%** 5	**15.79%** 3	**31.58%** 6	**15.79%** 3	**10.53%** 2	**0.00%** 0	19	2.68
Personal security	**14.29%** 3	**23.81%** 5	**28.57%** 6	**28.57%** 6	**4.76%** 1	**0.00%** 0	21	2.86
Availability of end-of-trip amenities (showers, lockers, etc.)	**61.11%** 11	**11.11%** 2	**0.00%** 0	**5.56%** 1	**11.11%** 2	**11.11%** 2	18	1.81
Winter weather conditions	**15.00%** 3	**10.00%** 2	**25.00%** 5	**20.00%** 4	**30.00%** 6	**0.00%** 0	20	3.40
Sidewalk conditions (sidewalk obstacles, cracked pavement, etc.)	**20.00%** 4	**15.00%** 3	**30.00%** 6	**20.00%** 4	**15.00%** 3	**0.00%** 0	20	2.95
Sidewalk availability	**20.00%** 4	**10.00%** 2	**35.00%** 7	**20.00%** 4	**15.00%** 3	**0.00%** 0	20	3.00

Q20 Of the following facilities or amenities, which would most likely increase your current level of biking and / or walking. Select and rank ONLY your top 5, with 1 representing the most desired.

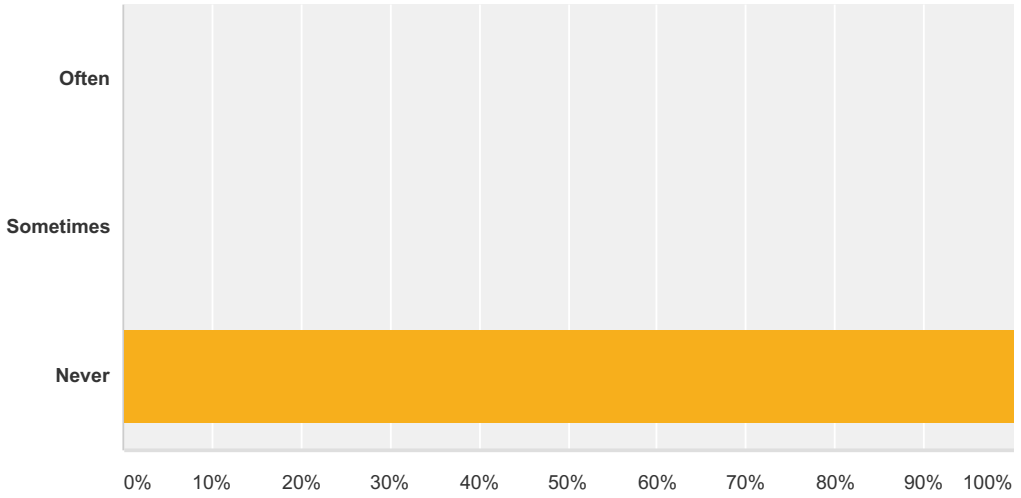
Answered: 18 Skipped: 10



	1	2	3	4	5	N/A	Total	Weighted Average
Signed bicycle routes	**20.00%** 1	**20.00%** 1	**20.00%** 1	**0.00%** 0	**40.00%** 2	**0.00%** 0	5	3.20
Bicycle boulevards (low-volume and low-speed streets that have been optimized for bicycle travel through treatments such as traffic calming and traffic reduction, signage and pavement markings, and intersection crossing treatments)	**33.33%** 2	**16.67%** 1	**16.67%** 1	**33.33%** 2	**0.00%** 0	**0.00%** 0	6	2.50
Designated (signed and marked) on-street bike lanes	**0.00%** 0	**33.33%** 3	**44.44%** 4	**11.11%** 1	**11.11%** 1	**0.00%** 0	9	3.00
On-street cycle track / buffered bike lane	**28.57%** 2	**14.29%** 1	**28.57%** 2	**28.57%** 2	**0.00%** 0	**0.00%** 0	7	2.57
Better maintained pedestrian sidewalks	**18.18%** 2	**27.27%** 3	**18.18%** 2	**18.18%** 2	**9.09%** 1	**9.09%** 1	11	2.70
Shared use paths (adjacent to road)	**33.33%** 4	**25.00%** 3	**0.00%** 0	**33.33%** 4	**8.33%** 1	**0.00%** 0	12	2.58
Shared use paths (not adjacent to road)	**33.33%** 2	**16.67%** 1	**16.67%** 1	**16.67%** 1	**16.67%** 1	**0.00%** 0	6	2.67
Pedestrian signals and crosswalks at intersections	**16.67%** 1	**50.00%** 3	**0.00%** 0	**16.67%** 1	**16.67%** 1	**0.00%** 0	6	2.67
Availability of secure, weather-protected bicycle parking	**14.29%** 1	**14.29%** 1	**28.57%** 2	**0.00%** 0	**42.86%** 3	**0.00%** 0	7	3.43
Availability of end-of-trip amenities (showers, lockers, etc.)	**50.00%** 1	**50.00%** 1	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	2	1.50
Availability of a bike share program	**33.33%** 1	**0.00%** 0	**33.33%** 1	**33.33%** 1	**0.00%** 0	**0.00%** 0	3	2.67

Q21 In the last year, how often have you used Regional Transit Service (RTS), previously CATS, bus service?

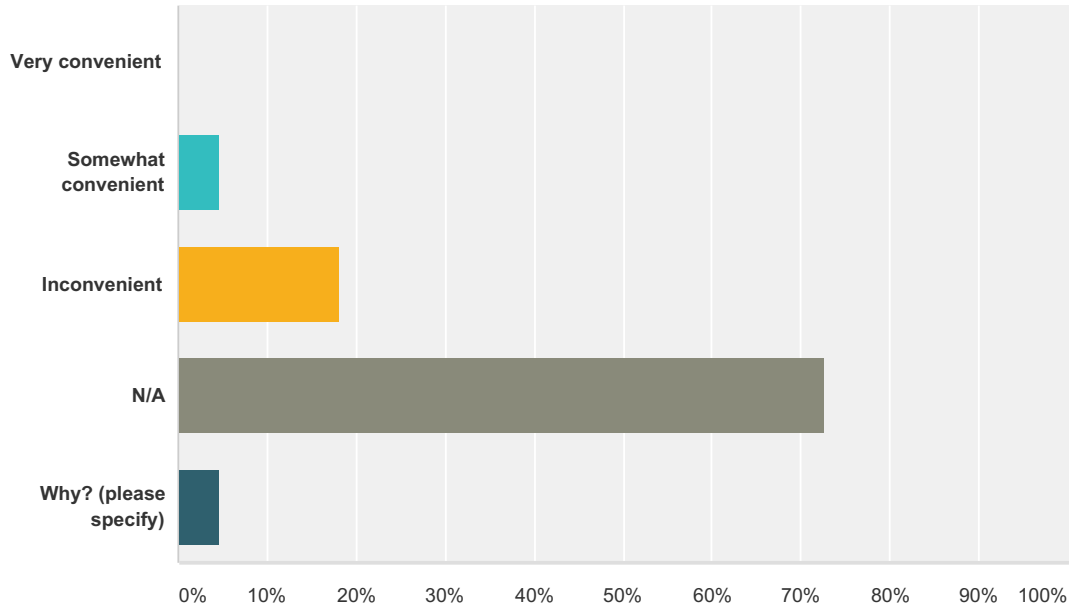
Answered: 22 Skipped: 6



Answer Choices	Responses	
Often	**0.00%**	0
Sometimes	**0.00%**	0
Never	**100.00%**	22
Total		**22**

Q22 How convenient do you find the bus service?

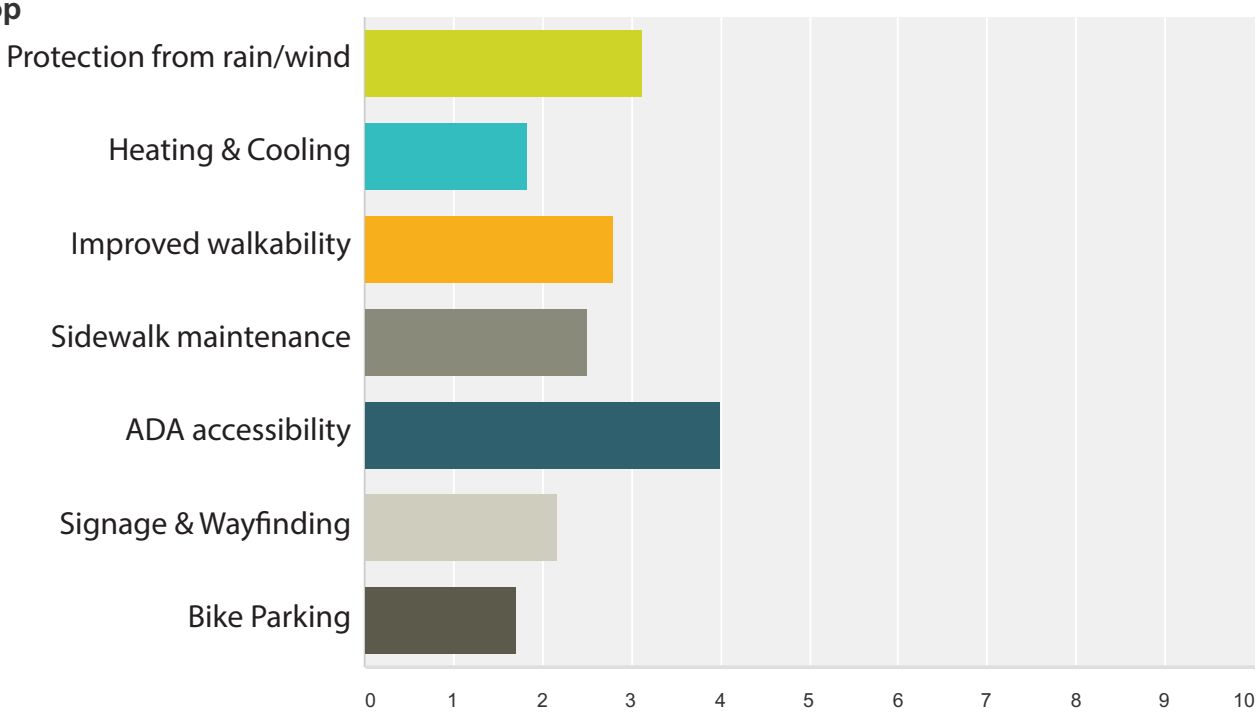
Answered: 22 Skipped: 6



Answer Choices	Responses	
Very convenient	**0.00%**	0
Somewhat convenient	**4.55%**	1
Inconvenient	**18.18%**	4
N/A	**72.73%**	16
Why? (please specify)	**4.55%**	1
Total		**22**

Q23 Of the following facilities or amenities, which would most likely increase your transit use. Select and rank ONLY your top 4, with 1 representing the most desired.

Answered: 10 Skipped: 18



	1	2	3	4	Total	Weighted Average
Availability of weather-protected transit stops (protection from rain and wind)	**12.50%** 1	**12.50%** 1	**25.00%** 2	**50.00%** 4	8	3.13
Availability of fully enclosed transit stops (heating in the winter, cooling in the summer)	**50.00%** 3	**16.67%** 1	**33.33%** 2	**0.00%** 0	6	1.83
Improved walkability around transit stops (between stop and destinations)	**20.00%** 1	**20.00%** 1	**20.00%** 1	**40.00%** 2	5	2.80
Improved sidewalk maintenance	**0.00%** 0	**50.00%** 2	**50.00%** 2	**0.00%** 0	4	2.50
Improved ADA accessibility	**0.00%** 0	**0.00%** 0	**0.00%** 0	**100.00%** 1	1	4.00
Improved signage and way-finding	**0.00%** 0	**83.33%** 5	**16.67%** 1	**0.00%** 0	6	2.17
Availability of bike parking at stops	**71.43%** 5	**0.00%** 0	**14.29%** 1	**14.29%** 1	7	1.71

Additional Questions:

Q5 For how many years have you lived in Geneva?

Answered: 25 Skipped: 3

Q7 Email address (if you would like to be informed of upcoming plan meetings and other activities):

Answered: 6 Skipped: 22

Q24 Please list up to five roadway segments (use from-to format: e.g., North St between Brook St and North Main St) within the Geneva which you feel would most benefit from a bicycle and/or pedestrian facility (sidewalk, bike lane, or shared use path) and indicate the needed facility type.

Answered: 11 Skipped: 17

Q25 Please list up to five key destinations (schools, parks, shopping areas, transit, neighborhoods, other) within Geneva that would benefit from improved bicycle and/or pedestrian access.

Answered: 11 Skipped: 17

Q26 Please list up to five specific locations where a spot-specific improvement (intersection improvement, mid-block crossing, maintenance issue, safety concern, etc.) is needed to improve bicycling and/or walking conditions and specify the needed improvement type.

Answered: 9 Skipped: 19

Q27 Other CommentsPlease use the space below to provide any other comments you may have regarding bicycling, walking or transit use in Geneva.

Answered: 10 Skipped: 18

APPENDIX

C. SUMMARY OF PROJECT ADVISORY COMMITTEE (PAC) VAN AND BIKE TOURS

Geneva Bicycle Tour

Geneva City Hall
47 Castle Street
April 16, 2016
9:30-11:00 AM

Attendees:

Meeting Format
Bicycle Tour of Geneva with project committee members, family members, and local residents

Comments, Questions and Observations

North Street should have pavement markings, maybe sharrows identifying bicycle space

Bicycle parking is lacking at FLCC campus. Colleges should be models for bicycle facilities at destinations.

There is some topography in Geneva that is challenging for average bicyclists. Might be good to include in project mapping.

Genesee St. pavement is in good condition, but lacks pavement markings. Pavement markings may contribute to traffic calming and help reduce speeds. Striped shoulders are helpful for bicyclists.

Some transit stops do not have concrete pads; just a sign stuck in the ground. Provide a standard minimum facility at all transit stops.

Consider improving narrow paved shoulders, where there is sufficient space in ROW
Carter Road, close to High School, is one example

Corner of Nursery and High St.- cars don't stop for bicycles, problem intersection (comment from Bike Tour rider)

No sidewalk on north side of W. North Street (school side)

Crossings in all school zones should be marked/signed more aggressively

Bike parking at High School could be improved (more racks, covered racks, etc.)

Establish high visibility design vocabulary for school zones

Sidewalk conditions in school zone is inconsistent

Need enhanced mid-block crossing at Brook Street Park.

One-way traffic pattern by West Street Elementary restricts bicycle accessibility.

Washington Street appears wide enough for shared-use lane markings: verify

Crossing Hamilton at Pulteney does not have ped countdown signals, or LPI

Note Pulteney Street reconstruction project, and any bike/ped improvements.

South Main Street along HWS- consider installing raised crosswalks for traffic calming and improved safety.

Lakeside tunnel: need better wayfinding to the tunnel. Improve tunnel context and approach. Make best use of existing connectors and infrastructure.

Note Lakeside Trail improvements, currently under construction.

Post bike tour comments, from Charles King:

Biking culture in Geneva makes more sense on "the next street over" parallel roadways... instead of biking on Hamilton, we should bike on Washington. Instead of 14 North, we should bike on Genessee. Instead of North, Middle, instead of South Main, Pulteney.

Scary intersections are: Washington & Preemption, Main & North, 5 points (Castle and Main and Milton), Pulteney & Hamilton, and Carter/Brook and North.

The scariest part of the school-to-school-to-school route was Brook Street hill, where the street drains are pretty dangerous. I usually ride north (the more uphill way) on the sidewalk and south (the more downhill way) in the street. That seems like a place where a wide bike/walk sidewalk would make sense, though I'm not sure what the engineering would be like around the bridge.

trobinson@bartonandloguidice.com

Geneva Walk Tour

Geneva City Hall
47 Castle Street
April 21, 2016
5:00-6:30 PM

Attendees:
Jim, Chris, Sage, (Oliver, Amelia) TMR, Simon, +

Meeting Format
Walk Tour of Geneva with project committee members, family members, and local residents

Comments, Questions and Observations

Milton Street, alongside new FLCC campus: buffer strip and street trees would be desirable between curb and sidewalk.

Bicycle parking is lacking at FLCC campus. Colleges should be models for bicycle facilities at destinations.

Intersection of Pulteney & Castle; walk signals and buttons are missing from poles. (same problem observed at some other intersections around downtown)

Castle & Union Street: no ADA curb ramps

No mid-block crossing at library

Crosswalk vocabulary varies. A more consistent streetscape vocabulary might be more intuitive and understandable for pedestrians and drivers.

4 lanes each direction Lakefront@ Lake Street. Possible lane reduction. Median with pedestrian refuge would be good. Very long crossing time/distance.

Assets: good pedestrian lighting and wayfinding system around downtown core.

Some store fronts are not ADA accessible in downtown core.

Verify and apply best practices for pedestrians at active railroad crossings

Castle Street @ Geneva Street, in front of city Hall: median is striped on pavement. Possibly install raised median, with mountable curb (fire station around the corner)

Farmers Market parking lot area. Install curb stops to prevent vehicle encroachment onto marked walkway.

Driver uncertainty is dangerous for pedestrians. (@ non-standard intersections with offset alignments)

Condition of city sidewalks is poor in many locations. Requires a change from current policy which requires residents to provide maintenance and replacement of sidewalks.

ADA compliance issues are common around downtown. Placement of sign posts restricting access space.

Note: Pedestrian related comments from the 4-16-2016 Geneva Bicycle Tour have been included here.

Some transit stops do not have concrete pads; just a sign stuck in the ground. Provide a standard minimum facility at all transit stops.

No sidewalk on north side of W. North Street (school side)

Crossings in all school zones should be marked/signed more aggressively

Establish high visibility design vocabulary for school zones

Sidewalk conditions in school zone is inconsistent

Need enhanced mid-block crossing at Brook Street Park.

Crossing Hamilton at Pulteney does not have ped countdown signals, or LPI

Note Pulteney Street reconstruction project, and any bike/ped improvements.

South Main Street along HWS- consider installing raised crosswalks for traffic calming and improved safety.

Lakeside tunnel: need better wayfinding to the tunnel. Improve tunnel context and approach. Make best use of existing connectors and infrastructure.

These meeting minutes were prepared by Tom Robinson of Barton & Loguidice. Please contact with any discrepancies.
trobinson@bartonandloguidice.com

APPENDIX

D. PEDESTRIAN AND BICYCLE LEVEL OF SERVICE MODELS

APPENDIX C: PEDESTRIAN AND BICYCLE LEVEL OF SERVICE MODELS

Bicycle Level of Service Model. The statistically-calibrated mathematical equation entitled the *Bicycle Level of Service*[1] *Model (Version 2.0)* was used as the foundation of Geneva's existing bicycling conditions evaluation. This *Model* is the most accurate method of evaluating the bicycling conditions of shared roadway environments. It uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes.

With statistical precision, the *Model* clearly reflects the effect on bicycling suitability or "compatibility" due to factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicles speed and type, and on-street parking.

The *Bicycle LOS Model* is based on the proven research documented in *Transportation Research Record 1578* published by the Transportation Research Board of the National Academy of Sciences. It was developed with a background of over 100,000 miles of evaluated urban, suburban, and rural roads and streets across North America. It now forms the basis for the bicycle level of service methodology contained in the *Highway Capacity Manual*. Many urbanized area planning agencies and state highway departments are using this established method of evaluating their roadway networks. These include metropolitan areas across North America such as Atlanta GA, Baltimore MD, Birmingham AL, Philadelphia PA, San Antonio TX, Houston TX, Buffalo NY, Anchorage AK, Lexington KY, and Tampa FL as well as state departments of transportation such as, Delaware Department of Transportation (DelDOT), New York State Department of Transportation (NYDOT), Maine Department of Transportation (MeDOT) and others.

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[1] Landis, Bruce W. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" *Transportation Research Record 1578*, Transportation Research Board, Washington DC 1997 (see Appendix A).

Widespread application of the original form of the *Bicycle LOS Model* has provided several refinements. Application of the *Bicycle LOS Model* in the metropolitan area of Philadelphia resulted in the final definition of the three effective width cases for evaluating roadways with on-street parking. Application of the *Bicycle LOS Model* in the rural areas surrounding the greater Buffalo region resulted in refinements to the "low traffic volume roadway width adjustment". A 1997 statistical enhancement to the *Model* (during statewide application in Delaware) resulted in better quantification of the effects of high- speed truck traffic [see the $SP_t(1+10.38HV)^2$ term]. As a result, *Version 2.0* (now with FDOT-approved truck volume adjustment factor included) has the highest correlation coefficient ($R^2 = 0.77$) of any form of the *Bicycle LOS Model*.

Version 2.0 of the *Bicycle LOS Model* has been employed to evaluate the roads and streets that comprise the TPO's study network. Its form is shown below:

$$\text{Bicycle LOS} = a_1 \ln (Vol_{15}/L_n) + a_2 SP_t(1+10.38HV)^2 + a_3(1/PR_5)^2 + a_4 (W_e)^2 + C$$

Where:

Vol_{15} = Volume of directional traffic in 15 minute time period Vol_{15}

$= (ADT \times D \times K_d) / (4 \times PHF)$

where:
ADT = Average Daily Traffic on the segment or link D = Directional Factor
K_d = Peak to Daily Factor
PHF = Peak Hour Factor

L_n = Total number of directional *through* lanes

SP_t = Effective speed limit

$SP_t = 1.1199 \ln(SP_p - 20) + 0.8103$

where:
SP_p = Posted speed limit (a surrogate for average running speed)

HV = percentage of heavy vehicles (as defined in the *Highway Capacity Manual*)

PR_5 = FHWA's five point pavement surface condition rating W_e
= Average effective width of outside through lane:

where:

$W_e = W_v$ - (10 ft x % OSPA) and $W_l = 0$

$W_e = W_v + W_l$ (1 - 2 x % OSPA) and $W_l > 0$ & $W_{ps} = 0$

$W_e = W_v + W_l$ - 2 (10 x % OSPA) and $W_l > 0$ & $W_{ps} > 0$ and a bikelane exists

where:

W_t = total width of outside lane (and shoulder) pavement

OSPA = percentage of segment with occupied on- street parking

W_l = width of paving between the outside lane stripe and the edge of pavement

W_{ps} = width of pavement striped for on-street parking W_v = Effective width as a function of traffic volume

and:

$W_v = W_t$ if ADT > 4,000veh/day

$W_v = W_t$(2-0.00025 x ADT) if ADT $\leq$ 400veh/day, and if the street/ road is undivided and unstriped

a_1: 0.507 a_2: 0.199 a_3: 7.066 a_4: - 0.005 C: 0.760

(a_1 - a_4) are coefficients established by multi-variate regression analysis.

The *Bicycle LOS* score resulting from the final equation is stratified into service categories A, B, C, D, E, and F (according to the ranges shown in Table D1) to reflect users' perception of the road segment's level of service for bicycle travel.

Bicycle Level of Service Categories

LEVEL OF SERVICE	BLOS SCORE
A	≤ 1.5
B	> 1.5 and ≤2.5
C	> 2.5 and ≤3.5
D	> 3.5 and ≤4.5
E	> 4.5 and ≤5.5
F	> 5.5

This stratification is in accordance with the linear scale established during the referenced research (i.e., the research project bicycle participants' aggregate response to roadway and traffic stimuli).

Data Collection/Inventory Guidelines

Following is the list of data required for computation of the *Bicycle LOS* scores as well as the associated guidelines for their collection and compilation into the programmed database.

Average Daily Traffic (ADT)

ADT is the average daily traffic volume on the segment or link. The programmed database will convert these volumes to Vol_{15} (volume of directional traffic every fifteen minutes) using the Directional Factor (D), Peak to Daily Factor (K_d) and Peak Hour Factor (PHF) for the road segment.

Percent Heavy Vehicles (HV)

Percent HV is the percentage of heavy vehicles (as defined in the *Highway Capacity Manual*).

Number of lanes of traffic (L)

L reflects the total number of *through* traffic lanes of the road segment and its configuration (D = Divided, U = Undivided, OW = One-Way, S = Two-Way Left Turn Lane). The programmed database converts these lanes into directional lanes.

Posted Speed Limit (S_p)

S_p is recorded as posted.

W_t - Total width of pavement

W_t is measured from the center of the road, yellow stripe, or (in the case of a multilane configuration) the lane separation striping to the edge of pavement or to the gutter pan of the curb.

W_l - Width of pavement between the outside lane stripe and the edge of pavement

W_l is measured from the outside lane stripe to the edge of pavement or to the gutter pan of the curb. When there is angled parking adjacent to the outside lane, W_l is measured from the outside lane stripe to the traffic-side end of the parking stall stripes.

Width of pavement is the pavement striped for on-street parking (W_{ps})

W_{ps} is recorded only if there is parking to the right of a striped bike lane (not if the striped parking area is immediately adjacent to the outside lane).

OSPA %

OSPA% is the estimated percentage of the segment (excluding driveways) along which there is occupied on-street parking at the time of survey.

Pavement Condition (PC)

PC is the pavement condition of the motor vehicle travel lane according to the FHWA's five-point pavement surface condition rating shown below in Figure D1.

DesignatedBikeLane

A "Y" is coded if there is a signed and marked bike lane on the segment; otherwise "N" is entered.

RATING	PAVEMENT CONDITION
5.0 (Very Good)	Only new or nearly new pavements are likely to be smooth enough and free of cracks and patches to qualify for this category.
4.0 (Good)	Pavement, although not as smooth as described above, gives a first class ride and exhibits signs of surface deterioration
3.0 (Fair)	Riding qualities are noticeably inferior to those above; may be barely tolerable for high-speed traffic. Defects may include rutting, map cracking, and extensive patching.
2.0 (Poor)	Pavements have deteriorated to such an extent that they affect the speed of free-flow traffic. Flexible pavement has distress over 50 percent or more of the surface. Rigid pavement distress includes joint spalling, patching, etc.
1.0 (Very Poor)	Pavements that are in an extremely deteriorated condition. Distress occurs over 75 percent or more of the surface.

Source: U.S. Department of Transportation. Highway Performance Monitoring System-Field Manual. Federal Highway Administration. Washington, DC, 1987.

Figure D1 Pavement Condition Descriptions

The *Pedestrian Level of Service (Pedestrian LOS) Model*[1] will be used for the evaluation of walking conditions. This model is the most accurate method of evaluating the walking conditions within shared roadway environments. It uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the *Model* clearly reflects the effect on walking suitability or "compatibility" due to factors such as roadway width, presence of sidewalks and intervening buffers, barriers within those buffers, traffic volume, motor vehicles speed, and on-street parking. The form of the *Pedestrian Level of Service Model*, and the definition of its terms are as follows:

$$\text{Ped LOS} = -1.2276 \ln (W_{ol} + W_l + f_p \times \%OSP + f_b \times W_b + f_{sw} \times W_s) + 0.0091 (Vol_{15}/L) + 0.0004 SPD^2 + 6.0468$$

Where:

W_{ol} = Width of outside lane (feet)
W_l = Width of shoulder or bike lane (feet)
f_p = On-street parking effect coefficient (=0.20)
%OSP = Percent of segment with on-street parking
f_b = Buffer area barrier coefficient (=5.37 for trees spaced 20 feet on center)
W_b = Buffer width (distance between edge of pavement

and sidewalk, feet)

f_{sw} = Sidewalk presence coefficient
$= 6 - 0.3W_s$
W_s = Width of sidewalk (feet)
Vol_{15} = average traffic during a fifteen (15) minute period
L = total number of (through) lanes (for road or street)
SPD = Average running speed of motor vehicle traffic (mi/hr)

The Pedestrian LOS score resulting from the final equation is pre-stratified into service categories "A, B, C, D, E, and F", according to the ranges shown below, which reflect users' perception of the road segments level of service for pedestrian travel. This stratification is in accordance with the linear scale established during the research (i.e., the research project participants' aggregate response to roadway and traffic stimuli).

[1] Landis, B.W., V.R. Vattikitti, R.M. Ottenberg, D.S. McLeod, M. Guttenplan, Modeling the Roadside Walking Environment: Pedestrian LOS, *Transportation Research Record 1773*, Transportation Research Board, National Research Council, Washington, DC, 2001.

Pedestrian Level-of-Service Categories

LEVEL-OF-SERVICE	Pedestrian LOS Score
A	≤ 1.5
B	> 1.5 and ≤2.5
C	> 2.5 and ≤3.5
D	> 3.5 and ≤4.5
E	> 4.5 and ≤5.5
F	> 5.5

The *Pedestrian LOS Model* is used by planners and engineers throughout the United States in a variety of planning and design applications. The *Pedestrian LOS Model* can be used to conduct a benefits comparison among proposed sidewalk/roadway cross-sections, identify roadways that are candidates for reconfiguration for sidewalk improvements, and to prioritize and program roadways for sidewalk improvements.

Additional Data Collection and Inventory Guidelines

Following is the additional list of data used in the computation of the Pedestrian LOS scores (beyond those previously described for the bicycle mode). Also described are the associated guidelines for their collection and compilation into the database.

Width of Buffer (W_b) – is the width of a grass buffer. The width of the buffer is measured from the edge of pavement or back of curb to the beginning edge of the sidewalk. If a sidewalk has trees planted within its surface, then the horizontal width of the sidewalk occupied by the trees is considered the buffer width.

Width of Sidewalk (W_s) – is the width of the sidewalk, measured from either the edge of pavement, if a grass buffer is not present. If a grass buffer is present, the width is measured from the edge of the buffer to the back side of the sidewalk.

Sidewalk Percentage – is the percentage of sidewalk coverage (estimated in increments of 25%) of the segment; this is to be collected directionally

Tree Spacing in Buffer – is the spacing of trees within a buffer, measured from the center (width of spacing between trees). Trees can either be in a grass buffer or in sidewalk islands.

Cross-section – a “C” is recorded if there is a curb and gutter on the segment, an “S” if there is an open shoulder. Note: Indicate any ditches or swales adjacent to the edge of pavement of the segment in the comments field.

Roadside Profile Condition – This data item is collected to assist in determining the lateral area available for bicycle lane or paved shoulder and sidewalk construction. It is the area between the outside edge of the pavement and the right-of-way line. The profile condition assists in determining the type of facility, hence its cost [i.e., bicycle lane or paved shoulder or bike path]. Roadside profiles were classified as one of the three types illustrated below. Condition 1, buildable shoulder, is defined as an area adjoining the edge of pavement with a minimum width of seven feet and a maximum cross-slope of 6%. Condition 2 is a swale. Condition 3 is a ditch or canal. The ARC is to provide total right-of-way width.

APPENDIX

E. PEDESTRIAN AND BICYCLE LEVEL OF SERVICE DATA SHEETS

DRAFT City and Town of Geneva Bicycle and Pedestrian Level of Service Results

Seg_ID	Road Name	From	To	Len-gth (Ls) (mi)	Dir. of Sur.	Lanes (L) Th #	Lanes (L) Con	ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width of Pavement W_t (ft)	Width of Pavement W_l (ft)	Occ. Park. (OSPA) (%)	Pavecon PC_t (1..5)	Pavecon PC_l (1..5)	Buff. Width (BW) (ft)	Tree Spcg. in Buffer (ft/ctr)	% with Sidewalk	Swalk Width (Ws) (ft)	Bicycle LOS Score (0...7)	Bicycle LOS Grade (A...F)	Pedestrian LOS Value (0...7)	Pedestrian LOS Grade (A...F)
1.0	Brook St.	High St.	North St.	0.64	N	2	U	*1,500*	*1*	30	12.0	0.0	10	3.0	-	3.0	0	75	4.0	2.04	B	2.46	B
1.0	Brook St.	High St.	North St.	0.64	S	2	U	*1,500*	*1*	30	12.0	0.0	0	3.0	-	3.0	0	100	4.0	1.85	B	2.26	B
2.0	Canandaigua Rd.	Town Line	14A	0.44	E	2	U	8,077	6	40	23.0	11.0	0	4.0	4.0	0.0	0	0	0.0	0.09	A	3.88	D
2.0	Canandaigua Rd.	Town Line	14A	0.44	W	2	U	8,077	6	40	23.0	11.0	0	4.0	4.0	0.0	0	0	0.0	0.09	A	3.88	D
3.0	Canandaigua Rd.	14A	PreEmption Rd.	0.16	E	4	S	15,777	6	40	15.5	3.5	0	4.5	4.5	0.0	0	0	0.0	3.96	D	4.35	D
3.0	Canandaigua Rd.	14A	PreEmption Rd.	0.16	W	4	S	15,777	6	40	15.5	3.5	0	4.5	4.5	5.0	0	100	5.0	3.96	D	3.10	C
4.0	Carter Rd.	North St.	Angelo St.	0.45	N	2	U	1,829	*1*	30	12.5	2.0	0	4.5	4.5	10.0	0	100	5.0	1.56	B	1.97	B
4.0	Carter Rd.	North St.	Angelo St.	0.45	S	2	U	1,829	*1*	30	12.5	2.0	0	4.5	4.5	0.0	0	0	0.0	1.56	B	3.54	D
5.0	Carter Rd.	Angelo St.	Gambee Rd.	0.61	N	2	U	1,829	*1*	40	12.5	2.0	0	4.0	4.0	0.0	0	0	0.0	1.82	B	3.82	D
5.0	Carter Rd.	Angelo St.	Gambee Rd.	0.61	S	2	U	1,829	*1*	40	12.5	2.0	0	4.0	4.0	0.0	0	0	0.0	1.82	B	3.82	D
6.0	Castle St.	North St.	Main St.	1.31	E	2	U	2,678	*1*	30	18.0	0.0	10	3.0	-	5.0	0	75	4.0	1.45	A	2.32	B
6.0	Castle St.	North St.	Main St.	1.31	W	2	U	2,678	*1*	30	18.0	0.0	10	3.0	-	5.0	75	100	5.0	1.45	A	1.81	B
7.0	Castle St.	Main St.	Genesee St.	0.10	E	2	U	8,928	*1*	30	11.0	0.0	0	4.5	-	3.0	0	100	5.5	3.69	D	3.09	C
7.0	Castle St.	Main St.	Genesee St.	0.10	W	2	U	8,928	*1*	30	20.0	9.0	75	4.5	4.5	5.0	50	100	9.0	3.09	C	1.89	B
8.0	Castle St.	Genesee St.	Lake Front Dr.	0.19	E	2	U	8,928	*1*	30	21.0	9.0	75	4.5	4.5	6.0	75	100	8.0	2.93	C	1.90	B
8.0	Castle St.	Genesee St.	Lake Front Dr.	0.19	W	2	U	8,928	*1*	30	21.0	9.0	75	4.5	4.5	6.0	75	100	8.0	2.93	C	1.90	B
9.0	Copeland Ave.	Hamilton St.	Washington St.	0.24	N	2	U	*5,100*	*1*	30	12.0	0.0	0	3.5	-	4.0	0	100	4.0	3.52	D	2.70	C
9.0	Copeland Ave.	Hamilton St.	Washington St.	0.24	S	2	U	*5,100*	*1*	30	12.0	0.0	0	3.5	-	4.0	0	100	4.0	3.52	D	2.70	C
10.0	Elizabeth Blackwell St.	Exhange St.	Lake Front Dr.	0.13	E	2	U	*2,200*	*1*	30	21.0	8.5	25	3.0	3.0	4.5	0	100	6.0	0.00	A	1.59	B
10.0	Elizabeth Blackwell St.	Exhange St.	Lake Front Dr.	0.13	W	2	U	*2,200*	*1*	30	11.5	0.0	0	3.0	-	3.0	0	100	5.0	2.56	C	2.26	B
11.0	Evans St.	Middle St.	North St.	0.18	N	2	U	*1,000*	*1*	30	14.0	0.0	0	3.0	-	0.0	0	0	0.0	0.55	A	2.61	C
11.0	Evans St.	Middle St.	North St.	0.18	S	2	U	*1,000*	*1*	30	14.0	0.0	0	3.0	-	9.5	0	100	4.0	0.55	A	1.93	B
12.0	Exchange St.	Elizabeth Blackwell St.	Seneca St.	0.22	N	2	U	*3,000*	*1*	30	19.5	8.0	50	3.0	3.0	0.0	0	100	6.0	1.62	B	1.59	B
12.0	Exchange St.	Elizabeth Blackwell St.	Seneca St.	0.22	S	2	U	*3,000*	*1*	30	19.5	8.0	50	3.0	3.0	0.0	0	100	6.0	1.62	B	1.59	B
13.0	Exchange St.	Seneca St.	Lake St.	0.16	N	2	U	9,249	6	30	17.0	0.0	50	4.0	-	0.0	0	100	14.0	4.75	E	2.17	B
13.0	Exchange St.	Seneca St.	Lake St.	0.16	S	2	U	9,249	6	30	17.0	0.0	50	4.0	-	0.0	0	100	12.5	4.75	E	2.23	B
14.0	Exchange St.	Lake St.	North St.	0.39	N	2	U	9,249	6	30	21.5	7.5	10	3.0	3.0	2.5	0	100	5.0	2.02	B	2.77	C
14.0	Exchange St.	Lake St.	North St.	0.39	S	2	U	9,249	6	30	21.5	7.5	10	3.0	3.0	2.5	0	100	5.0	2.02	B	2.77	C
15.0	Gambee Rd.	Carter Rd.	Genesee St.	0.49	N	2	U	2,259	8	40	14.5	3.0	0	4.5	4.5	0.0	0	0	0.0	2.69	C	3.70	D
15.0	Gambee Rd.	Carter Rd.	Genesee St.	0.49	S	2	U	2,259	8	40	14.5	3.0	0	4.5	4.5	0.0	0	0	0.0	2.69	C	3.70	D

DRAFT City and Town of Geneva Bicycle and Pedestrian Level of Service Results

Seg_ID	Road Name	From	To	Len-gth (Ls) (mi)	Dir. of Sur.	Lanes (L) Th #	Lanes (L) Con	ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width of Pavement W_t (ft)	Width of Pavement W_l (ft)	Occ. Park. (OSPA) (%)	Pavecon PC_t (1..5)	Pavecon PC_l (1..5)	Buff. Width (BW) (ft)	Tree Spcg. in Buffer (ft/ctr)	% with Sidewalk	Swalk Width (Ws) (ft)	Bicycle LOS Score (0...7)	Bicycle LOS Grade (A...F)	Pedestrian LOS Value (0...7)	Pedestrian LOS Grade (A...F)
16.0	Gambee Rd.	Genesee St.	Lyons Rd.	0.32	N	2	U	2,869	8	40	15.5	4.0	0	5.0	5.0	0.0	0	0	0.0	3.13	C	3.70	D
16.0	Gambee Rd.	Genesee St.	Lyons Rd.	0.32	S	2	U	2,869	8	40	15.5	4.0	0	5.0	5.0	0.0	0	0	0.0	3.13	C	3.70	D
17.0	Genesee St.	Castle St.	Lewis St.	0.21	N	2	U	*1,500*	*1*	30	15.0	0.0	0	3.0	-	0.0	0	100	5.5	0.97	A	2.10	B
17.0	Genesee St.	Castle St.	Lewis St.	0.21	S	2	U	*1,500*	*1*	30	15.0	0.0	25	3.0	-	0.0	0	100	5.5	1.36	A	1.76	B
18.0	Genesee St.	Lewis St.	North St.	0.32	N	2	U	*1,500*	*1*	30	18.0	0.0	75	3.0	-	5.5	50	100	6.0	1.38	A	0.99	A
18.0	Genesee St.	Lewis St.	North St.	0.32	S	2	U	*1,500*	*1*	30	18.0	0.0	25	3.0	-	8.5	50	100	6.0	0.16	A	1.21	A
19.0	Genesee St.	North St.	Avenue G/City Line	0.52	N	2	U	3,249	*1*	30	18.0	0.0	25	4.0	-	8.0	50	100	5.5	2.05	B	1.49	A
19.0	Genesee St.	North St.	Avenue G/City Line	0.52	S	2	U	3,249	*1*	30	18.0	0.0	10	4.0	-	7.0	50	100	5.5	1.76	B	1.66	B
20.0	Genesee St.	Avenue G/City Line	Gambee Rd.	0.61	N	2	U	1,522	*1*	35	14.0	3.5	0	3.0	3.0	0.0	0	0	0.0	0.99	A	3.50	C
20.0	Genesee St.	Avenue G/City Line	Gambee Rd.	0.61	S	2	U	1,522	*1*	35	13.0	2.5	0	3.0	3.0	0.0	0	0	0.0	1.45	A	3.59	D
21.0	Hamilton St.	PreEmption Rd.	White Springs Rd.	0.53	E	4	S	17,448	4	35	13.5	3.5	0	4.0	4.0	5.0	0	100	8.0	3.72	D	2.94	C
21.0	Hamilton St.	PreEmption Rd.	White Springs Rd.	0.53	W	4	S	17,448	4	35	13.5	3.5	0	4.0	4.0	5.0	0	100	8.0	3.72	D	2.94	C
22.0	Hamilton St.	White Springs Rd.	Cloverleaf Dr.	0.90	E	4	S	19,869	5	35	13.5	3.5	0	4.5	4.5	0.0	0	100	5.0	4.02	D	3.43	C
22.0	Hamilton St.	White Springs Rd.	Cloverleaf Dr.	0.90	W	4	S	19,869	5	35	13.5	3.5	0	4.5	4.5	0.0	0	90	5.0	4.02	D	3.55	D
23.0	High St.	Reed St.	Nursery Ave.	0.42	E	2	U	*1,500*	*1*	30	10.0	0.0	10	3.0	-	0.0	0	0	0.0	2.58	C	3.17	C
23.0	High St.	Reed St.	Nursery Ave.	0.42	W	2	U	*1,500*	*1*	30	10.0	0.0	10	3.0	-	0.0	0	0	0.0	2.58	C	3.17	C
24.0	High St.	Nursery Ave.	Pulteney St.	0.57	E	2	U	*1,500*	*1*	30	12.0	0.0	10	2.5	-	7.5	0	100	4.0	2.41	B	1.96	B
24.0	High St.	Nursery Ave.	Pulteney St.	0.57	W	2	U	*1,500*	*1*	30	12.0	0.0	10	2.5	-	7.5	0	100	4.0	2.41	B	1.96	B
25.0	Jay St.	White Springs Rd.	Main St.	0.84	E	2	U	884	*1*	30	10.0	0.0	0	3.0	-	0.0	0	0	0.0	2.06	B	2.99	C
25.0	Jay St.	White Springs Rd.	Main St.	0.84	W	2	U	884	*1*	30	10.0	0.0	0	3.0	-	4.0	75	10	4.5	2.06	B	3.53	D
26.0	Lafayette Ave.	Hillcrest Ave.	Genesee St.	0.6	E	2	U	*1,000*	*1*	30	11.5	0.0	0	2.0	-	12.0	75	100	4.0	2.53	C	1.57	B
26.0	Lafayette Ave.	Hillcrest Ave.	Genesee St.	0.6	W	2	U	*1,000*	*1*	30	11.5	0.0	0	2.0	-	12.0	75	100	4.0	2.53	C	1.57	B
27.0	Lake Front Dr.	Cloverleaf Dr.	S of Elizabeth Blackwell St.	0.42	E	4	D	15,224	6	35	15.5	3.5	0	4.5	4.5	0.0	0	40	5.0	3.65	D	3.72	D
27.0	Lake Front Dr.	Cloverleaf Dr.	S of Elizabeth Blackwell St.	0.42	W	4	D	15,224	6	35	15.5	3.5	0	4.5	4.5	0.0	0	40	5.0	3.65	D	3.72	D
28.0	Lake Front Dr.	S of Elizabeth Blackwell St.	Castle St.	0.19	E	4	S	15,224	6	45	13.5	1.5	0	3.0	3.0	8.0	0	75	6.0	5.27	E	3.52	D
28.0	Lake Front Dr.	S of Elizabeth Blackwell St.	Castle St.	0.19	W	4	S	15,224	6	45	12.0	0.0	0	3.0	-	0.0	0	0	0.0	5.46	E	4.80	E
29.0	Lake Front Dr.	Castle St.	Seneca County Line	1.04	E	4	S	12,740	2	45	13.5	1.5	0	2.5	2.5	30.0	30	75	10.0	4.31	D	2.15	B
29.0	Lake Front Dr.	Castle St.	Seneca County Line	1.04	W	4	S	12,740	2	45	13.5	1.5	0	2.5	2.5	0.0	0	0	0.0	4.31	D	4.47	D
30.0	Lewis St.	Oak St.	Genesee St.	0.35	E	2	U	*1,500*	*1*	30	12.0	0.0	0	4.0	-	13.0	75	100	5.0	1.53	B	1.52	B
30.0	Lewis St.	Oak St.	Genesee St.	0.35	W	2	U	*1,500*	*1*	30	12.0	0.0	10	4.0	-	11.0	75	100	5.0	1.72	B	1.50	A

DRAFT City and Town of Geneva Bicycle and Pedestrian Level of Service Results

Seg_ID	Road Name	From	To	Len-gth (Ls) (mi)	Dir. of Sur.	Lanes (L) Th #	Lanes (L) Con	ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width of Pavement W_t (ft)	Width of Pavement W_l (ft)	Occ. Park. (OSPA) (%)	Pavecon PC_t (1..5)	Pavecon PC_l (1..5)	Buff. Width (BW) (ft)	Tree Spcg. in Buffer (ft/ctr)	% with Sidewalk	Swalk Width (Ws) (ft)	Bicycle LOS Score (0...7)	Bicycle LOS Grade (A...F)	Pedestrian LOS Value (0...7)	Pedestrian LOS Grade (A...F)
31.0	Lewis St.	Genesee St.	Exchange St.	0.18	E	2	U	*1,500*	*1*	30	18.0	0.0	10	3.5	-	7.5	0	100	5.0	0.00	A	1.72	B
31.0	Lewis St.	Genesee St.	Exchange St.	0.18	W	2	U	*1,500*	*1*	30	18.0	0.0	10	3.5	-	7.5	0	100	5.0	0.00	A	1.72	B
32.0	Lochland Rd.	Snell Rd.	Kings Ln.	0.91	N	2	U	7,055	8	35	18.0	7.0	0	3.5	3.5	16.0	0	25	4.0	3.26	C	3.39	C
32.0	Lochland Rd.	Snell Rd.	Kings Ln.	0.91	S	2	U	7,055	8	35	18.0	7.0	0	3.5	3.5	0.0	0	0	0.0	3.26	C	3.72	D
33.0	Lyceum St.	Nursery Ave.	Elmwood Ave.	0.43	E	2	U	*1,000*	*1*	30	12.5	0.0	10	3.0	-	6.0	50	100	4.0	1.24	A	1.61	B
33.0	Lyceum St.	Nursery Ave.	Elmwood Ave.	0.43	W	2	U	*1,000*	*1*	30	12.5	0.0	10	3.0	-	6.0	50	100	4.0	1.24	A	1.61	B
34.0	Lyons Rd.	North St.	City Line	0.57	N	2	U	8,404	8	30	20.0	7.5	0	3.5	3.5	3.0	0	100	5.0	2.37	B	3.07	C
34.0	Lyons Rd.	North St.	City Line	0.57	S	2	U	8,404	8	30	22.0	9.5	0	3.5	3.5	3.0	0	100	5.0	1.19	A	3.02	C
35.0	Lyons Rd.	City Line	Gambee Rd.	0.56	N	2	U	8,016	11	35	18.0	6.0	0	3.5	3.5	0.0	0	0	0.0	4.32	D	4.11	D
35.0	Lyons Rd.	City Line	Gambee Rd.	0.56	S	2	U	8,016	11	35	18.0	6.0	0	3.5	3.5	0.0	0	0	0.0	4.32	D	4.11	D
36.0	Lyons Rd.	Gambee Rd.	Town Line	0.97	N	2	U	7,829	10	45	18.0	6.0	0	3.5	3.5	0.0	0	0	0.0	4.67	E	4.40	D
36.0	Lyons Rd.	Gambee Rd.	Town Line	0.97	S	2	U	7,829	10	45	18.0	6.0	0	3.5	3.5	0.0	0	0	0.0	4.67	E	4.40	D
37.0	Main St.	Kings Ln.	St. Clair St.	0.32	N	2	U	7,651	8	30	20.0	0.0	0	3.5	-	12.0	0	100	6.0	4.04	D	2.43	B
37.0	Main St.	Kings Ln.	St. Clair St.	0.32	S	2	U	7,651	8	30	20.0	0.0	10	3.5	-	21.0	0	100	6.0	4.23	D	2.16	B
38.0	Main St.	St. Clair St.	Park Pl.	0.59	N	2	U	7,127	*6*	30	20.0	0.0	75	3.0	-	10.0	75	100	8.0	4.87	E	1.59	B
38.0	Main St.	St. Clair St.	Park Pl.	0.59	S	2	U	7,127	*6*	30	20.0	0.0	25	3.0	-	10.0	50	100	6.0	4.12	D	1.86	B
39.0	Main St.	Park Pl.	Castle St.	0.19	N	2	U	6,519	*2*	30	19.0	8.0	75	3.0	3.0	0.0	0	100	9.0	3.55	D	1.89	B
39.0	Main St.	Park Pl.	Castle St.	0.19	S	2	U	6,519	*2*	30	19.0	8.0	75	3.0	3.0	0.0	0	100	6.0	3.55	D	1.96	B
40.0	Main St.	Castle St.	North St.	0.56	N	2	D	4,203	*1*	30	20.0	0.0	25	3.0	-	13.0	75	100	5.0	2.84	C	1.59	B
40.0	Main St.	Castle St.	North St.	0.56	S	2	D	4,203	*1*	30	20.0	0.0	25	3.0	-	13.0	75	100	5.0	2.84	C	1.59	B
41.0	Middle St.	Exchange St.	Hallenbeck Ave.	0.38	E	2	U	*1,000*	*1*	30	12.0	0.0	0	3.0	-	3.0	0	60	5.0	1.41	A	2.67	C
41.0	Middle St.	Exchange St.	Hallenbeck Ave.	0.38	W	2	U	*1,000*	*1*	30	12.0	0.0	0	3.0	-	3.0	0	100	5.0	1.41	A	2.11	B
42.0	Middle St.	Hallenbeck Ave.	Evans St.	0.15	E	2	U	*1,000*	*1*	30	12.0	0.0	0	2.0	-	0.0	0	0	0.0	2.41	B	2.82	C
42.0	Middle St.	Hallenbeck Ave.	Evans St.	0.15	W	2	U	*1,000*	*1*	30	12.0	0.0	0	2.0	-	0.0	0	0	0.0	2.41	B	2.82	C
43.0	Milton St.	Pulteney St.	Main St.	0.15	W	1	OW	*2,700*	*3*	30	27.0	8.0	75	3.0	3.0	4.0	0	100	6.0	2.17	B	1.44	A
44.0	North St.	PreEmption Rd.	Brook St.	0.83	E	2	U	5,362	1	30	15.0	3.5	0	3.5	3.5	9.0	0	100	5.0	2.80	C	2.54	C
44.0	North St.	PreEmption Rd.	Brook St.	0.83	W	2	U	5,362	1	30	15.0	3.5	0	3.5	3.5	11.0	0	30	4.0	2.68	C	3.35	C
45.0	North St.	Brook St.	Exchange St.	0.87	E	2	U	7,257	1	30	14.5	0.0	0	2.5	-	5.0	0	100	5.0	4.01	D	2.73	C
45.0	North St.	Brook St.	Exchange St.	0.87	W	2	U	7,257	1	30	14.5	0.0	0	2.5	-	5.0	0	90	5.0	3.94	D	2.93	C
46.0	North St.	Exchange St.	PreEmption St.	0.78	E	2	U	6,641	1	30	14.0	0.0	0	2.5	-	0.0	0	100	5.0	3.96	D	2.89	C

DRAFT City and Town of Geneva Bicycle and Pedestrian Level of Service Results

Seg_ID	Road Name	From	To	Len-gth (Ls) (mi)	Dir. of Sur.	Lanes (L) Th #	Lanes (L) Con	ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width of Pavement W_t (ft)	Width of Pavement W_l (ft)	Occ. Park. (OSPA) (%)	Pavecon PC_t (1..5)	Pavecon PC_l (1..5)	Buff. Width (BW) (ft)	Tree Spcg. in Buffer (ft/ctr)	% with Sidewalk	Swalk Width (Ws) (ft)	Bicycle LOS Score (0...7)	Bicycle LOS Grade (A...F)	Pedestrian LOS Value (0...7)	Pedestrian LOS Grade (A...F)
46.0	North St.	Exchange St.	PreEmption St.	0.78	W	2	U	6,641	1	30	14.0	0.0	0	2.5	-	2.5	0	100	5.0	3.99	D	2.89	C
47.0	Nursery Ave.	Washington St.	Lyceum St.	0.45	N	2	U	*1,500*	*1*	30	12.5	0.0	0	3.5	-	2.5	0	100	4.0	1.59	B	2.29	B
47.0	Nursery Ave.	Washington St.	Lyceum St.	0.45	S	2	U	*1,500*	*1*	30	12.5	0.0	0	3.5	-	2.5	0	100	4.0	1.65	B	2.32	B
48.0	PreEmption Rd.	Snell Rd.	Hamilton St.	2.68	N	2	U	3,891	6	50	16.0	4.0	0	4.0	4.0	0.0	0	0	0.0	3.63	D	4.27	D
48.0	PreEmption Rd.	Snell Rd.	Hamilton St.	2.68	S	2	U	3,891	6	50	16.0	4.0	0	4.0	4.0	0.0	0	0	0.0	3.68	D	4.15	D
49.0	PreEmption Rd.	Hamilton St.	North St.	1.44	N	2	S	9,470	7	40	17.0	5.5	0	4.0	4.0	0.0	0	0	0.0	3.70	D	4.44	D
49.0	PreEmption Rd.	Hamilton St.	North St.	1.44	S	2	S	9,470	7	40	17.0	5.5	0	4.0	4.0	0.0	0	0	0.0	3.70	D	4.44	D
50.0	PreEmption Rd.	North St.	Town Line	1.66	N	2	U	4,530	9	40	14.5	4.5	0	3.5	3.5	0.0	0	0	0.0	4.80	E	4.00	D
50.0	PreEmption Rd.	North St.	Town Line	1.66	S	2	U	4,530	9	40	14.5	4.5	0	3.5	3.5	0.0	0	0	0.0	4.80	E	4.00	D
51.0	PreEmption St.	North St.	Forge Ave./City Line	0.29	N	2	U	2,140	*3*	30	13.0	0.0	0	3.0	-	0.0	0	0	0.0	2.40	B	3.07	C
51.0	PreEmption St.	North St.	Forge Ave./City Line	0.29	S	2	U	2,140	*3*	30	13.0	0.0	0	3.0	-	0.0	0	0	0.0	2.57	C	3.15	C
52.0	PreEmption St.	Forge Ave./City Line	Town Line	1.43	N	2	U	2,140	*3*	45	12.0	1.0	0	4.5	4.5	0.0	0	0	0.0	2.89	C	3.80	D
52.0	PreEmption St.	Forge Ave./City Line	Town Line	1.43	S	2	U	2,140	*3*	45	12.0	1.0	0	4.5	4.5	0.0	0	0	0.0	2.70	C	3.72	D
53.0	Pulteney St.	Jay St.	Hamilton St.	0.51	N	2	U	2,789	*1*	30	12.0	0.0	0	2.0	-	5.0	0	100	5.0	3.99	D	2.25	B
53.0	Pulteney St.	Jay St.	Hamilton St.	0.51	S	2	U	2,789	*1*	30	12.0	0.0	0	2.0	-	5.0	0	95	4.0	3.87	D	2.43	B
54.0	Pulteney St.	Hamilton St.	Washington St.	0.24	N	2	U	2,789	*1*	30	19.5	0.0	25	2.5	-	9.0	75	100	5.0	1.83	B	1.48	A
54.0	Pulteney St.	Hamilton St.	Washington St.	0.24	S	2	U	2,789	*1*	30	11.5	0.0	0	2.5	-	9.0	0	100	5.0	3.33	C	2.16	B
55.0	Pulteney St.	Washington St.	Castle St.	0.36	N	2	U	2,789	*1*	30	16.0	0.0	25	4.5	-	6.0	75	100	5.0	1.99	B	1.66	B
55.0	Pulteney St.	Washington St.	Castle St.	0.36	S	2	U	2,789	*1*	30	16.0	0.0	0	4.5	-	4.0	75	100	5.0	1.50	A	2.03	B
56.0	Reed St.	Hamilton St.	High St.	0.64	N	2	U	1,548	*1*	30	13.0	0.0	0	3.0	-	0.0	0	0	0.0	1.58	B	2.88	C
56.0	Reed St.	Hamilton St.	High St.	0.64	S	2	U	1,548	*1*	30	13.0	0.0	0	3.0	-	0.0	0	0	0.0	1.74	B	2.88	C
57.0	Seneca St.	Main St.	Exchange St.	0.16	E	2	U	9,249	*5*	30	20.0	8.0	100	3.5	3.5	4.0	0	100	10.0	4.66	E	1.91	B
57.0	Seneca St.	Main St.	Exchange St.	0.16	W	2	U	9,249	*5*	30	20.0	8.0	100	3.5	3.5	4.0	0	100	10.0	4.66	E	1.91	B
58.0	Snell Rd.	White Springs Rd.	Main St.	0.66	E	2	U	1,674	*1*	30	11.0	1.0	0	4.5	4.5	0.0	0	0	0.0	2.27	B	3.24	C
58.0	Snell Rd.	White Springs Rd.	Main St.	0.66	W	2	U	1,674	*1*	30	11.0	1.0	0	4.5	4.5	0.0	0	0	0.0	2.27	B	3.24	C
59.0	St. Clair St.	White Springs Rd.	Main St.	0.88	E	2	U	*1,000*	*1*	30	12.0	0.0	0	2.5	-	12.0	0	20	5.0	1.87	B	3.16	C
59.0	St. Clair St.	White Springs Rd.	Main St.	0.88	W	2	U	*1,000*	*1*	30	12.0	0.0	10	2.5	-	10.0	0	70	5.0	1.91	B	2.27	B
60.0	Washington St.	PreEmption Rd.	Reed St.	0.31	E	2	U	2,834	*1*	30	15.0	4.0	0	3.5	3.0	0.0	0	0	0.0	1.75	B	3.44	C
60.0	Washington St.	PreEmption Rd.	Reed St.	0.31	W	2	U	2,834	*1*	30	15.0	4.0	0	3.5	3.0	0.0	0	0	0.0	1.75	B	3.44	C
61.0	Washington St.	Reed St.	Park Pl.	1.07	E	2	U	3,837	*1*	30	15.5	0.0	0	3.0	-	15.0	100	100	5.0	3.09	C	1.79	B

DRAFT City and Town of Geneva Bicycle and Pedestrian Level of Service Results

Seg_ID	Road Name	From	To	Len-gth (Ls) (mi)	Dir. of Sur.	Lanes (L) Th #	Lanes (L) Con	ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width of Pavement W_t (ft)	Width of Pavement W_l (ft)	Occ. Park. (OSPA) (%)	Pavecon PC_t (1..5)	Pavecon PC_l (1..5)	Buff. Width (BW) (ft)	Tree Spcg. in Buffer (ft/ctr)	% with Sidewalk	Swalk Width (Ws) (ft)	Bicycle LOS Score (0...7)	Bicycle LOS Grade (A...F)	Pedestrian LOS Value (0...7)	Pedestrian LOS Grade (A...F)
61.0	Washington St.	Reed St.	Park Pl.	1.07	W	2	U	3,837	*1*	30	15.5	0.0	10	3.0	-	15.0	75	100	5.5	3.12	C	1.57	B
62.0	West St.	Hamilton St.	Washington St.	0.25	N	2	U	*1,500*	*1*	30	12.0	0.0	0	3.5	-	6.5	30	100	4.0	1.83	B	1.61	B
62.0	West St.	Hamilton St.	Washington St.	0.25	S	2	U	*1,500*	*1*	30	12.0	0.0	10	3.5	-	6.5	50	100	4.0	1.87	B	1.68	B
63.0	West St.	Washington St.	High St.	0.29	N	1	OW	*1,000*	*1*	30	17.0	0.0	0	3.5	-	3.0	0	100	4.0	2.35	B	2.12	B
64.0	White Springs Ln.	PreEmption Rd.	White Springs Rd.	0.70	E	2	U	1,381	*1*	35	10.0	0.0	0	5.0	-	0.0	0	0	0.0	2.10	B	3.28	C
64.0	White Springs Ln.	PreEmption Rd.	White Springs Rd.	0.70	W	2	U	1,381	*1*	35	10.0	0.0	0	5.0	-	0.0	0	0	0.0	2.10	B	3.28	C
65.0	White Springs Rd.	Snell Rd.	Hamilton St.	1.52	N	2	U	1,660	*1*	30	14.0	3.0	0	3.5	3.5	0.0	0	0	0.0	1.10	A	3.38	C
65.0	White Springs Rd.	Snell Rd.	Hamilton St.	1.52	S	2	U	1,660	*1*	30	14.0	3.0	0	3.5	3.5	0.0	0	0	0.0	1.10	A	3.38	C
66.0	William St.	Reed St.	Pulteney St.	0.96	E	2	U	*1,500*	*1*	30	12.0	0.0	10	3.0	-	9.0	40	90	4.0	2.04	B	1.65	B
66.0	William St.	Reed St.	Pulteney St.	0.96	W	2	U	*1,500*	*1*	30	12.0	0.0	10	3.0	-	9.0	40	100	4.0	2.04	B	1.44	A
67.0	William St.	Pulteney St.	Main St.	0.14	E	1	OW	*1,000*	*1*	30	19.0	0.0	50	4.0	-	0.0	0	100	6.0	2.53	C	1.42	A

APPENDIX

F. SCHEMATIC COSTS FOR PEDESTRIAN AND BICYCLE INFRASTRUCTURE IMPROVEMENTS

Costs for Pedestrian and Bicyclist Infrastructure Improvements

A Resource for Researchers, Engineers, Planners, and the General Public

Authors: Max A. Bushell, Bryan W. Poole, Charles V. Zegeer, Daniel A. Rodriguez

UNC Highway Safety Research Center

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Contents

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Charlie V. Zegeer is the Associate Director of Engineering and Planning for HSRC, where he has worked from 1986 to present. He is also currently the Director of the Pedestrian and Bicycle Information Center (PBIC), the existing FHWA-sponsored National Bicycle and Pedestrian Clearinghouse. In all, he has authored more than 150 reports and publications, mostly dealing with pedestrian and bicyclist safety. He has also received several international awards, including those from Transportation Research Board (TRB) and Institute of Transportation Engineers (ITE). Mr. Zegeer is a registered Professional Engineer and an Emeritus Member of the TRB Pedestrian Committee. He received his Bachelor's Degree in Civil Engineering (Virginia Tech) in 1972 and a Master's Degree in Civil Engineering (Transportation) from the University of Kentucky in 1974.

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The Highway Safety Research Center

The University of North Carolina at Chapel Hill's Highway Safety Research Center has been a leading research institute that has helped shape the field of transportation safety. The Center's mission is to improve the safety, security, access, and efficiency of all surface transportation modes through a balanced, interdisciplinary program of research, evaluation and information dissemination.

Today, HSRC research stretches across multiple disciplines, from social and behavioral sciences to engineering and planning, and addresses many of the new challenging concerns of the North Carolina and American public. Among other things, HSRC researchers are exploring ways of making roads safer for pedestrians and bicyclists, researching the effects of aging on driver performance, studying how driver distractions such as cell phone use affect transportation safety, researching how fatigue and sleep-deprivation affect driver performance, and examining how changes in roadway design and traffic operations can make travel safer for all road users.

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Executive Summary

Costs for pedestrian and bicycle safety infrastructure often vary greatly from city to city and state to state. This document (and associated database) is intended to provide meaningful estimates of infrastructure costs by collecting up-to-date cost information for pedestrian and bicycle treatments from states and cities across the country. Using this information, researchers, engineers, planners, and the general public can better understand the cost of pedestrian and bicycle treatments in their communities and make informed decisions about which infrastructure enhancements are best suited for implementation. By collecting countrywide cost information, this database should contain useful information for any state or city, even if costs from that particular state or city are not included for a given treatment.

A better understanding of pedestrian and bicycle infrastructure costs will hopefully ensure that funding is allocated to pedestrian and bicycle improvements more efficiently. The goal is to encourage more communities to enhance facilities for non-motorized users and increase the safety of those choosing to walk and bike. Building a new roadway for automobiles can cost tens of millions of dollars to construct, and many of the pedestrian and bicycle infrastructure projects and facilities are extremely low-cost in comparison. This infrastructure can also serve to improve safety for all road users, while also promoting healthier lifestyles through more bicycling and walking. The tables provided in this document provide general estimates and cost ranges for 77 pedestrian and bicycle facilities using more than 1,700 cost observations, and are presented with a median and average price, the minimum and maximum cost, and the number of sources. By making more informed decisions about the costs of pedestrian and bicycle infrastructure treatments, decision-makers will be able to dedicate funds to those treatments secure in the knowledge that these investments are often affordable as well as determine which treatment is the most cost-effective.

It must be noted that costs can vary widely from state to state and also from site to site. Therefore, the cost information contained in this report should be used only for estimating purposes and not necessarily for determining actual bid prices for a specific infrastructure project.

Making the Case for Pedestrian and Bicycle Infrastructure

Walking and bicycling have both been frequently overlooked as city, state, and federal governments focus their effort and funds on building sophisticated transportation systems. Yet there are a growing percentage of people that want to change the common notion of transportation and mobility. They want livable communities where they can commute to work, socialize and recreate by foot and bicycle.

Recent socio-economic and cultural trends highlight the desire for walkable and bikeable communities. The 15-Year Report on Walking and Biking determined that 12 percent of all trips are now made by bicycle or foot in 2009, a 25 percent increase from 2001, even though there are often not adequate facilities for safe walking or bicycling. Bicyclists and pedestrians make up 14 percent of traffic fatalities, although federal funding for biking and walking projects is approximately 2 percent of the federal transportation budget.[1]

While new national initiatives, such as Complete Streets and Safe Routes to School, are examples of programs that support pedestrian facility development, problems persist. In 2010, 4,280 pedestrians and 618 bicyclists were killed and roughly 59,000 pedestrians and 52,000 bicyclists were injured.[2,3] Though these totals have decreased somewhat in recent years, pedestrian and bicyclist safety is an ongoing problem that should continue to be comprehensively addressed at all levels of government.

Creating a walkable and bikeable community starts with the built environment: having destinations close to each other; siting schools, parks, and public spaces appropriately; allowing mixed-use developments; having sufficient densities to support transit; creating commercial districts that people can access by bicycle, foot and wheelchair; etc. Most walking trips are less than .5 mi (0.8 km), so having a compact environment is essential. Similarly, while half of all household trips are three miles or less, fewer than 2 percent of those trips are made by bicycle.[4] Finally, a recent study found bicyclists will go out of their way to use bicycle infrastructure, highlighting the importance of having sufficient facilities.[5] The connection between land-use planning and transportation planning is critical to safely and effectively accommodate trips by foot and bicycle.

Developing pedestrian and bicycle infrastructure has economic benefits also. Studies have found that bicycle infrastructure improvements can have a positive overall impact on business, and that people who walk or bike to a commercial area spend more money per month than those who accessed the area by automobile.[6] The removal of on-street parking is often thought to negatively impact business, but reports show adding facilities such as bicycle racks and bicycle lanes can actually increase economic activity, and also help create a buffer from moving traffic that aides both pedestrian and bicyclist activity.[7] Finally, improving bicycle and pedestrian infrastructure can lead to positively impacting real estate values. Homes near bicycle paths have been found to support higher sales prices, and areas that facilitate walkability and attract pedestrians sustain higher rents, revenues and resale values.[8]

Pedestrian and bicycle- specific infrastructure improvements can also improve conditions for all road users. The 2011 Sustainable Streets Index, published by New York City's Department of Transportation, found that improvements such as pedestrian islands and bicycle paths led to an overall reduction in motorist crashes as well as injury crashes, a decrease in speeding, and an increase in pedestrian and bicycle activities.[9]

Finally, new roadway projects can cost tens of millions of dollars to construct, depending on location and type of road. Many of the pedestrian and bicycle infrastructure projects and facilities highlighted in this paper are extremely low-cost in comparison.

Walking/Bicycling and Public Health

The health benefits of walking and bicycling have been well-documented by public health and medical professionals. Current CDC recommendations suggest that adults ages 18 and up should get 150 minutes of moderate-intensity exercise throughout the week to experience the health benefits of physical activity. Brisk 10 minute walks or short trips by bicycle to work can both help contribute to this overall goal. Health benefits of undertaking these activities include weight management, increased bone and muscle strength, improved mental health and mood, and increased coordination. As the focus of healthcare transitions from focusing on the treatment to the prevention of disease, walking and biking are being promoted as an accessible and easy way to improve both our current and future well-being.

As a result, urban planners, engineers, and public health professionals are increasingly working together to create pedestrian- and bicycle-friendly environments that promote these activities for both leisure and transportation purposes. Researchers who study the effect of the built environment on walking and biking have discovered that numerous variables affect such decisions. The proximity of destinations, the presence and quality of sidewalks or bicycle lanes, perceptions of safety and security, the steepness of grades, the presence of other people, separation from traffic, and aesthetics are all factors that can encourage or discourage people from walking or biking. Policies and roadway features can also help promote active transportation, such as the use of wayfinding signage and pedestrian and bicyclist-oriented crossing signals. Studies have shown that facilities such as separated paths, bike boxes, sidewalks and benches are associated with enhanced safety and/or activity.[10] Through the design or redesign of environments to make walking and biking safer or more pleasant, planners and engineers can help people of all ages get the exercise they need to live longer, healthier lives. The infrastructure costs summarized in this document are intended to aide and encourage improvements to these environments.

Methodology

Highway Safety Research Center (HSRC) staff began work on a database of general engineering in late 2011. Using this as a basis and with additional support from the Federal Highway Administration and Active Living Research, HSRC researchers developed a pedestrian and bicycle infrastructure cost database for use by planners, engineers, and others. A summary of costs from that database is provided herein with a direct link to the full infrastructure cost database.

Beginning with bid-letting summaries or price indices from states across the country, infrastructure costs were identified and entered into a database. Bid-letting sheets were usually available from State Departments of Transportation web sites, which contain a range of costs based on local contractor bids. In some cases, however, only one bid – or an average of all bids – is listed. In this situation, either the range of bids or the single bid is included in the database. While staff attempted to use the most up-to-date bid-letting and pricing sheets available, the availability of bid-letting summaries varies from state to state. As such, some information in the database dates from 2009 or earlier. Most of the costs, however, are from 2010, 2011, or 2012. All costs have been updated to 2012 US Dollar equivalents using the United States Consumer Price Index published by the Bureau of Labor Statistics.[11]

HSRC researchers also subscribed to the Bid Express service, an online resource that facilitates secure online project bidding for city and state agencies and contractors. Using Bid Tabulation sheets downloaded from the website with the permission of the service and relevant agencies, Bid Express cost

data were added into the database. Data from the Bid Express service is mostly from 2011, but may also include 2010 information.[12] Special approval was obtained from Bid Express for inclusion of cost information from selected states to be used in the database and this report.

For some treatments, particularly newer innovative treatments, cost information was not included in bid-letting sheets. To ensure that costs were included for as many treatments as possible, HSRC researchers also conducted targeted searches of selected infrastructure measures, using conventional search engines as well as searching state and city websites. The source of data as well as a hyperlink is included in each of the more than 1,700 cost entries in the database. Drawing from city plans, manufacturer pricing information, and other sources, these targeted searches provided information that was otherwise unavailable from other sources. By using search terms such as "pedestrian", "bicycle", "sidewalk", "bike lane", and many others and by conducting a general scan of each document, costs pertaining specifically to pedestrian and bicyclist-related infrastructure improvements were identified, entered into the database, and included in the following cost summaries.

After costs were compiled, interviews were conducted with Department of Transportation employees in various states to validate the cost averages. HSRC researchers contacted the safety, engineering, or construction divisions of State Departments of Transportation (DOT) in North Carolina, Tennessee, Florida, Nebraska, Wyoming, Ohio, and California to determine what information is included in the costs. According to these State DOTs, the costs found in Bid Letting or Bid Tabulation Sheets include labor, materials, mobilization costs (though mobilization costs were often bid separately as well), and contractor profits, effectively making the treatment cost a complete "in the ground" cost.

The database includes the following categories of information for each cost item:

- Infrastructure Name – the title of the treatment (e.g. Sidewalk)
- Infrastructure Description – the details of the treatment (e.g. Portland Cement)
    - Specifics/Classes – specific identifying details (e.g. 4 inch patterned)
- Initial (Total) Cost – if a total cost is provided, it is included here
- Revised Cost – the costs modified to the standard unit
- Revised Unit – the unit of infrastructure treatment, if it was modified
- Information Source Year – the year of the cost information
- Inflation Year – the year used to calculate the inflation factor
- Cost with Inflation – the cost indexed to 2012 dollars
- Annual (Maintenance) Cost – if provided, how much the treatment costs to maintain, usually per year
- Low Cost– if a range of costs is provided, the lowest cost
- Revised Low – the unit of infrastructure treatment, if it was modified
- Low with Inflation – the low cost indexed to 2012 dollars
- High Cost Estimate – if a range of costs is provided, the highest cost
- Revised High – the unit of infrastructure treatment, if it was modified
- High with Inflation – the high cost indexed to 2012 dollars
- Cost Unit – the unit to which the cost is linked (e.g. lump sum, each, per mile, per linear foot, per square yard, etc.)
- State Name – the state name in postal code format
- Information Source Citation – the title of the information source, usually a bid-letting sheet or specific research paper

- Page Number within Document – the page within the information source that contains this cost
- Sample Size – the number of bids and/or instances of treatment implementation
- Link to Source – the reference URL for the source of the treatment cost
- Notes – Any other relevant information or caveats that are important to consider in relation to the specific cost

Only infrastructure costs that are specifically pedestrian or bicycle related are entered into the database. Other documents containing infrastructure cost information such as spot safety evaluations, city plans, government agency reports, guidebooks, and cost reports among others are also included in this database. In order to present a useable database, costs were eliminated if they were extreme outliers, that is, generally greater or less than two standard deviations away from the mean cost.[i] Costs were also removed if they did not appear to include complete cost information (i.e. only the cost of the unit without the cost to install).

Database users should understand that these costs were taken from various sources across the country and that costs may vary between states and also by the quantity purchased. Generally, costs per unit (square yard, linear foot, each, etc.) may vary widely depending on the size of the order, with larger quantities usually leading to lower per unit costs.

Also, there are non-geographic factors that influence variability of costs, and which could not be adequately addressed in this database due to the lack of information in the source data. One of these is the issue of economies of scale and resulting non-linearity of costs. A small project may require a fixed cost such as access to a cement truck or engineering services. The costs of these services unsurprisingly would decline with increasing project scale. Another limitation is related to economies of scope, as it would be more cost effective to add a bicycle lane along with a sidewalk rather than doing both projects separately. There can also be price differences if the project is for a new development versus a retrofit project, with retrofit projects often having higher costs. Finally, differences in contracts and negotiations over the length of time a project will take can also influence cost information. Faster completion times can lower the inconvenience to non-active commuters, but can also raise the price of installation. All of these issues inevitably influence the costs captured in this database. The assumption, however, is that the range of costs will help mitigate these factors and allows for a useful database. In order to obtain a more detailed estimate, however, both geographic and non-geographic factors must be considered.

Key Assumptions

In order to provide cost estimates for some treatments, HSRC researchers made certain assumptions, given in the bulleted list below.

- General assumptions:
    - If cost information included multiple years, i.e. 2002-2003, the earliest year was used for the purposes of determining the inflation factor.
    - All costs are updated to 2012 dollars.

[i] Due to large cost variances and insufficient data, judgment had to be made concerning certain treatments apart from the standard deviation criteria.

    - Costs are assumed to include engineering, design, mobilization, and furnish and installation costs.
- Specific assumptions for estimating purposes (where linear length of sidewalk, bikeway, bike lane, etc. are used):
    - All bike lanes are five feet in width.
    - Wide curb lanes are four feet in width.
    - Separated bikeways are eight feet in width.
    - Multi-use paths, whether paved or unpaved are eight feet in width.
    - All sidewalks are five feet in width and have a thickness of four inches.

Sources

This database is based mostly on bid letting sheets and costs summaries from State Departments of Transportation. As a result, the potential exists that the cost information is skewed toward state-funded transportation projects rather than local jurisdictions. In order to offset this factor, information was obtained through targeted searches, yielding data from research reports, pedestrian/bicycle guides, and city and county websites. While some states have available and easily obtainable information, others do not have any easily accessible information for specific treatments or do not provide this information publicly. As such, some state information sources supplied a large amount of information to this database, while for others, little or no data has been included. If no cost information was available for a certain state, however, efforts were made to include information from a nearby state or a city within that state. In total, 1,747 costs were obtained from 40 states to create this database. The states with the most cost information include Ohio (161), California (146), Minnesota (115), Massachusetts (104), and Wisconsin (101). The states for which no information was included in the database are Delaware, the District of Columbia, Hawaii, Mississippi, Nevada, Pennsylvania, South Dakota, Tennessee, Utah, and West Virginia. For a complete listing of cost frequency by state, see Appendix D.

It is useful to note that while these infrastructure costs constitute, in most cases, the most up-to-date information available, these are cost estimates. The capricious nature of estimating infrastructure costs means that these data only provide a general idea of what any treatment may cost for a specific location.

Infrastructure Cost Tables

The following tables summarize information from the larger database of infrastructure costs. The average cost, median cost, and the absolute low and high cost ranges are provided to create both a price estimate and price range for each infrastructure element. The median and average infrastructure treatment costs are both presented since the “average” cost value may be misleading (i.e. it may be influenced heavily by one or two outliers). The tables only include cost information with a minimum of four sources.

The paragraphs under each subheading provide information regarding what is included in the table and any caveats associated with using this cost information, while the tables provide the finalized cost estimates and ranges. For some treatments, there was not enough information to create a table. In these cases, cost information is provided in the paragraphs. In terms of units, some treatments were presented in different units, such as “each” and “per square feet”. If there were four or more treatment

costs per unit, the treatment is presented in the following table by both units to provide more detail. Additionally, a column indicating the number of sources, defined as the number of agencies/organizations, and observations, which represent the actual number of costs included from all sources, is included in the tables. In some cases, the authors have provided examples, usually as a "per intersection" or "per unit" basis, of how this cost information can be used by practitioners to create a complete cost estimate for a treatment in the paragraphs as well.

Generally, infrastructure cost information in this document will include engineering, design, mobilization, and furnish and installation costs. However, these costs are likely to vary based on site conditions, choice of contractor, and other factors. In some cases, such as for bikeways, site preparation costs have been presented in this document in a separate section in order for database users to get a better sense of what types of actions are necessary to prepare a site and what actions may be necessary to retrofit a site.

A brief description of each treatment and external issues that can dramatically alter facility costs is given before each listed cost. For more specific information about each of the following treatments, please consult the Pedestrian Safety Guide and Countermeasure Selection System Guide (PEDSAFE) (2004) or the Bicycle Safety Guide and Countermeasure Selection System (BIKESAFE) (2006), which were developed for FHWA by HSRC. Most of the definitions provided below for pedestrian and bicycle infrastructure improvements were based on information from PEDSAFE and/or BIKESAFE.

Bicycle Facilities

From various types of bicycle parking to bicycle lanes and separated paths, this category encompasses most bicycle infrastructure costs identified in this project.

Figure 1: Bike Parking

Bicycle Parking

Bicycle Parking includes bicycle racks (see Figure 1), bicycle lockers (see Figure 2), and bicycle stations. Bicycle racks are fixed objects, usually constructed out of metal, to which bicycles can be securely locked, while bicycle lockers are used to securely store a single bicycle. Depending on bike parking design and materials, cost may vary widely. For example, a bicycle rack may be as simple as an inverted U rack designed for two bikes, but may also include more elaborate designs, such as wave design or ornamental bike racks that hold multiple bikes. Bike Stations are buildings or structures designed to provide secure bicycle parking and often incorporate other amenities such as showers or bike maintenance services. Due to insufficient data, cost ranges were obtained for the following bicycle parking facilities: bicycle stations (approximately $250,000) and bus racks (approximately $730). Removing a bicycle rack costs approximately $1,000. The costs below are presented in terms of the cost per unit.

Figure 2: Bicycle Locker

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Bicycle Parking	Bicycle Locker	$2,140	$2,090	$1,280	$2,680	Each	4 (5)
Bicycle Parking	Bicycle Rack	$540	$660	$64	$3,610	Each	19 (21)

Table 1: Costs for Bicycle Parking

Bikeway

The Bikeway category contains bicycle lanes, bicycle paths, and signed bicycle routes. The cost of separated multi-use paths designed for bicyclists and pedestrians can be found in the "Path" section below on page 25. For the purposes of standardizing the units, bicycle lanes are assumed to be five feet in width and bicycle paths 8 feet, with costs given in miles. Additionally bicycle boulevards, streets designed to give priority to bicyclists as through-going traffic, typically range from approximately $200,000 to $650,000 each. Bikeways, or bike paths, are separated facilities designed specifically for bicycles (see Figure 3), while bicycle lanes are designated travel lanes for bicyclists. Separated bikeway projects typically cost between $536,664 and $4,293,320 per mile, depending on site conditions, path width, and materials used. Indicated by bike route signs, signed bike routes are used to direct bicyclists to safer facilities and/or are located on lightly

Figure 3: Bikeway (Concrete Bicycle Path)

trafficked roads. These types of large-scale bicycle treatments will vary greatly due to differences in project specifications and the scale and length of the treatment.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Bikeway	Bicycle Lane	$89,470	$133,170	$5,360	$536,680	Mile	6 (6)
Bikeway	Signed Bicycle Route	$27,240	$25,070	$5,360	$64,330	Mile	3 (6)
Bikeway	Signed Bicycle Route with Improvements	$241,230	$239,440	$42,890	$536,070	Mile	1 (6)

Table 2: Costs for Bikeway

Bikeway Preparation

The costs for bikeways shown above are assumed to include all costs including bikeway preparation, if applicable. However, costs were also identified for specific actions related to preparing a site for a separated bikeway, including excavation, grading, curb/gutter removal, and clearing and grubbing (removing vegetation and roots). Though cost information was limited, the following individual costs were obtained (all costs are approximate): excavation ($55 per foot); grading ($2,000 per acre); curb/gutter removal ($5 per linear foot); and clearing and grubbing ($2,000 to $15,500 per acre, depending on the width of the road and whether it is done on one or both sides of the road).

Traffic Calming Measures

Traffic calming measures are engineering tools used with the goal of reducing vehicle speed and improving the safety of motorists, pedestrians, and bicyclists. Common traffic calming measures include chicanes, chokers, curb extensions (neckdowns/bulb-outs), median islands, and raised crossings among others. In this section, cost information will be provided per unit, though certain traffic calming measures may also be given in linear or square feet. Any users of the database will, in cases when a treatment is provided in linear of square feet, need to calculate a cost based on the project specifications.

Chicanes

Chicanes are concrete islands that offset traffic, and create a horizontal diversion of traffic used to reduce the speed of vehicular traffic on local streets. Landscaped chicanes have the added benefit of adding more green landscaping to a street. Figure 3 illustrates how chicanes can be combined with a median island to ensure motorists do not disregard roadway markings.

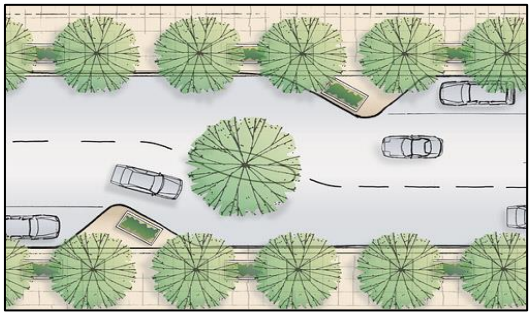

Figure 4 - Chicane

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Chicanes	Chicane	$8,050	$9,960	$2,140	$25,730	Each	8 (9)

Table 3: Cost for Chicanes

Curb Extensions

Curb extensions (see Figure 5), alternatively called chokers or bulb-outs, extend the sidewalk or curb line out into the parking lane, which reduces the effective street width and creates a pinch point along the street. They can be created by bringing both curbs in, or by more dramatically widening one side at a midblock location. They can also be used at intersections, creating a gateway effect. Costs can vary depending on drainage, the addition of street furnishings/landscaping/special paving, and whether utilities must be relocated.

Figure 4: Curb Extension

The cost to retrofit a four-leg intersection with curb extensions would be approximately $100,000 (8 X $12,620), though costs will likely vary based on site conditions, drainage, and curb extension design.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Curb Extension	Curb Extension/ Choker/ Bulb-Out	$10,150	$13,000	$1,070	$41,170	Each	19 (28)

Table 4: Cost of Curb Extension

Diverters

A diverter is an island built at a residential street intersection that prevents certain through and/or turning movements. They can be placed across both lanes of traffic as a full diverter or across one lane of traffic as a semi-diverter. There are four primary types of diverters: diagonal, star, forced turn, and truncated diverters (see Figure 6). A diagonal diverter breaks up cut-through movements and forces right or left turns in certain directions. A star diverter consists of a star-shaped island placed at the intersection, which forces right turns from each approach. A forced turn diverter is an island that forces drivers in one or more lanes of an intersection to turn in only direction. A truncated diagonal diverter, also known as a semi-diverter, has one end open to allow additional turning movements. The costs presented in the table below are limited to full diverters and truncated diagonal, or semi-, diverters. The cost of installations will vary based on the amount of material needed and the drainage needs at the site.

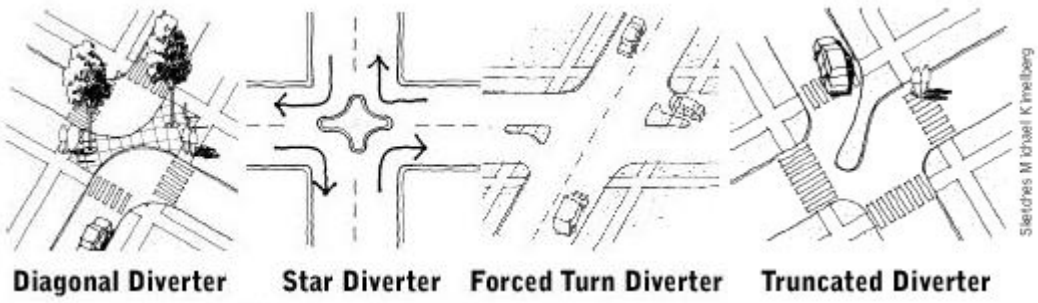

Figure 5: Diverters

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Diverter	Diverter	$22,790	$26,040	$10,000	$51,460	Each	5 (6)
Diverter	Partial/Semi Diverter	$15,000	$15,060	$5,000	$35,000	Each	3 (4)

Table 5: Diverter Cost

Island

Crossing islands — also known as center islands, refuge islands, pedestrian islands, or median slow points — are raised islands placed in the center of the street at intersections or midblock crossings to help protect crossing pedestrians from motor vehicles (see Figure 7). They allow pedestrians to deal with only one direction of traffic at a time, and enable pedestrians to stop partway across the street and wait for an adequate gap in traffic before crossing the second half of the street. Crossing islands can be constructed at an angle to the right so that crossing pedestrians are forced to the right to view oncoming traffic as they are halfway through the crossing.

Figure 6: Crossing Island

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Island	Median Island	$10,460	$13,520	$2,140	$41,170	Each	17 (19)
Island	Median Island	$9.80	$10	$2.28	$26	Square Foot	6 (15)

Table 6: Island Cost

Median

Medians are raised islands that separate opposing streams of traffic and limit turning movements (see Figure 8). They are typically narrower than islands, are placed in the center of a roadway, and are separated from the travel lanes by a curb. Medians facilitate pedestrian crossings, improve pedestrian visibility to motorists, slow motor vehicle speeds, and provide space for lighting and landscaping. The costs for installing a median can vary based on the type of median, the materials, and the scope of the project.

Medians will often require grading, excavation, grubbing, and other site preparation activities. These costs are included in the cost information above, but may vary based on site conditions and the type of median.

Figure 8: Raised Median

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Median	Median	$6.00	$7.26	$1.86	$44	Square Foot	9 (30)

Table 7: Median Cost

Raised Crossing

A raised intersection is essentially a speed table for the entire intersection.[ii] Construction involves providing ramps on each vehicle approach, which elevates the entire intersection to the level of the sidewalk. A raised pedestrian crossing is similar to a raised intersection, but it is only the width of a crosswalk, usually 10 to 15 ft. (see Figure 9). Raised intersections and crosswalks encourage motorists to yield to pedestrians because the raised crosswalk increases pedestrian visibility and forces motorists to slow down before going over the speed table. Costs will vary based on the width of the road, as well as drainage conditions and the type of material used.

Figure 9: Raised Crossing

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Raised Crossing	Raised Crosswalk	$7,110	$8,170	$1,290	$30,880	Each	14 (14)
Raised Crossing	Raised Intersection	$59,160	$50,540	$12,500	$114,150	Each	5 (5)

Table 8: Raised Crossing Cost

Roundabout/Traffic Circle

Traffic circles can include anything from small mini-circles to large roundabouts (see Figures 10 and 11).

Figure 10: Mini-Circle

Figure 11: Roundabout

Costs for these items were not specified in enough detail to differentiate design details of each cost estimate. Roundabouts are circular intersections designed to eliminate left turns by requiring traffic to

[ii] For a description of speed tables, see Appendix B.

exit to the right of the circle. Roundabouts are installed to reduce vehicular speeds, improve safety at intersections through eliminating angle collisions, help traffic flow more efficiently, reduce operation costs when converting from signalized intersections, and help create gateway treatments to signify the entrance of a special district or area. Costs will vary widely, depending on the size, site conditions, and whether right-of-way acquisitions are needed. Roundabouts usually have lower ongoing maintenance costs than traffic signals, depending on whether the roundabout is landscaped.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Roundabout/ Traffic Circle	Roundabout/ Traffic Circle	$27,190	$85,370	$5,000	$523,080	Each	11 (14)

Table 9: Roundabout/ Traffic Circle Cost

Speed Treatments

Speed humps are vertical traffic control measures that tend to have the most predictable speed reduction impacts. Speed humps are paved (usually asphalt) and approximately 3 to 4 inches-high at their center, and extend the full width of the street with height tapering near the drain gutter to allow unimpeded bicycle travel (see Figure 12). Speed bumps are typically smaller with a more extreme grade, which forces automobiles to more significantly reduce speeds but can more significantly impede bicyclists.

Figure 12: Speed Hump

A speed table is a term used to describe a very long and broad speed hump, or a flat-topped speed hump, where sometimes a pedestrian crossing is provided in the flat portion of the speed table. The speed table can either be parabolic, making it more like a speed hump, or trapezoidal. Speed tables can be used in combination with curb extensions where parking exists. Costs can vary depending on the drainage needs of each site, the width of the road, and the specific design used.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Speed Bump/Hump /Cushion/Table	Speed Hump	$2,130	$2,640	$690	$6,860	Each	14 (14)
Speed Bump/Hump /Cushion/Table	Speed Bump	$1,670	$1,550	$540	$2,300	Each	4 (4)
Speed Bump/Hump /Cushion/Table	Speed Table	$2,090	$2,400	$2,000	$4,180	Each	5 (5)

Table 10: Speed Hump/ Cushion/ Table Cost

Speed treatments are usually installed as sets, typically in groups of three. For instance, assume that a two mile residential road has speeding issues and citizens petition to install speed humps. After examining the feasibility of the installation, the city decides to install three speed humps to ameliorate the issue, at a cost of $7,500 ($2,500 X 3).

Pedestrian Accommodations

Pedestrian accommodation treatment costs are presented in this section. In this case, pedestrian accommodation refers to infrastructure provided to enhance the pedestrian environment that may include improving pedestrian safety, mobility and/or access. In many cases, treatment costs in this section will be presented as lump sums, though in some instances, the cost information may be provided in linear feet or square feet.

Bollard

Traffic bollards are posts embedded in the ground, which are used to keep pedestrians safer, by slowing vehicle speeds and separating pedestrian from motor vehicle traffic, and/or limiting vehicle access either temporarily or permanently (see Figure 13). There are multiple types of bollards available for use (fixed, rising, security, removable, breakaway, decorative, flexible, etc.). The cost below combines these various types into one set of costs, and thus the costs will vary depending on the specific bollard type and material used.

Figure 13: Bollards

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources
Bollard	Bollard	$650	$730	$62	$4,130	Each	28 (42)

Table 11: Bollard Cost

Curb Ramp

Curb ramps provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, or who have mobility impairments that make it difficult to step up and down the curbs (see Figure 14). While curb ramps are needed for use on all types of streets, priority locations are streets in downtown areas and near transit stops, schools, parks, medical facilities, shopping areas, and residences with people who use wheelchairs. Truncated domes/ detectable warning surfaces provide a distinctive surface pattern that is detectable underfoot as a warning to those who are visually impaired of an approaching street and are required at all intersections with sidewalks in compliance with the Americans with Disabilities Act (ADA) of 1990.

Figure 14: Curb Ramp

As many cities include truncated domes/detectable warnings as part of their curb ramp installations, combining the cost per square foot for detectable warnings and the wheelchair ramps in accordance with local design standards and multiplying by eight will provide a per intersection cost for providing ADA-compliant curb ramps.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Curb Ramp	Truncated Dome/ Detectable Warning	$37	$42	$6.18	$260	Square Foot	9 (15)
Curb Ramp	Wheelchair Ramp	$740	$810	$89	$3,600	Each	16 (31)
Curb Ramp	Wheelchair Ramp	$12	$12	$3.37	$76	Square Foot	10 (43)

Table 12: Curb Ramp Cost

Fence/Gate

Fencing and gating can help separate pedestrians and cyclists from roadways and railroad tracks, and can also be used in the construction of pedestrian/bicyclist paths, bridges, and overpasses (see Figure 15). The cost of pedestrian fencing and gates will vary depending on the location, type, design, material, height, etc. used. For instance, fencing may include chain link, ornamental or other fence types. The median and average costs provided below provide a range of estimates of what fencing is likely to cost.

Figure 15: Fencing

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Fence/Gate	Fence	$120	$130	$17	$370	Linear Foot	7 (7)
Fence/Gate	Gate	$510	$910	$330	$1,710	Each	5 (5)

Table 13: Fence/ Gate Cost

Gateway

A gateway is a physical or geometric landmark that indicates a change in environment from a higher speed arterial or collector road to a lower speed residential, mixed-use, or commercial district (see Figure 16). They often place a higher emphasis on aesthetics and are frequently used to identify neighborhood and commercial areas within a larger urban setting. Sign costs below reflect a variety of materials, including plastic ($500), metal (approximately $200), and wood (approximately $530).

Figure 16: Gateway Treatment

The cost of gateway structures can range greatly depending on the specific type of items chosen. The costs below combine a variety of gateway structure treatments, such as: monument signs (approximately $19,000), street spanning arches supported by metal posts within bulb-outs (approximately $64,000), and gateway columns ($10,000).

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Gateway	Gateway Sign	$350	$340	$130	$520	Each	3 (4)
Gateway	Structure	$15,350	$22,750	$5,000	$64,330	Each	5 (6)

Table 14: Gateway Cost

Lighting

Adequate roadway lighting enhances the safety of all roadway users, while pedestrian-scale lighting improves nighttime security and enhances commercial districts (see Figure 17). These costs can vary depending on the fixture type and service agreement with local utility, as well as if other improvements are made to the streetscape at the same time. Also, though not included below, average approximate underpass lighting costs can range from $350 to $3,400 each, and crosswalk lighting can range from approximately $10,750 to $42,000 per crosswalk.

Figure 17: Lighting

The cost range for in-pavement lights is very broad, based on manufacturer differences, roadway widths, and project-specific factors. Usually, in-pavement lights are installed as a system, which is the reason the total cost of installing lights at a location is included here, as opposed to an individual light cost.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Lighting	In-pavement Lighting	$18,250	$17,620	$6,480	$40,000	Total	4 (4)
Lighting	Streetlight	$3,600	$4,880	$310	$13,900	Each	12 (17)

Table 15: Lighting Cost

Overpass/Underpass

Pedestrian Overpasses and Underpasses completely separate pedestrians from vehicular traffic and provide safe pedestrian accommodation over often impassable barriers, such as highways, railways, and natural barriers such as rivers (see Figures 18 and 19). Over- and Underpasses consist of different types of structures, including bridges, and are generally very expensive, though some cost savings can be realized depending on the materials used. Cost information is typically provided as a lump sum cost, but can also be presented as a cost per square foot.

Figure 18: Pedestrian Overpass

Underpasses (excluding bridges) range from slightly less than $1,609,000 to $10,733,000 in total or around $120 per square foot. Overpasses (excluding bridges) have a range from $150 to $250 per square foot or $1,073,000 to $5,366,000 per complete installation, depending on site conditions.

The cost for specific types of bridges can vary substantially, based on the specific situation, materials, and other factors, as demonstrated in the table below for wooden and pre-fab steel bridges.

Figure 19: Pedestrian Underpass

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Overpass/Underpass	Wooden Bridge	$122,610	$124,670	$91,010	$165,710	Each	1 (8)
Overpass/Underpass	Pre-Fab Steel Bridge	$191,400	$206,290	$41,850	$653,840	Each	5 (5)

Table 16: Overpass/ Underpass Cost

Railing

Pedestrian railings provide an important safety benefit on walkways, and are required for ADA compliance on ramps with steep inclines and along stairways.[iii] They also buffer the pedestrian path from vehicular traffic. Pedestrian railing materials range from aluminum and steel to wood and chain link fence. All of these costs are aggregated in the table below.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Railing	Pedestrian Rail	$95	$100	$7.20	$690	Linear Foot	29 (83)

Table 17: Railing Cost

Street Furniture

Street furniture often serves as a buffer between the sidewalk and the roadway, providing an important safety benefit to pedestrians. Including trees, benches, bus shelters, newspaper racks, kiosks, and other pedestrian amenities, street furniture also serves to create a more pleasant and attractive environment for pedestrians.

The cost of street furniture will vary depending on the design, style, and manufacturer for benches, bus shelters, and other street furniture, while trees will also vary in cost based on the type and size of tree

[iii] Handrails are required for ADA accessibility on both sides of paths with rise greater than 6 inches or a horizontal projection greater than 72 inches, as well as all stairways.

(see Figure 20). The costs that follow and provided in the table below assume to include installation, which can vary based on the number of items installed at one time.

More substantial structures tend to be more expensive, with gazebos averaging at nearly $53,000, with a range of $36,600 to $71,600; information kiosks averaging at slightly less than $16,000; and shade shelters averaging at $30,000, with a range of $29,290 to $41,850.

Historical markers average at $3,498 with a range of $1,230 to $4,700, while newspaper racks typically cost slightly less than $6,500. Picnic tables cost around $1,683 on average with a range of $530 to $4,180 based on materials and manufacturer. Lastly, tree grates cost an average of $1,340 or between $1,400 and $3,500 (not including the tree), while shrubs cost between $55 and $80. Street furniture removal costs are also available. Bench removal costs around $910 with a range of costs from $80 to $3,140, while bus shelter removal averages at $3,690 with a range of as low as $720 to $10,460. Costs for removing trash cans ($320 average, $130 to $520 range) and tree grates ($250 average, $52 to $890 range) are also available.

Figure 20: Bench

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Street Furniture	Street Trees	$460	$430	$54	$940	Each	7(7)
Street Furniture	Bench	$1,660	$1,550	$220	$5,750	Each	15 (17)
Street Furniture	Bus Shelter	$11,490	$11,560	$5,230	$41,850	Each	4 (4)
Street Furniture	Trash/ Recycling Receptacle	$1,330	$1,420	$310	$3,220	Each	12 (13)

Table 18: Street Furniture Cost

Street Closures

Full and partial (half) street closures are the ultimate way of discouraging automobile through traffic, while still allowing pedestrian and bicycle traffic. Typically, full street closures close the street entirely to vehicles, while partial street closures restrict turning movements onto streets, without having to create one-way streets. Depending on the street closure strategy, which could use bollards, islands, or other measures, the costs are likely to vary substantially. Full street closures can cost from less than $500 to $120,000, while partial street closures usually cost around $37,500, but can cost as low as $10,290 or as high as $41,170.

Figure 21: Full Street Closure

The wide ranges in price for full and partial street closures are related to the strategies used to complete the street closure. For instance, a full street closure (see Figure 21) can be accomplished by only adding a few bollards, but under a different strategy might involve altering roadway design by installing new concrete islands, restriping, and adding channelizer cones and signage. Depending on the site conditions, either strategy might be appropriate. More information about exact street closure costs can be found in the full database.

Pedestrian Crossings and Paths

This section provides information about the cost of facilities for pedestrians and includes information about sidewalks, crosswalks, and paths. Treatment information for sidewalks is presented in miles or square feet, while crosswalks are included as a cost per unit. Path costs are presented in either miles or linear feet. For some infrastructure treatments, such as paths, cost information was presented using a variety of different units. Assuming that a standard multi-use path is eight feet wide, the authors converted cost information for paths to linear feet and miles.

Figure 22: Crosswalk

Crosswalks

Striped crosswalks indicate a legal and preferred crossing for pedestrians, and may be installed at intersections or midblock locations. Motorists often fail to yield to pedestrians at these crossing points so marked crosswalks (see Figure 22) are often installed to warn motorists to expect pedestrians crossings ahead and also to indicate a preferred crossing location to pedestrians. A wide variety of crosswalk marking patterns exist, including parallel lines (standard crosswalk marking) and high visibility types, which include ladder, transverse lines, and zebra among others (see Figure 23).

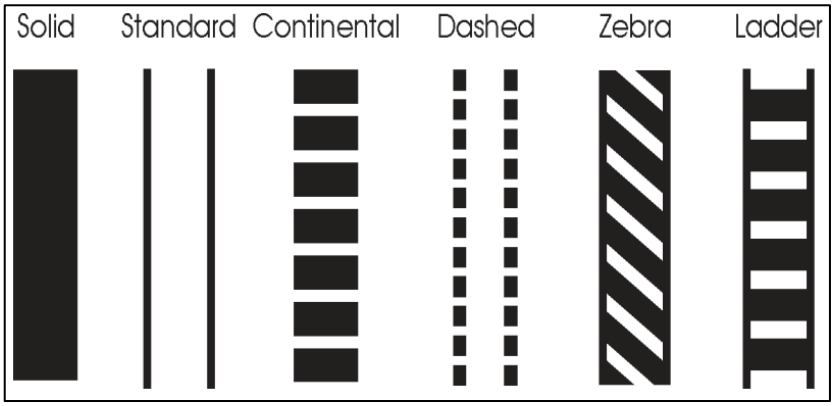

Figure 23: Optional Crosswalk Marking Patterns

Cost information for striped crosswalks of all varieties as well as for high visibility crosswalks is given in the table above. However, some of the bid prices for striped crosswalks may include some high visibility crosswalks, though it was not specified.

For other crosswalk types, costs tend to vary by a large amount. For instance, for crosswalks using other materials such as brick or pavement scoring, costs range from $7.25 to $15 per square foot, or approximately $2,500 to $5,000 each. Ladder crosswalks cost range from $350 to $1,000 each and patterned concrete crosswalks cost $3,470 each or $9.68 per square foot on average.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Crosswalk	High Visibility Crosswalk	$3,070	$2,540	$600	$5,710	Each	4(4)
Crosswalk	Striped Crosswalk	$340	$770	$110	$2,090	Each	8 (8)
Crosswalk	Striped Crosswalk	$5.87	$8.51	$1.03	$26	Linear Foot	12 (48)
Crosswalk	Striped Crosswalk	$6.32	$7.38	$1.06	$31	Square Foot	5 (15)

Table 19: Crosswalk Cost

Since street widths vary a large amount depending on the situation, it is difficult to estimate the cost to provide crosswalks at every intersection. However, if a high visibility crosswalk costs approximately $3,000 per crossing, the cost for the entire intersection would be $12,000 ($3,000 X 4).

Sidewalks

Sidewalks are the most basic pedestrian facility and provide an area within the public right-of-way for pedestrian travel (see Figure 24). Sidewalk materials can vary substantially, including concrete, asphalt, brick, or other materials. In some cases, sidewalk costs are presented as a combination of both sidewalks and curbs, though it is important to note that the costs presented in the table below represent the cost of the sidewalk "in the ground" and may or may not include curb and gutter. All sidewalk costs are presented either by linear foot or by square foot with all unit conversion assuming that sidewalks are five feet in width. Sidewalk costs without sufficient details to include in the table are included in the following paragraphs.

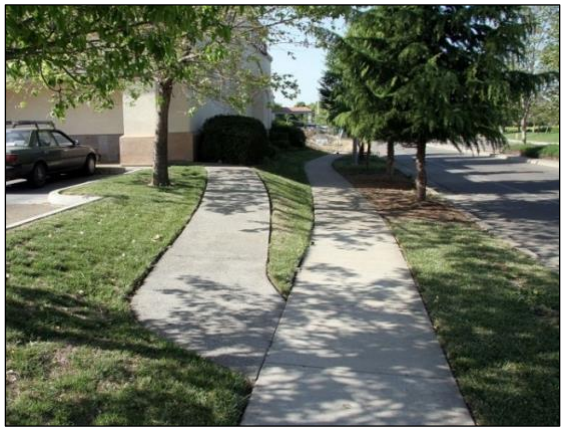

Figure 24: Sidewalk

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Sidewalk	Asphalt Paved Shoulder	$5.81	$5.56	$2.96	$7.65	Square Foot	1 (4)
Sidewalk	Asphalt Sidewalk	$16	$35	$6.02	$150	Linear Foot	7 (11)

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Sidewalk	Brick Sidewalk	$60	$60	$12	$160	Linear Foot	9 (9)
Sidewalk	Concrete Paved Shoulder	$6.10	$6.64	$2.79	$58	Square Foot	1 (11)
Sidewalk	Concrete Sidewalk	$27	$32	$2.09	$410	Linear Foot	46 (164)
Sidewalk	Concrete Sidewalk - Patterned	$38	$36	$11	$170	Linear Foot	4 (5)
Sidewalk	Concrete Sidewalk - Stamped	$45	$45	$4.66	$160	Linear Foot	12 (17)
Sidewalk	Concrete Sidewalk + Curb	$170	$150	$23	$230	Linear Foot	4 (7)
Sidewalk	Sidewalk Unspecified	$34	$45	$14	$150	Linear Foot	17 (24)
Sidewalk	Sidewalk Pavers	$70	$80	$54	$200	Linear Foot	3 (4)

Table 20: Sidewalk Cost

Paths

Multi-use paths are the safest facilities for pedestrians and bicyclists, providing mobility options away from the roadway. Often accommodating both pedestrians and bikes, multi-use paths are usually at least eight feet in width, can be both paved and unpaved, and are used for both recreation and transportation purposes. Costs will vary substantially for multi-use paths, based on the materials used, right-of-way costs, and other factors.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Path	Boardwalk	$1,957,040	$2,219,470	$789,390	$4,288,520	Mile	5 (5)
Path	Multi-Use Trail - Paved	$261,000	$481,140	$64,710	$4,288,520	Mile	11 (42)
Path	Multi-Use Trail - Unpaved	$83,870	$121,390	$29,520	$412,720	Mile	3 (7)

Table 21: Path Cost

Mid-Block Crossings

Mid-block crossings can be necessary on major roads with few intersections or in areas with documented pedestrian crash problems. Often installed in conjunction with other safety and traffic calming features, particularly advance yield lines, in-pavement yield/stop signs, raised pedestrian crossings, or Rectangular Rapid Flash Beacons or High Intensity Activated Crosswalk (HAWK) signals, mid-block crossings can make substantial improvements in pedestrian safety, while also having traffic calming effects. Mid-block crossings are striped crosswalks away from intersections and are very helpful in the vicinity of transit stops or in other areas where pedestrians are likely to cross the road often.

Mid-block crossings are typically much more expensive than standard crosswalk treatments, with costs ranging from approximately $2,700 to more than $71,000 if bulb-outs, trees, landscaping, crosswalks, etc. are included. It is a good idea to consider the context of the situation in order to apply a tailored solution, usually a combination of infrastructure treatments, to ensure that pedestrians are accommodated in the safest possible way.

Signals

Signals for both pedestrians and bicyclists are included in this section. Pedestrian and bicycle detectors and speed trailers are included in this section as well. New signal types have become more prevalent in the last ten years, including the Rectangular Rapid Flash Beacon and the Pedestrian Hybrid Beacon, formerly known as a High Intensity Activated Crosswalk (HAWK) signal. These are included here. Efforts will be made to include any new signals as they become more prevalent.

Flashing Beacon

Flashing beacons are typically used in conjunction with pedestrian crossings to provide an enhanced warning for vehicles to yield to pedestrians. Rectangular rapid flashing beacons (RRFBs) differ from regular flashing beacons in that RRFBs have a rapid strobe-like warning flash, are brighter, and can be specifically aimed (see Figure 25). As a relatively new treatment, RRFBs have not been implemented extensively throughout this country, but are now becoming more prevalent in certain states and cities. The cost to furnish and install a flashing beacon can vary widely, depending on site conditions and the type of device used. The costs shown in the table include the complete system installation with labor and materials.

Figure 25: Rapid Flash Beacon

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Flashing Beacon	Flashing Beacon	$5,170	$10,010	$360	$59,100	Each	16 (25)
Flashing Beacon	RRFB	$14,160	$22,250	$4,520	$52,310	Each	3 (4)

Table 22: Flashing Beacon Cost

Pedestrian Hybrid Beacon

The Pedestrian Hybrid Beacon, otherwise known as the High Intensity Activated Crosswalk (HAWK) signal, is a special type of beacon to warn and control vehicles to allow pedestrians to safely cross a road or highway at a marked midblock crossing location (see Figure 26). Developed by the City of Tucson, Arizona in the 1990s, the pedestrian hybrid beacon is comprised of three signal sections, overhead pedestrian crosswalk signs, pedestrian detectors, and countdown pedestrian signal heads. According to a FHWA study, pedestrian hybrid beacons have a large impact on vehicle yielding rates.[13] As with RRFBs, pedestrian hybrid beacons are typically more expensive to implement and maintain than some devices, but less expensive than full traffic signals.

Figure 26: Pedestrian Hybrid Beacon

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Pedestrian Hybrid Beacon	Pedestrian Hybrid Beacon	$51,460	$57,680	$21,440	$128,660	Each	9 (9)

Table 23: Pedestrian Hybrid Beacon Cost

Pedestrian and Bicycle Detection

Pedestrian and bicycle detection devices are used to determine if a pedestrian or bicyclist is waiting for the signal. There are many different ways that these devices detect pedestrians and bicyclists. For instance, bicycle detectors ($1,920 on average, $1,070 to $2,680 range) are usually loop detectors embedded in the pavement, while pedestrian detectors use video and other strategies to detect the presence of pedestrians waiting to cross.

Actuated pedestrian detectors provide dynamic recognition of pedestrians and signal to motorists to stop once a pedestrian approaches a crosswalk. The cost to retrofit a signal with a pushbutton at an existing pedestrian signal averages around $350. The cost to remove a pushbutton installation is slightly more than $45 on average, with a range of $21 to $92.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Pedestrian/Bike Detection	Furnish and Install Pedestrian Detector	$180	$390	$68	$1,330	Each	7 (14)
Pedestrian/Bike Detection	Push Button	$230	$350	$61	$2,510	Each	22 (34)

Table 24: Pedestrian/ Bike Detection Cost

Signals for Drivers and Pedestrians

Signals serve the important function of guiding and regulating traffic and help reduce conflicts between different road users. Many of the costs in the table below are representative of various components of a signal and are not representative of the complete cost of a signal. Some information about signals is not included in the table, namely bicycle signals, which have an average cost of $12,800. In the table, "Signal Face" refers to the cost of a signal's front display visible to pedestrians, while "Signal Head" refers to the entire unit. The adjacent image displays a pedestrian countdown timer signal (see Figure 27).

Figure 277: Pedestrian Signal

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Signal	Audible Pedestrian Signal	$810	$800	$550	$990	Each	4 (4)
Signal	Countdown Timer Module	$600	$740	$190	$1,930	Each	14 (18)

Signal	Pedestrian Signal	$980	$1,480	$130	$10,000	Each	22 (33)
Signal	Signal Face	$490	$430	$130	$800	Each	3 (6)
Signal	Signal Head	$570	$550	$100	$1,450	Each	12 (26)
Signal	Signal Pedestal	$640	$800	$490	$1,160	Each	3 (5)

Table 25: Signal Cost

Speed Trailer

Speeding in neighborhoods can create dangerous situations for pedestrians, particularly children. Speed trailers, which display the motorist speed and provide a warning if the speed limit is exceeded, as well as signs and reader boards can help education and awareness efforts and can be especially effective when coupled with enforcement efforts.

Figure 28: Speed Trailer

Speed trailers are sign boards that display the speed or passing vehicles and typically range in cost from $7,000 to $12,410 with an average cost of $9,510 (see Figure 28). Speed reader boards are similar to speed trailers, but are typically permanently installed.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Speed Trailer	Speed Trailer	$9,480	$9,510	$7,000	$12,410	Each	6 (6)

Table 26: Speed Trailer Cost

Signs

Signs can provide important information that can improve road safety. By letting people know what to expect, there is a greater chance that they will react and behave appropriately. Regulatory signs, such as STOP (see Figure 29), YIELD, or turn restriction signs such as NO TURN ON RED require compliant driver actions and can be enforced. Sign use and movement should be done judiciously, as overuse may breed noncompliance and disrespect.

Figure 29: Stop Sign

Signs not included in the table but pertinent to pedestrian and bicyclists include (all costs are approximated and per unit): bike route signage ($160), “no turn on red” signage ($220 for a metal sign or $3,200 for an electronic sign), in-pavement yield paddles ($240), trail regulation sign ($160), and trail wayfinding/information sign (range from $530 to $2,150).

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Sign	Stop/Yield Signs	$220	$300	$210	$560	Each	4 (4)

Table 27: Sign Cost

Striping

Striping costs, in this case, include bicycle and pedestrian symbols, textured pavement, yield/stop lines, and painted island/curb/sidewalks. For symbols, cost information is provided per unit, while striping and painted surfaces are given as linear and square feet, respectively.

Figure 30: Advance Stop/Yield Lines

Pavement Marking

Pavement markings cover a variety of pedestrian and bicycle treatment costs. Advance stop/yield lines (see Figure 30) improve the visibility of pedestrians to motorists and prevent multiple-threat crashes.[iv] They also encourage drivers to stop back far enough so a pedestrian can see if a second motor vehicle is not stopping and be able to take evasive action.

The advance stop or yield line should be supplemented with "Stop Here For Pedestrians" signs to alert drivers where to stop to let a pedestrian cross. The price will range depending on the material used and the type of line selected. Having island markings and painted curbs/sidewalks can alert pedestrians, bicyclists, and drivers of the presence of these items, and also help restrict parking. Painting a “bicycle box” (see Figure 31) will cost approximately $11.50 per square foot. “Striping” combines a number of related costs, such as: contraflow lanes, broken/solid white or yellow stripe, bicycle lanes, and bikeway centerlines. It also combines the wide assortment of widths and materials used for striping.

Figure 31: Bicycle Box

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Pavement Marking	Advance Stop/Yield Line	$380	$320	$77	$570	Each	3 (5)
Pavement Marking	Advance Stop/Yield Line	$10	$10	$4.46	$100	Square Foot	1 (4)
Pavement Marking	Island Marking	$1.49	$1.94	$0.41	$11	Square Foot	1 (4)
Pavement Marking	Painted Curb/Sidewalk	$1.21	$3.40	$0.44	$12	Square Foot	4 (5)
Pavement Marking	Painted Curb/Sidewalk	$2.57	$3.06	$1.05	$10	Linear Foot	2 (5)

Table 28: Pavement Marking Cost

[iv] A multiple-threat crash involves a driver stopping in one lane of a multilane road to permit pedestrians to cross, blocking the view of oncoming vehicles travelling in the same direction and causing a collision between the motorist and pedestrian.

Pavement Marking Symbols

Pavement marking symbol costs have been separated by the type of symbol. “Pedestrian Crossing” symbols notify pedestrians and/or motorists of places where pedestrians cross the street. “Shared Lane/Bicycle” symbols identify bicycle lanes and/or shared-lanes (see Figure 32). School crossing symbols highlight areas where motorists should be aware of children and increased pedestrian activity.

Costs will vary due to the type of paint used and the size of the symbol, as well as whether the symbol is added at the same time as other road treatments.

Figure 32: Shared Lane Marking

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Pavement Marking Symbol	Pedestrian Crossing	$310	$360	$240	$1,240	Each	4 (6)
Pavement Marking Symbol	Shared Lane/Bicycle Marking	$160	$180	$22	$600	Each	15 (39)
Pavement Marking Symbol	School Crossing	$520	$470	$100	$1,150	Each	4 (18)

Table 29: Pavement Marking Symbol Cost

Curb and Gutter

Curb and Gutters are used in conjunction with a number of other bicycle and pedestrian facility improvements, such as: sidewalks, bikeways, medians, islands, paths, curb extensions, bikeways, diverters, chicanes, and bulb-outs, among others. The cost can vary widely based on the scale of the project and whether the curb and/or gutter installation is in conjunction with other road treatments.

Infrastructure	Description	Median	Average	Minimum	Maximum	Cost Unit	Number of Sources (Observations)
Curb/Gutter	Curb	$18	$21	$1.05	$110	Linear Foot	16 (68)
Curb/Gutter	Curb and Gutter	$20	$21	$1.05	$120	Linear Foot	16 (108)
Curb/Gutter	Gutter	$23	$23	$10	$78	Linear Foot	4 (4)

Table 30: Curb/ Gutter Cost

Summary of Results

These tables and associated database provide up-to-date information on pedestrian and bicycle treatments. It is important to remember that the tables above are estimates of pedestrian and bicycle-related infrastructure costs and that infrastructure costs will likely differ substantially between communities and between states. Additionally, these costs may not always accurately reflect the current market price of materials, labor, mobilization, and other costs included in all situations. More detailed infrastructure cost information can be found in the larger database, located at bit.ly/pedbikecosts.

This database of costs is presented here for use by city planners, engineers, and other city officials. The ultimate goal of the database is to encourage bicycling and walking and to make bicycling and walking safer through the provision of relevant infrastructure. HSRC researchers hope that this cost database is used to simplify the process for implementing pedestrian and bicycle infrastructure and will help decision-makers understand the costs involved in sustaining and encouraging pedestrian and bicycle transportation. By making more informed decisions about the costs of pedestrian and bicycle infrastructure treatments, decision-makers will be able to dedicate funds to those treatments secure in the knowledge that a) these investments are often affordable and b) which treatment is the most cost-effective.

Additionally, this database will be available to both city transportation officials as well the general public, allowing anyone with an interest in non-motorized transportation the chance to research cost information.

Figure References

Figure 1: Dan Burden / www.pedbikeimages.org

Figure 2: Nate Baird / www.flickr.com

Figure 3: Reed Huegerich / www.pedbikeimages.org

Figure 4: "Chicanes," sfbetterstreets / www.sfbetterstreets.org

Figure 5: Thisisbossi / www.flickr.com

Figure 6: "Pedestrians: Strategies for Addressing the Problem" / http://safety.transportation.org/htmlguides/peds/description_of_strat.htm

Figure 7: Dan Burden / www.pedbikeimages.org

Figure 8: Dan Burden / www.pedbikeimages.org

Figure 9: Dan Burden / www.pedbikeimages.org

Figure 10: Designing for Pedestrian Safety / www.walkinginfo.org

Figure 11: Heather Bowden / www.pedbikeimages.org

Figure 12: Austin Brown / www.pedbikeimages.org

Figure 13: Dan Burden / www.pedbikeimages.org

Figure 14: Dan Burden / www.pedbikeimages.org

Figure 15: Jennifer Wampler / www.pedbikeimages.org

Figure 16: LA Wad / www.flickr.com

Figure 17: Ron Bloomquist / www.pedbikeimages.org

Figure 18: Laura Sandt / www.pedbikeimages.com

Figure 19: Dan Burden / www.pedbikeimages.com

Figure 20: BazzaDaRambler / www.flickr.com

Figure 21: City of Los Altos / www.ci.los-altos.ca.us/

Figure 22: CompleteStreets / www.flickr.com

Figure 23: FHWA-HRT-04-100. 2005.

Figure 24: Dan Burden / www.pedbikeimages.org

Figure 25: Dan Burden / www.pedbikeimages.org

Figure 26: Mike Cynecki / www.pedbikeimages.org

Figure 27: James Wagner / www.pedbikeimages.org

Figure 28: Town of Warrenton, VA / http://www.warrentonva.gov/

Figure 29: Mike Cynecki / www.pedbikeimages.org

Figure 30: Dan Burden / www.pedbikeimages.org

Figure 31: Laura Sandt / www.pedbikeimages.org

Figure 32: Lyubov Zuyeva / www.pedbikeimages.org

Appendix A – Links to Database and More Information

The final database, including more detailed information about the data source of each observation, is located at the following URL: bit.ly/pedbikecosts. It also includes more information regarding materials, classes, units, etc.

A summary page with additional resources and information can be found here: http://www.walkinginfo.org/library/details.cfm?id=4876

This paper can be downloaded directly by following this URL: http://katana.hsrc.unc.edu/cms/downloads/Costs-for-Pedestrian-Bicycle-Infrastructure-Improvements.xlsx

Appendix B – Glossary of Terms

Bicycle Boulevard
A bicycle boulevard is a low-speed street that has been designed to give priority to bicyclists as through-going traffic. They discourage non-local vehicular traffic and provide right-of-way and traffic control to bicyclists. A variety of traffic calming elements can be used to create these streets, such as diverters, curb extensions, and partial or full road closures.

Bicycle Lane
Bicycle lanes are designated travel lanes for bicyclists, separated from vehicular traffic by striping. For this database, the width is assumed to be five feet.

Bicycle Locker
A bicycle locker is a box or locker used to store a single bicycle. They are typically used in areas where parking is needed for an extended period of time yet where otherwise the bicycles could be damaged or stolen.

Bicycle Parking Stations
Bicycle parking stations are buildings or structures designed to provide secure bicycle parking, with sheltered bike racks secured by having on-site staff or a gate/door controlled by key or electronic card access. Facility designs range from a simple cage or shed to multi-level structures. Some also include other facilities, such as bicycle repair workstation, showers, and/or lockers.

Bicycle Racks
Bicycle racks are devices to which bicycles can be securely attached in order to prevent theft. General styles include: the Inverted U, Serpentine, Bollard, Grid and Decorative.

Bicycle Stairway Channel
A bicycle stairway channel is a pedestrian stairway with an included channel, which helps facilitate walking a bicycle up or down the stairs.

Bikeway Preparation
Bikeway preparation is what is required to prepare a site for a separated bicycle route, including excavation, grading, curb/gutter removal, and clearing and grubbing.

Bollard
Traffic bollards are used to keep pedestrians safe, slow and separate traffic, and limit vehicle access either temporarily or permanently.

Bus Racks
Bus racks are typically attached to the front of a bus to facilitate the transportation of bicycles for bus riders.

Chicanes
Chicanes are concrete islands that offset traffic, and create a horizontal diversion of traffic used to reduce the speed of vehicular traffic on local streets. Landscaped chicanes have the added benefit of adding more green landscaping to a street.

Chokers
Chokers are curb extensions that narrow a street by widening the sidewalks or planting strips, effectively creating a pinch point along the street. They can be created by bringing both curbs in, or by more dramatically widening one side at a midblock location.

Crossing Islands
Also known as center islands, refuge islands, pedestrian islands, or median slow points, crossing islands are raised islands placed in the center of the street at intersections or midblock crossings to help protect crossing pedestrians from motor vehicles.

Crosswalk
Striped crosswalks indicate a legal crossing for pedestrians, while natural unmarked crosswalks occur at the intersection of any two streets. Motorists often fail to yield to pedestrians at these crossing points and marked crosswalks are often installed to warn motorists to expect pedestrians and to indicate safe and comfortable crossing locations for pedestrians.

Curb and Gutter
Curb and Gutters are used in conjunction with a number of other bicycle and pedestrian facility improvements, such as: sidewalks, bikeways, medians, islands, paths, curb extensions, bikeways, diverters, chicanes, and bulb-outs, among others.

Curb Extensions
Curb extensions extend the sidewalk or curb line out into the parking lane, which reduces the effective street width. They are often also known as chokers or bulb-outs.

Curb Ramp
Curb ramps provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, or who have mobility impairments that make it difficult to step up and down high curbs.

Diverter
A diverter is an island built at a residential street intersection that prevents certain through and/or turning movements. There are four primary types of diverters, namely diagonal, star, forced turn, and truncated diverters. A diagonal diverter breaks up cut-through movements and forces right or left turns in certain directions. A star diverter consists of a star-shaped island placed at the intersection, which forces right turns from each approach. A truncated diagonal diverter is a diverter with one end open to allow additional turning movements.

Fence/Gate
Fencing and gating can help separate pedestrians and cyclists from roadways and railroad tracks, and can also be used in the construction of pedestrian/bicyclist paths, bridges, and overpasses.

Flashing Beacons
Flashing beacons are typically used in conjunction with pedestrian crossings to provide an enhanced warning for vehicles to yield to pedestrians. Rectangular rapid flash beacons (RRFBs) differ from regular flashing beacons in that RRFBs have a rapid strobe-like warning flash, are brighter, and can be specifically aimed.

Gateway
A gateway is a physical or geometric landmark that indicates a change in environment from a higher speed arterial or collector road to a lower speed residential or commercial district. They often place a higher emphasis on aesthetics and are frequently used to identify neighborhood and commercial areas within a larger urban setting.

Lighting
Adequate roadway lighting enhances the safety of all roadway users, while pedestrian-scale lighting improves nighttime security and enhances commercial districts.

Median
Medians are defined as raised islands placed in the center of a roadway in order to separates opposing streams of traffic and limit turning movements. Medians facilitate pedestrian crossings, improve pedestrian visibility to motorists, slow motor vehicle speeds, and provide space for lighting and landscaping.

Mid-Block Crossing
Often installed in conjunction with other safety and traffic calming features, particularly advance yield lines, in-pavement yield/stop signs, raised pedestrian crossings, or Rectangular Rapid Flash Beacons or Pedestrian Hybrid Beacons, mid-block crossings can affect substantial improvements in pedestrian safety, while also having traffic calming effects. Mid-block crossings are striped crosswalks away from intersections and are very helpful in the vicinity of transit stops or in other areas where pedestrians are likely to cross the road often.

Overpass/Underpass
Pedestrian Overpasses and Underpasses completely separate pedestrians from vehicular traffic and provide safe pedestrian accommodation over often impassable barriers, such as highways, railways, and natural barriers such as rivers.

Path
Multi-use paths are the safest pedestrian facilities and provide pedestrian mobility options away from the roadway. Often accommodating both pedestrians and bikes, multi-use paths are usually at least eight feet in width, can be both paved and unpaved, and are used for both recreation and transportation purposes.

Pavement Marking
Pavement markings cover a variety of pedestrian and bicycle treatment costs, including advance stop/yield lines, island markings, painted curbs/sidewalks, and symbols.

Pedestrian Hybrid Beacon
The Pedestrian Hybrid Beacon, otherwise known as the High Intensity Activated Crosswalk (HAWK) signal, is a special type of beacon to warn and control vehicles to allow pedestrians to safely cross a road or highway at a marked midblock crossing location. Developed by the City of Tucson, Arizona in the 1990s, the pedestrian hybrid beacon is comprised of three signal sections, overhead pedestrian crosswalk signs, pedestrian detectors, and countdown pedestrian signal heads.

Railing
Pedestrian railings provide an important safety benefit on walkways with steep inclines or on stairs and also buffer the pedestrian path from vehicular traffic.

Raised Crosswalk
Raised crosswalks are similar to a raised intersection, with ramps on each side elevating the road to the level of the sidewalk, though only the width of a crosswalk, usually 10 – 15 ft.

Raised Intersection
Raised intersections are essentially speed tables for the entire intersection, with ramps on each vehicle approach, which elevate the entire intersection to the level of the sidewalk.

Roundabout
Roundabouts are circular intersections designed to eliminate left turns by requiring traffic to exit to the right of the circle. They are usually installed to reduce vehicular speeds, improve safety at intersections through eliminating angle collisions, help traffic flow more efficiently, reduce operation costs when converting from signalized intersections, and help create gateway treatments to signify the entrance of a special district or area.

Separated Bikeway
Separated bikeways are paths completely separated from vehicular traffic and used exclusively by pedestrians and bicyclists, with crossflow minimized. For this database, the path width is assumed to be eight feet.

Sidewalk
Sidewalks are the most basic pedestrian facility and provide a safe area within the public right-of-way for pedestrian travel.

Signed Bicycle Routes
Signed bicycle routes are roads where bicyclists and motor vehicles are not separated. Shared-use of the street is indicated with signing.

Signals for Drivers and Pedestrians
Signals serve the important function of guiding and regulating traffic and help reduce conflicts between different road users.

Signs
Signs can provide important information that can improve road safety. By letting people know what to expect, there is a greater chance that they will react and behave appropriately. Regulatory signs, such as STOP, YIELD, or turn restriction signs such as NO TURN ON RED require compliant driver actions and can be enforced.

Speed Bumps
Speed bumps are typically smaller than speed humps with a more extreme grade, which forces automobiles to more significantly reduce speeds.

Speed Humps
Speed humps are paved (usually asphalt) and are approximately 3 to 4 in. high at their center. They are used to slow traffic in neighborhoods and extend the full width of the street with height tapering near the drain gutter to allow unimpeded bicycle travel.

Speed Table
Speed tables are very long and broad speed humps, or flat-topped speed humps, where sometimes a pedestrian crossing is provided in the flat portion of the speed table. The primary use of speed tables is to calm traffic in neighborhoods.

Speed Trailer
Speed trailers, which display the motorist speed and provide a warning if the speed limit is exceeded, as well as signs and reader boards can help education and awareness efforts and can be especially effective when coupled with enforcement efforts.

Street Closure
Full and partial (half) street closures are the ultimate way of discouraging automobile through traffic, while still allowing pedestrian and bicycle traffic. Typically, full street closures close the street entirely to vehicles, while partial street closures restrict turning movements onto streets, without having to create one-way streets.

Street Furniture
Street furniture often serves as a buffer between the sidewalk and the roadway, providing an important safety benefit to pedestrians. Including trees, benches, bus shelters, newspaper racks, kiosks, and other pedestrian amenities, street furniture also serves to create a more pleasant and attractive environment for pedestrians.

Appendix C – Cost Information by State

Table 21: Cost Information Frequency by State

State	Number of Treatments
AL	30
AK	6
AZ	1
AR	21
CA	146
CO	80
CT	1
DE	0
DC	0
FL	75
GA	44
HI	0
ID	5
IL	4
IN	24
IA	63
KS	38
KY	41
LA	21
ME	11
MD	1
MA	104
MI	29
MN	115
MS	0
MO	16
MT	15
NE	86
NV	0
NH	1
NJ	26
NM	57
NY	24
NC	68
ND	9
OH	161

State	Number of Treatments
OK	33
OR	78
PA	0
RI	21
SC	49
SD	0
TN	0
TX	24
UT	0
VT	60
VA	32
WA	13
WV	0
WI	101
WY	2
National	5
Unknown	6
Total	1747

Appendix D - Complete Table of Infrastructure Costs

The tables presented in this paper are summarized in the table below.

Infrastructure	Description	Median	Average	Minimum Low	Maximum High	Cost Unit	Number of Sources (Observations)
Bicycle Parking	Bicycle Locker	$2,140	$2,090	$1,280	$2,680	Each	4 (5)
Bicycle Parking	Bicycle Rack	$540	$660	$64	$3,610	Each	19 (21)
Bikeway	Bicycle Lane	$89,470	$133,170	$5,360	$536,680	Mile	6 (6)
Bikeway	Concrete Bicycle Path	$182,870	$179,340	$91,420	$343,700	Mile	2 (6)
Bikeway	Signed Bicycle Route	$27,240	$25,070	$5,360	$64,330	Mile	3 (6)
Bikeway	Signed Bicycle Route with Improvements	$241,230	$239,440	$42,890	$536,070	Mile	1 (6)
Bollard	Bollard	$650	$730	$62	$4,130	Each	28 (42)
Chicanes	Chicane	$8,050	$9,960	$2,140	$25,730	Each	8 (9)
Crosswalk	High Visibility Crosswalk	$3,070	$2,540	$600	$5,710	Each	4(4)
Crosswalk	Striped Crosswalk	$340	$770	$110	$2,090	Each	8 (8)
Crosswalk	Striped Crosswalk	$5.87	$8.51	$1.03	$26	Linear Foot	12 (48)
Crosswalk	Striped Crosswalk	$6.32	$7.38	$1.06	$31	Square Foot	5 (15)
Curb/Gutter	Curb	$18	$21	$1.05	$110	Linear Foot	16 (68)
Curb/Gutter	Curb and Gutter	$20	$21	$1.05	$120	Linear Foot	16 (108)
Curb/Gutter	Gutter	$23	$23	$10	$78	Linear Foot	4 (4)
Curb Extension	Curb Extension/ Choker/ Bulb-Out	$10,150	$13,000	$1,070	$41,170	Each	19(28)
Curb Ramp	Truncated Dome/Detectable Warning	$37	$42	$6.18	$260	Square Foot	9 (15)
Curb Ramp	Wheelchair Ramp	$740	$810	$89	$3,600	Each	16 (31)
Curb Ramp	Wheelchair Ramp	$12	$12	$3.37	$76	Square Foot	10 (43)
Diverter	Diverter	$22,790	$26,040	$10,000	$51,460	Each	5 (6)
Diverter	Partial/Semi Diverter	$15,000	$15,060	$5,000	$35,000	Each	3 (4)
Fence/Gate	Fence	$120	$130	$17	$370	Linear Foot	7 (7)
Fence/Gate	Gate	$510	$910	$330	$1,710	Each	5 (5)
Flashing Beacon	Flashing Beacon	$5,170	$10,010	$360	$59,100	Each	16 (25)
Flashing Beacon	RRFB	$14,160	$22,250	$4,520	$52,310	Each	3 (4)
Gateway	Gateway Sign	$350	$340	$130	$520	Each	3 (4)
Gateway	Structure	$15,350	$22,750	$5,000	$64,330	Each	5 (6)
Pedestrian Hybrid Beacon	Pedestrian Hybrid Beacon	$51,460	$57,680	$21,440	$128,660	Each	9 (9)
Island	Median Island	$10,460	$13,520	$2,140	$41,170	Each	17 (19)

Infrastructure	Description	Median	Average	Minimum Low	Maximum High	Cost Unit	Number of Sources (Observations)
Island	Median Island	$9.80	$10	$2.28	$26	Square Foot	6 (15)
Lighting	In-pavement Lighting	$18,250	$17,620	$6,480	$40,000	Total	4 (4)
Lighting	Streetlight	$3,600	$4,880	$310	$13,900	Each	12 (17)
Median	Median	$6.00	$7.26	$1.86	$44	Square Foot	9 (30)
Overpass/ Underpass	Wooden Bridge	$122,610	$124,670	$91,010	$165,710	Each	1 (8)
Overpass/ Underpass	Pre-Fab Steel Bridge	$191,400	$206,290	$41,850	$653,840	Each	5 (5)
Path	Boardwalk	$1,957,040	$2,219,470	$789,390	$4,288,520	Mile	5 (5)
Path	Multi-Use Trail - Paved	$261,000	$481,140	$64,710	$4,288,520	Mile	11 (42)
Path	Multi-Use Trail - Unpaved	$83,870	$121,390	$29,520	$412,720	Mile	3 (7)
Pavement Marking	Advance Stop/Yield Line	$380	$320	$77	$570	Each	3 (5)
Pavement Marking	Advance Stop/Yield Line	$10	$10	$4.46	$100	Square Foot	1 (4)
Pavement Marking	Island Marking	$1.49	$1.94	$0.41	$11	Square Foot	1 (4)
Pavement Marking	Painted Curb/Sidewalk	$1.21	$3.40	$0.44	$12	Square Foot	4 (5)
Pavement Marking	Painted Curb/Sidewalk	$2.57	$3.06	$1.05	$10	Linear Foot	2 (5)
Pavement Marking Symbol	Pedestrian Crossing	$310	$360	$240	$1,240	Each	4 (6)
Pavement Marking Symbol	Shared Lane/Bicycle Marking	$160	$180	$22	$600	Each	15 (39)
Pavement Marking Symbol	School Crossing	$520	$470	$100	$1,150	Each	4 (18)
Signal	Audible Pedestrian Signal	$810	$800	$550	$990	Each	4 (4)
Signal	Countdown Timer Module	$600	$740	$190	$1,930	Each	14 (18)
Signal	Pedestrian Signal	$980	$1,480	$130	$10,000	Each	22 (33)
Signal	Signal Face	$490	$430	$130	$800	Each	3 (6)
Signal	Signal Head	$570	$550	$100	$1,450	Each	12 (26)
Signal	Signal Pedestal	$640	$800	$490	$1,160	Each	3 (5)
Pedestrian/Bike Detection	Furnish and Install Pedestrian Detector	$180	$390	$68	$1,330	Each	7 (14)
Pedestrian/Bike Detection	Push Button	$230	$350	$61	$2,510	Each	22 (34)
Railing	Pedestrian Rail	$95	$100	$7.20	$690	Linear Foot	29 (83)
Raised Crossing	Raised Crosswalk	$7,110	$8,170	$1,290	$30,880	Each	14 (14)

Infrastructure	Description	Median	Average	Minimum Low	Maximum High	Cost Unit	Number of Sources (Observations)
Raised Crossing	Raised Intersection	$59,160	$50,540	$12,500	$114,150	Each	5 (5)
Roundabout/ Traffic Circle	Roundabout/ Traffic Circle	$27,190	$85,370	$5,000	$523,080	Each	11 (14)
Sidewalk	Asphalt Paved Shoulder	$5.81	$5.56	$2.96	$7.65	Square Foot	1 (4)
Sidewalk	Asphalt Sidewalk	$16	$35	$6.02	$150	Linear Foot	7 (11)
Sidewalk	Brick Sidewalk	$60	$60	$12	$160	Linear Foot	9 (9)
Sidewalk	Concrete Paved Shoulder	$6.10	$6.64	$2.79	$58	Square Foot	1 (11)
Sidewalk	Concrete Sidewalk	$27	$32	$2.09	$410	Linear Foot	46 (164)
Sidewalk	Concrete Sidewalk - Patterned	$38	$36	$11	$170	Linear Foot	4 (5)
Sidewalk	Concrete Sidewalk - Stamped	$45	$45	$4.66	$160	Linear Foot	12 (17)
Sidewalk	Concrete Sidewalk + Curb	$170	$150	$23	$230	Linear Foot	4 (7)
Sidewalk	Sidewalk	$34	$45	$14	$150	Linear Foot	17 (24)
Sidewalk	Sidewalk Pavers	$70	$80	$54	$200	Linear Foot	3 (4)
Sign	Stop/Yield Signs	$220	$300	$210	$560	Each	4 (4)
Speed Trailer	Speed Trailer	$9,480	$9,510	$7,000	$12,410	Each	6 (6)
Speed Bump/Hump /Cushion/Table	Speed Hump	$2,130	$2,640	$690	$6,860	Each	14 (14)
Speed Bump/Hump /Cushion/Table	Speed Bump	$1,670	$1,550	$540	$2,300	Each	4 (4)
Speed Bump/Hump /Cushion/Table	Speed Table	$2,090	$2,400	$2,000	$4,180	Each	5 (5)
Street Furniture	Street Trees	$460	$430	$54	$940	Each	7(7)
Street Furniture	Bench	$1,660	$1,550	$220	$5,750	Each	15 (17)
Street Furniture	Bus Shelter	$11,490	$11,560	$5,230	$41,850	Each	4 (4)
Street Furniture	Trash/Recycling Receptacle	$1,330	$1,420	$310	$3,220	Each	12 (13)

Other Resources

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Endnotes

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APPENDIX

G. BICYCLE AND PEDESTRIAN FACILITY DESIGN FLEXIBILITY (FEDERAL HIGHWAY ADMINISTRATION - FHWA)

U.S. Department of Transportation
Federal Highway Administration

Memorandum

SENT BY ELECTRONIC MAIL

Subject: **GUIDANCE:** Bicycle and Pedestrian Facility Design Flexibility Date: August 20, 2013

From: Gloria M. Shepherd
Associate Administrator for Planning, Environment and Realty

In Reply Refer To:
HEPH-10

Walter C. (Butch) Waidelich, Jr.
Associate Administrator for Infrastructure

Jeffrey A. Lindley
Associate Administrator for Operations

Tony T. Furst
Associate Administrator for Safety

To: Division Administrators
cc: Directors of Field Services

This memorandum expresses the Federal Highway Administration's (FHWA) support for taking a flexible approach to bicycle and pedestrian facility design. The American Association of State Highway and Transportation Officials (AASHTO) bicycle and pedestrian design guides are the primary national resources for planning, designing, and operating bicycle and pedestrian facilities. The National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and the Institute of Transportation Engineers (ITE) *Designing Urban Walkable Thoroughfares* guide builds upon the flexibilities provided in the AASHTO guides, which can help communities plan and design safe and convenient facilities for pedestrian and bicyclists. FHWA supports the use of these resources to further develop nonmotorized transportation networks, particularly in urban areas.

AASHTO Guides

AASHTO publishes two guides that address pedestrian and bicycle facilities:

- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, July 2004, (AASHTO Pedestrian Guide) provides guidelines for the planning, design, operation, and maintenance of pedestrian facilities, including signals and signing. The guide recommends methods for accommodating pedestrians, which vary among roadway and facility types, and addresses the effects of land use planning and site design on pedestrian mobility.

- *Guide for the Development of Bicycle Facilities 2012, Fourth Edition* (AASHTO Bike Guide) provides detailed planning and design guidelines on how to accommodate bicycle travel and operation in most riding environments. It covers the planning, design, operation,

maintenance, and safety of on-road facilities, shared use paths, and parking facilities. Flexibility is provided through ranges in design values to encourage facilities that are sensitive to local context and incorporate the needs of bicyclists, pedestrians, and motorists.

NACTO Guide

NACTO first released the *Urban Bikeway Design Guide* (NACTO Guide) in 2010 to address more recently developed bicycle design treatments and techniques. It provides options that can help create "complete streets" that better accommodate bicyclists. While not directly referenced in the AASHTO Bike Guide, many of the treatments in the NACTO Guide are compatible with the AASHTO Bike Guide and demonstrate new and innovative solutions for the varied urban settings across the country.

The vast majority of treatments illustrated in the NACTO Guide are either allowed or not precluded by the Manual on Uniform Traffic Control Devices (MUTCD). In addition, non-compliant traffic control devices may be piloted through the MUTCD experimentation process. That process is described in Section 1A.10 of the MUTCD and a table on the FHWA's bicycle and pedestrian design guidance Web page is regularly updated (FHWA Bicycle and Pedestrian Design Guidance), and explains what bicycle facilities, signs, and markings are allowed in accordance with the MUTCD. Other elements of the NACTO Guide's new and revised provisions will be considered in the rulemaking cycle for the next edition of the MUTCD.

ITE Guide

In 2010, FHWA supported production of the ITE Guide *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. This guide is useful in gaining an understanding of the flexibility that is inherent in the AASHTO "Green Book," *A Policy on Geometric Design of Highways and Streets*. The chapters emphasize thoroughfares in "walkable communities" – compact, pedestrian-scaled villages, neighborhoods, town centers, urban centers, urban cores and other areas where walking, bicycling and transit are encouraged. It describes the relationship, compatibility and trade-offs that may be appropriate when balancing the needs of all users, adjoining land uses, environment and community interests when making decisions in the project development process.

Summary

FHWA encourages agencies to appropriately use these guides and other resources to help fulfill the aims of the *2010 US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations* – "...DOT encourages transportation agencies to go beyond the minimum requirements, and proactively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities, and utilize universal design characteristics when appropriate."

Accompanying this memo are the latest versions of the: 1) AASHTO Bike Guide, 2) NACTO Bike Guide; and 3) the ITE *Designing Walkable Urban Thoroughfares* Guide.

The attachments provide two examples that demonstrate the use of treatments illustrated in the NACTO Guide (i.e., buffered bike lanes and green colored pavement for bicycle lanes) by State or local DOTs, and a list of FHWA staff that can help with questions about pedestrian and bicycle design issues.

Attachments

Attachment 1 – Example 1 & 2

Example 1: Michigan DOT's Buffered Bike Lanes

One of the innovative bicycle facilities discussed in the NACTO *Urban Bikeway Design Guide* is buffered bike lanes. Buffered bike lanes create more space between motor vehicles and bicycles by delineating extra space between the bike lane and parked cars and/or a motor vehicle lane. Buffered bike lanes can be implemented if the pavement markings and channelizing devices are compliant with the MUTCD (see Bicycle Facilities and the Manual on Uniform Traffic Control Devices). Michigan DOT developed a video that describes their efforts to install buffered bike lanes in Oakland County (see Northwestern Highway Bicycle Lane: A Safer Place to Ride). Michigan DOT also developed a brochure that explains buffered bike lanes to the public (see What Every Michigan Driver Should Know About Bike Lanes).

Example 2: Missoula's Colored Bike Lanes

MUTCD experimentation is a methodology that analyzes innovative traffic control devices through field deployment for the purpose of testing or evaluating its application or manner of use. An approved request to experiment numbered and titled as Official Ruling "3(09)-3(E) – Colored Bike Lanes – Missoula, MT" illustrates a successful experiment. The City of Missoula submitted a request to experiment in January 2010 in accordance with all Items in Paragraph 11 of Section 1A.10 in the 2009 MUTCD.

The experiment was conducted for one year and revealed that approximately 70 percent of motorists noticed the color conspicuity enhancement to the bike lane. This was interpreted as an increased awareness by motorists of the potential presence of bicyclists at intersections where those motorists would be making a right turn.

The City also reported ancillary findings that were not anticipated in the original Evaluation Plan of the request to experiment. This included psychological discomfort of the cyclist with the lateral locations of the colored bicycle lane with respect to door zones in parallel parking corridors. In addition, the experiment revealed an unintended design weakness where colored bike lanes that achieve high compliance of little or no occupation of motorized vehicles can also be attractive to pedestrians who wish to use them to facilitate their travel in lieu of crowded sidewalks or to patronize parking meters. For these reasons, a successful experiment can reveal unanticipated findings, further demonstrating the value of official experimentation.

This particular experiment provided two conclusions that supported FHWA's decision to issue Interim Approval for green colored pavement for bicycle lanes in April 2011.

For more information see http://mutcd.fhwa.dot.gov/reqdetails.asp?id=1135.

Attachment 2

FHWA Bicycle and Pedestrian Staff Resources

Human Environment —Livability and Bicycle and Pedestrian Programs

- Shana Baker, Livability Team Leader, 202-366-4649, shana.baker@dot.gov: Livability, Context Sensitive Solutions
- Christopher Douwes, Trails and Enhancements Program Manager 202-366-5013, christopher.douwes@dot.gov: Transportation Alternatives Program/Enhancement Activities; Recreational Trails Program related activities; Bicycle and pedestrian policy and guidance
- Daniel Goodman, Transportation Specialist, 202-366-9064, daniel.goodman@dot.gov: Bicycle and pedestrian activities; Livability
- Wesley Blount, Program Manager, 202-366-0799, wesley.blount@dot.gov: Safe Routes to School, Discretionary programs

Planning

- Brian Gardner, 202-366-4061, brian.gardner@dot.gov: Modeling
- Jeremy Raw, 202-366-0986, jeremy.raw@dot.gov: Modeling
- Harlan Miller, 202-366-0847, harlan.miller@dot.gov: Planning Oversight
- Kenneth Petty, 202-366-6654 kenneth.petty@dot.gov: Planning Capacity Building

Policy

- Steven Jessberger, 202-366-5052, steven.jessberger@dot.gov, Traffic Monitoring Guide

Infrastructure — Design (including accessible design)

- Michael Matzke, 202-366-4658, michael.matzke@dot.gov

Resource Center— Design (including accessible design)

- Brooke Struve, Safety and Design Team, 720-963-3270, brooke.struve@dot.gov
- Peter Eun, Safety and Design Team, 360-753-9551, peter.eun@dot.gov

Operations — Manual on Uniform Traffic Control Devices

- Kevin Dunn, Transportation Specialist, 202-366-6054, kevin.dunn@dot.gov: MUTCD Team

Pedestrian and Bicycle Safety

- Gabe Rousseau, Safety Operations Team Leader, 202-366-8044, gabe.rousseau@dot.gov: Bicycle and pedestrian safety programs
- Tamara Redmon, Pedestrian Safety Program Manager, 202-366-4077, tamara.redmon@dot.gov: Pedestrian safety

Pedestrian and Bicyclist Safety Research

- Ann Do, 202-493-3319, ann.do@dot.gov
- Jim Shurbutt, 202-493-3420, jimmy.shurbutt@dot.gov

Civil Rights — Accessibility Policy and Compliance

- Patrick Gomez, Resource Center Civil Rights Team, 720-963-3269, patrick.gomez@dot.gov
- Candace Groudine, Director of External Civil Rights Programs, 202-366-4634, candace.groudine@dot.gov

APPENDIX

H. BICYCLE AND PEDESTRIAN SUPPORTIVE CODE LANGUAGE

TECHNICAL MEMORANDUM

TO: Interested Parties

FROM: Robert Torzynski, AICP
Program Manager – Bicycle & Pedestrian Planning

DATE: July 27, 2007

RE: Bicycle & Pedestrian Supportive Code Language (UPWP Task 5510)

Introduction

Local zoning codes, community design guidelines, and site planning requirements (local codes) can significantly affect the accessibility, safety, and attractiveness of development for bicyclists and pedestrians. Site plan elements, presence of sidewalks, building orientation, parking supply, and parking layout can affect the attractiveness of bicycling and walking as modes of travel. Likewise, connectivity between adjacent properties can also be influenced through local code requirements.

The objective of the Bicycle and Pedestrian Supportive Code Language project was to develop information on and identify examples of noteworthy zoning code and site planning language and guidance that enhances accessibility and safety for bicyclists and pedestrians. The project is a joint effort between the Genesee Transportation Council (GTC) and the Genesee/Finger Lakes Regional Planning Council (G/FLRPC). Staff researched and assessed materials previously compiled by G/FLRPC including, but not limited to, comprehensive plans, zoning regulations, and site planning guidance. Project research also assessed codes and associated materials available from national- and state-level agencies and associations such as the Federal Highway Administration, New York State Department of State, the American Planning Association, and municipalities located within New York State.

Project Methodology

GTC staff surveyed county planning departments in the nine-county Genesee-Finger Lakes region to identify those topics related to supporting bicyclists and pedestrians that could be addressed within the scope of the project. The survey identified the following key areas: 1) sidewalk requirements adjacent to new and existing development, 2) bicycle parking requirements, and 3) automobile parking design. Within the identified key areas, research was conducted and relevant codes obtained through the G/FLRPC library and internet-based resources. Fact sheets and presentation materials were developed to provide examples that may be considered by jurisdictions that seek to improve bicycle and pedestrian safety, access, and attractiveness within the community.

Background

In New York State, land use is regulated predominantly at the local level pursuant to the State's Consolidated Laws. These include the General City Law, General Municipal Law, Municipal Home Rule Law, Town Law, and Village Law. The Consolidated Laws provides a wide variety of tools

that local governments can utilize to improve the transportation system for pedestrians and bicyclists.

The study scope is limited to code language such as local zoning ordinances, site plan review guidelines, and subdivision ordinances. Many communities include bicycle and pedestrian related policies within local comprehensive plans; however, specific code examples are less often available although essential to implementing policy. One town's formally-adopted sidewalk policy has been included because it provides a direct link between exemplary policy and the implementing code. Study examples are limited to New York State jurisdictions to ensure consistency with the enabling provisions included in the State's Consolidated Laws. The study is not presented as legal analysis however; it is instead intended to provide a resource for communities that may wish to assess suitability toward local conditions and needs.

Key Findings

Based on the survey results and project research, five key findings emerge as areas where communities might consider revisions to land use codes to support bicycle and pedestrian travel. These include:

- Require that developers include sidewalks within residential subdivisions;
- Work to infill gaps in the existing sidewalk network within each community;
- Ensure that bicycle parking is provided within new commercial development;
- Improve the integration of pedestrian facilities within automobile parking lots; and
- Locate buildings to the front of lot lines and parking toward the rear in order to support pedestrian access to the site.

None of the measures are a panacea, and few if any of the communities studied include all the measures throughout their land use regulations. However, each approach has been used by municipalities within New York State and the implementation of one or all of the measures described below could provide tangible benefits to local communities seeking to improve conditions for motorists, bicyclists, and pedestrians.

A. Sidewalks Adjacent to New Residential Development

1. Background

Every trip begins and ends with a walking trip. Providing sidewalks adjacent to new development is one way that communities can improve mobility for all users including the elderly, the young, people with disabilities, and others without access to an automobile. Sidewalks can improve pedestrian safety and convenience by providing a firm, stable, and slip resistant surface separate from the roadway.

The determination of whether or not sidewalks should be provided adjacent to new development depends on the roadway classification and the proposed land use which influences the number of pedestrian trips that will occur. The Federal Highway Administration (FHWA) recommendations range from paved shoulders (typically, three-foot minimum width for rural highways with less than 400 average daily vehicle trips) to sidewalks on both sides of the street (typically, five-foot minimum width) for commercial urban streets.

FHWA guidelines represent standard practice where high intensity land use warrants sidewalks as a safety measure and in low density rural areas where paved roadway shoulders comprise adequate facilities. However, at medium residential densities near FHWA's threshold of four dwelling units per acre there appear to be opportunities for communities that may wish to improve local pedestrian facilities by requiring that sidewalks be provided adjacent to new residential development regardless of roadway classification and the proposed land use.

Residential subdivisions comprise a significant land use in many communities and have the potential to generate a considerable number of pedestrian trips. In addition to improved pedestrian safety, providing sidewalks to serve residential neighborhoods facilitates access to nearby parks, schools, and commercial activity centers and promotes public health through daily physical activity.

2. How it's done

Communities that seek to provide sidewalks adjacent to new residential development can utilize several approaches, including:

- Sidewalk requirements based on residential density (i.e., per FHWA Guidelines);
- Requirements based on the roadway's functional classification;
- Sidewalk requirements based on adjacent land use; and
- Policy-based requirements.

3. Examples

Requirements based on residential density: the Town of Malta (Code Chapter 143-13.1, Subdivision of Land) requires sidewalks to be provided within all new residential and commercial projects within the Town. The code specifies that the sidewalk shall have a minimum width of five feet and be constructed of concrete designed to serve pedestrians. The code's requirements go on to state that for residential development with more than four units per acre sidewalks shall be required on both sides of the roadway and are required on one side only when the density of development is less than four units per acre. These density-based requirements are consistent with FHWA guidelines.

Requirements based on the roadway's functional classification: the Town of Rhinebeck (Land Subdivision Regulations Article VI, Section 2, Subdivision Design Standards) requires that all streets designated as through roads shall be provided a pedestrian path, sidewalk, or bikeway on at least one side of the street. Sidewalks, if provided, must include a four-foot buffer between the sidewalk and the street. Bikeways (combined bicyclist/pedestrian paths) must also meet this buffer requirement and be at least four-feet in width. Similar requirements apply within the Town of Bethel (applicable to collectors and arterial roads). Sidewalks can also be required based on the ownership of the road. This approach is followed by the Town of Guilderland which requires sidewalks on both sides of all state and county roads wherever properties abutting such roads have access to municipal waterlines (unless adjacent to agriculturally zoned property).

Sidewalk requirements based on nearby land use: the Town of Perinton (Code Section 208-28) requires that sidewalks or pedestrian ways shall be constructed along lands fronting both sides of collector or arterial street(s), within Pedestrian (PED) Zones as shown on the

Town of Perinton's Official PED Map. A "PED Zone" is defined as land within a 4,000-foot radius of the central point of a public school, public park, or active commercial area.

Policy-based requirements: the Town of Penfield has adopted a Sidewalk Policy that requires all new development approved by the Town to include sidewalks along both sides of all local roads. Developers may seek a waiver from the policy subject to the payment of a $500 per dwelling unit fee placed in the sidewalk capital account specifically for the installation of sidewalks in locations identified by the Town Board.

4. Summary

There are several options available to communities that wish to provide sidewalks adjacent to new residential development and/or support the development of “complete streets” within these areas. Code language linked to roadway classification and adjacent land use may support pedestrian travel between neighborhoods (along collector roads to and from schools and local shopping centers, etc.) but is unlikely to support improved pedestrian facilities along local streets unless local streets are included in the requirements.

Two options that might also be considered by jurisdictions seeking to improve pedestrian accessibility include providing between-lot pedestrian easements to connect residences with parks, schools, neighborhood shopping facilities, and similar destinations and limiting the length of cul-de-sacs to provide more direct pedestrian access between destinations.

B. Sidewalks Adjacent to Existing Development

1. Background

In many communities there are gaps within the existing sidewalk network. These result when new development includes sidewalks but the development site is not located adjacent to the existing sidewalk network with the number of gaps increasing over time. Communities have several options to consider if they wish to complete the existing sidewalk network for residents and visitors.

2. How it’s done

Local communities can provide sidewalks adjacent to existing development using the following techniques:

- Sidewalks constructed at the property owner’s expense;
- Sidewalks constructed at the municipality’s expense;
- Sidewalks constructed following petition by the affected property owners; and
- Comprehensive sidewalk policy.

3. Examples

Sidewalks constructed at the property owner’s expense: the Town of Ithaca (Code Section 230-8, Streets & Sidewalks) provides that the Town Board may require that sidewalks be constructed along streets and highways at the owner’s expense. The code includes language to authorize the Town to construct the facility and then to assess the owner for the cost, plus any interest. The code allows but does not require the Town to pay some portion of the cost pursuant to an adopted local law.

Sidewalks constructed at the municipality’s expense: the Town of Mamaroneck (Code Section 187-2, Streets & Sidewalks) authorizes the Town Board to direct the Town

Superintendent to construct sidewalks along county roads and state highways (with permission from county or state officials) at Town expense. Sidewalks along town roads are the responsibility of, and must be voluntarily constructed by, the property owner at their own expense.

Sidewalks constructed following petition by affected property owners: the Town of Union (Code Chapter 178-1, Streets and Sidewalks) adopted a regulation in 1946 that creates a mechanism for property owners to request sidewalks along their side of the street. When 51 percent of the property owners request the sidewalk, its construction becomes mandatory. The Town acts as agent for the construction and the property owners are required to pay all costs.

Comprehensive sidewalk policy: The Town of Penfield Sidewalk Policy applies to new development and also to existing development. This policy articulates the Town's intent to "Install sidewalks along all Minor Arterial, Major Collector and Minor Collector roads to develop safe pedestrian mobility and enjoyment." These roadways comprise what is referred to as the primary sidewalk system. The installation of sidewalks along the primary sidewalk system is supported by the allocation of funds from the Town's General Fund, by grants, and by the sidewalk waiver fees paid when an exemption to the sidewalk requirement for new development is granted.

This policy is further supported by an officially adopted "Primary Sidewalk System Map" that identifies the improvements that will be made on an annual basis, as resources permit.

4. Summary

Local jurisdictions may wish to consider developing specific codes and/or policies that address the process and financial details that will apply if they seek to improve the existing sidewalk system.

Mandating that property owners pay for the installation of sidewalks may not be well received, and even a petition-based process could create hard feelings between neighbors depending on individual positions on the issue.

For these reasons, a policy-based approach that identifies and funds specific sidewalk improvements adjacent to existing development linked to a requirement that new development provide sidewalks or pay a fee that can be allocated for the construction of sidewalks adjacent to existing development (such as the Penfield example cited above) may represent a workable approach to improving the existing sidewalk system.

C. Bicycle Parking

1. Background

Bicyclists need places to park and secure their bicycles upon reaching their destination. Lacking designated facilities, bicyclists will use trees, utility poles, parking meters, railings, and street furniture to secure their bicycles. Doing so may cause damage to the bike or to the ad-hoc bike racks and may also result in inconvenience and potential danger (such as tripping hazards) to non-cyclists. Lack of bicycle parking facilities discourages bicycling by cyclists who may feel uncomfortable locking bicycles to non-designated facilities.

In order to avoid the undesirable effects associated with ad-hoc bike racks, bicycle parking facilities can be provided at activity centers that are accessible by bike. Bicycle parking facilities should be convenient, safe, secure, and protected from inclement weather. At a

minimum, well-designed racks should be provided and, depending on the need, enclosed bike lockers located within covered parking structures may be considered.

2. How it's done

Communities can provide adequate bicycle parking in the following ways:

- Allocate an identified percentage of off-street parking for bicycle parking;
- Incorporate general bicycle parking provisions in the off-street parking regulations; and
- Implement flexible bicycle parking requirements via the Planning Board.

3. Examples

Allocate an identified percentage of off-street parking for bicycle parking: the City of Rochester Charter and Code (Chapter 120-173, Off-Street Parking) requires that bicycle parking equal to 10 percent of the vehicle parking requirements for the property (for a minimum of two bicycles) be provided at all multifamily housing (over 10 units), commercial, and industrial uses. An additional requirement is that bicycle parking be located and clearly designated in a safe and convenient location, at least as convenient as the majority of auto spaces provided and that facilities are designed to accommodate U-shaped locking devices and support bicycles in a stable position without damage to wheels, frame, or other components. The facilities are required to be securely anchored and of sufficient strength to resist vandalism and theft.

Incorporate general bicycle parking provisions in the off-street parking regulations: the Town of Warwick (Zoning Ordinance Section 164.43.2, Off-Street Parking and Loading Requirements) requires that pedestrian and bicycle amenities such as benches, shade, human-scale lighting, and bicycle racks be provided for parking lots meeting specific requirements.

Implement flexible requirements via the Planning Board: the Town of Red Hook (Zoning Ordinance Section 143-116) includes a provision in its site plan design criteria that facilities be provided, where deemed applicable by the Planning Board, for the short-term parking of bicycles.

4. Summary

In communities with ongoing commercial, multi-family, and industrial development, a percentage-based approach could be considered to ensure that bicycle accommodations are provided for new development. Those communities that prefer additional flexibility or wish to defer the decision to the Planning Board and/or site plan review process may want to consider more general code language that would allow but not require the provision of bicycle facilities on a case-by-case basis.

D. Automobile Parking to Include Pedestrian Accommodations

1. Background

Providing convenient parking for motorists adjacent to retail and other establishments is typically addressed through a municipality's off-street parking requirements. These requirements, within the zoning code, provide dimensions for automobile parking spaces and specify the number of automobile parking spaces required for each land use. In some

cases, a general acknowledgement that pedestrians be considered during the design review for the parking facility is included within the off-street parking requirements. In other cases, however, pedestrians are not considered during the design review for parking lots and the resulting facilities are difficult to cross, creating barriers to pedestrian travel that could be resolved with improved design.

2. How it's done

Local jurisdictions may consider the following options if they wish to include pedestrian accommodations within off-street parking facilities:

- Specific requirements within off-street parking code language; and
- Flexible requirements based on the Planning Board's determination.

3. Examples

Specific requirements within off-street parking code language: the Town of Warwick (Zoning Ordinance Section 164.43.2, Off-Street Parking and Loading Requirements) includes specific requirements for parking lot design that improve the environment for pedestrians by: 1) breaking up large parking lots into smaller parking groves and parking courts with a significant number of shade trees and surrounded by low hedges, stone walls, or attractive fencing; 2) encouraging designs that avoid placing more than 15 parking spaces in a continuous row and more than 60 spaces in any single parking area as defined by landscaping; 3) promoting landscaping that delineates vehicular and pedestrian patterns; 4) providing clear and legible signs, different color and texture paving materials, raised or inverted areas, and other techniques to direct the flow of both vehicular and pedestrian traffic within the lot; and 5) providing separate pedestrian walkways in large parking lots to allow safe movement within the lots.

Additional design criteria specify that: 1) One walkway can serve as a collector for up to four bays of parked cars; 2) the walkway should be a minimum of four-feet wide, allowing an additional 30 inches on each side for overhanging of automobiles; 3) all walkways should be raised to a standard sidewalk height and should be constructed of different paving material than the parking lot; and 4) pedestrian and bicycle amenities such as benches, shade, human-scale lighting, and bicycle racks should be provided.

Flexible requirements based on the Planning Board's determination: the Town of Malta (Zoning Ordinance Chapter 167, Site Plan) provides that the Planning Board shall consider the maximum adequacy of interior circulation in parking and loading facilities with particular attention to vehicular and pedestrian safety.

4. Summary

Communities that wish to promote pedestrian and bicycle-sensitive parking lot design can do so by including the desired design elements within their off-street parking code language. Doing so will provide developers with examples of expected design features at an early stage in the site planning process. For communities that prefer a more flexible approach, the Planning Board can be directed and/or authorized to consider pedestrian safety within the design/site plan review process.

E. Automobile Parking Site Location

1. Background

The location of automobile parking facilities with respect to buildings on a commercial development site can have a significant effect on the viability of pedestrian access to and from the site. When the buildings are located near the rear lot line and the parking facilities are located between the front of the building and the street, pedestrians may be forced to walk through the parking lot to access the buildings from the public right of way. This creates a potential for conflict between motorists and pedestrians that can be reduced by locating parking lots to the rear of buildings and locating buildings adjacent to the street with minimal setback.

Additionally, locating buildings near the street provides a sense of enclosure to the streetscape and provides merchants the opportunity for exposure to passersby that is lost when buildings are set behind parking facilities.

2. How it's done

The location of parking facilities on a site can be controlled directly by:

- Parking to the side or rear of the primary use included within design criteria; and
- Parking to the side or rear of the primary use and on the same lot.

3. Example

Parking to the side or rear of the primary use included within design criteria: the City of Batavia (Code Section 190-39, Parking requirements) "seeks to balance the need for adequate parking with the need to minimize harm resulting from the provision of parking and to avoid the negative impacts of excessive parking requirements." In seeking that balance, the code requires that all off-street parking be located behind or to the side of the principal building. In order to provide limited amounts of parking in front of buildings, a maximum of two rows of parking may be located in the front of a principal building in a C-2 District. The code language also specifies that parking areas shall be designed and landscaped to avoid long, uninterrupted rows of vehicles.

Parking to the side or rear of the primary use and on the same lot: the City of Lackawanna (Code Section 230-36, Parking, loading and stacking) requires that off-street parking be located on the same lot as the building to which it is an accessory use. The code further requires that all off-street parking facilities shall be located to the side or rear of the principal use building except in the Central Business District, where off-street parking shall be restricted to the rear yard.

4. Summary

Communities can direct parking to the rear of development sites and thereby support pedestrian utilization of commercial facilities located within their jurisdiction. Since parking lot and building location are closely interrelated, jurisdictions could also address this issue by revised building setback requirements. However, including the location criteria for the parking lot within the parking regulations allows a more unified approach to managing the

facilities by including criteria related to parking lot internal design within the same section of the zoning ordinance as parking lot location criteria.

Summary and Conclusion

This report shows that within New York State and the Genesee-Finger Lakes Region there are numerous examples of noteworthy zoning code and site planning language and guidance that enhance accessibility and safety for bicyclists and pedestrians. Exemplary codes and policies demonstrate that:

- Sidewalks can be provided adjacent to new residential developments utilizing a code-based approach (within the jurisdiction's subdivision regulations) or based on a comprehensive sidewalk policy that guides the implementation of the subdivision, site planning, and zoning ordinance.
- Providing sidewalks adjacent to existing development is challenging due to the cost and the difficulty in obtaining consensus from the affected parties. An approach based on a comprehensive sidewalk policy supported by an officially-adopted Sidewalk System Map, including a dedicated funding source and prioritization strategy, may be preferable to mandated construction at the property owners' expense adjacent to existing development.
- Bicycle facilities can be provided by including the requirements to do so within the jurisdiction's off-street parking requirements. A ratio of required automobile parking can be used, and the ordinance should include appropriate design criteria to ensure that damage to bicycles does not occur and that bicycle parking is properly located on the site.
- Designing parking lots to incorporate pedestrian-friendly features can be accomplished by "breaking up" the lot with bays and islands and by providing identifiable separation between vehicles and pedestrians on the site. These strategies should be combined with appropriate location on the site (parking lots located to the rear of the site) and can be addressed within the jurisdictions off-street parking requirements.
- The siting of parking lots toward the rear of the development site can be controlled within a jurisdiction's off-street parking requirements and should be combined with requirements to include pedestrian-friendly features within the lot to maximize the quality of the site design.

Resources:

1. Federal Highway Administration, Pedestrian Facilities Users Guide, FHWA-RD-01-102, March 2002.

2. New York State Department of State, Creating the Community You Want: Municipal Options for Land Use Control, June 1998.

3. Office of the New York State Comptroller, Division of Local Government Services & Economic Development, Smart Growth in New York State: A Discussion Paper, May 2004.

4. The Rockefeller Institute of Government, Local Governments in New York State, May 2003.

5. State of New York, Local Government Handbook, 5th Edition, January 2000.

6. Codes and Policies, as provided in Appendix A.

Appendix A

Bicycle and Pedestrian Supportive Codes and Policies Representative Examples

Sidewalks Adjacent to New Development

1. Town of Malta, New York, Code Chapter 143-13.1, Subdivision of Land:

   Sidewalks.

   A. General. Sidewalks shall be provided within all new residential and commercial projects within the Town.

   B. Definitions. As used in this section, the following terms shall have the meanings indicated: SIDEWALK — A walking surface with a minimum width of five feet and constructed of concrete designed to service pedestrians. C. Requirements. (1) Sidewalks shall be required within all residential and commercial projects within the Downtown District (as defined herein) and all residential and commercial Planned Development Districts. “Downtown” shall be defined as ... (2) Sidewalks shall be installed within all residential projects under the following criteria: (a) Residential development with more than four units per acre: sidewalks shall be required on both sides of the roadway.
   (b) Residential developments with fewer than four units per acre: sidewalks shall be required on one side of the roadways.

2. Town of Rhinebeck, New York, Land Subdivision Regulations Article VI, Section 2, Subdivision Design Standards:

   Pedestrian Ways: Adequate provision shall be made for convenient and safe movement of pedestrians and bicyclists in any subdivision of land for residential purposes throughout the Town of Rhinebeck. All streets designated as through roads shall have an improved pedestrian path, sidewalk or bikeway provided on at least one (1) side of the street. Any such sidewalk or pedestrian path shall be so placed that there will be a distance of not less than four (4) feet between the sidewalk and the street pavement. A bikeway, or combined bicyclist/pedestrian path, not less than four (4) feet in width, may be alternatively situated adjacent the street pavement and be visually separated there from by striping on both its inner and outer edges.

   To the extent considered practicable by the Planning Board, and in consideration of Public Health, safety and convenience, the Planning Board may require that additional or alternatively-located pedestrian ways be provided within a residential subdivision to provide access to parks or public spaces, school sites, neighborhood shopping facilities, or similar destination. Any such pedestrian way may be situated within either a public right-of-way or established within a suitable easement.

3. Town of Bethel, New York, Land Subdivision Regulations Chapter 116-11, Design Standards, Streets:

   Streets shall be graded and improved with pavements in accordance with the minimum road specifications of the Town of Bethel, New York, as amended. Curbs and provision for sidewalks shall be required for all arterial and collector streets in accordance with the graphic standards included in this chapter.

4. Town of Guilderland, New York, Code Chapter 227-2, Sidewalks:

   Required sidewalk locations.

A. Sidewalks shall be required on both sides of all state and county roads wherever properties abutting such roads have access to municipal water lines, except such roads abutting agricultural zoned property, and shall be required on any other Town road, or part thereof, by resolution of the Town Board after a public hearing, or by provision of state law.

B. On all roads other than those enumerated in § 227-2A, the Planning Board and the Zoning Board of Appeals are authorized, in their discretion, to require the installation of sidewalks, bike paths, or other pedestrian facilities as a condition of approval for property under review. The Planning Board and the Zoning Board of Appeals shall consider sidewalks, bike paths, or other pedestrian facilities as a condition of approval for property under review when said property is in proximity to schools, parks, businesses, religious institutions, existing neighborhoods, undeveloped land zoned for residential or commercial construction, existing sidewalks, or roads with the potential for high traffic volumes.

5. Town of Perinton, New York, Code Section 208-28:

   Sidewalks.

   A. Intent. The Town of Perinton recognizes the need to encourage and facilitate the development of a system of sidewalks for the safety of its residents along its collector and arterial streets.

   B. Requirements. Sidewalks or pedestrian ways shall be constructed and an easement for maintenance of such shall be provided along lands fronting both sides of collector or arterial street(s), as defined in Chapter 182, Subdivision of Land, within Pedestrian (PED) Zones as shown on the Town of Perinton's Official PED Map, adopted July 8, 1981, and as amended. A "PED Zone" is defined as land within a four-thousand-foot radius of the central point of a public school, public park or active commercial area. The central point shall be determined by the intersection of two roads or a driveway and a road. If the four-thousand-foot radius intersects any portion of a given property, then that lot in total becomes subject to sidewalk installation. Pedestrian zones may also be linear, with the bounds of the zones set forth on the Official Town of Perinton PED Map.

   The Planning Board may require the construction of sidewalks along streets not within PED Zones at its discretion, after considering the policies set forth in § 182-6 of this Code. Sidewalks defined under this section shall be constructed in conformance with the Design Criteria of the Town of Perinton. In cases where a sidewalk has been previously constructed by the Town, county or state along frontage proposed for development or subdivision approval, the applicant shall be required to make a contribution to the Sidewalk Fund as described in § 208-28E. The Planning Board may require a sidewalk contribution in lieu of construction when it determines that a constructed sidewalk will not connect with an existing sidewalk and that the contribution may be used to link or extend existing sidewalks within the Town. [Amended 6-8-1994 by L.L. No. 2-1994; 6-27-2001 by L.L. No. 5-2001]

6. Town of Penfield, New York, Sidewalk Policy:

   All new development approved by the Town of Penfield is required to install sidewalks along both sides of all local roads.

Sidewalks Adjacent to Existing Development

1. Town of Ithaca, New York, Code Section 230-8, Streets & Sidewalks:

   Duty to construct and maintain sidewalks. The Town Board may adopt orders from time to time, directing the owners of the respective lots and parcels of land abutting on any Town street or highway, or, with the consent of the County Superintendent of Highways or the State Commissioner of Transportation, as the case may be, abutting on a county or state highway within the Town of Ithaca, along which it is desired that sidewalks be built, relaid or repaired, to

construct the same to conform the terms of this article, and specifying the time within which the same shall be done...

Notwithstanding the foregoing, the Town Board may adopt a local law apportioning the expense of building, relaying or repairing any sidewalk within such Town between the Town and owners of the respective lots and parcels of land abutting any street or county or state highway within the Town along which it is desired that sidewalks be built, relaid or repaired.

2. Town of Mamaroneck, New York, Code Section 187-2, Streets & Sidewalks:

Construction of sidewalks along county roads or state highways.

A. The Town Board of the Town of Mamaroneck may, by resolution, direct the Town Superintendent to construct a sidewalk along a described portion of any county road or state highway in the manner and not exceeding an expense to be specified in the resolution, and the expense of constructing such sidewalk shall be a town charge and shall be paid in the same manner as other town charges.

B. No such sidewalks shall be built along any state highway until the State Superintendent of Public Works shall have given his consent thereto, pursuant to § 54 of the Highway Law, and no such sidewalk shall be built along any county road until the County Superintendent of Highways shall have given his consent thereto, pursuant to § 136 of the Highway Law.

§ 187-3. Construction of sidewalks by property owner. Editor's Note: Amended at time of adoption of Code; see Ch. 1, General Provisions, Art. I.

Any property owner, after applying for and receiving a permit, may construct a sidewalk or curb on town property or may build a drain from any structure, enclosure or lot of ground at his own expense. Before the owner may proceed with the work, the Town Engineer shall establish proper grades and the same shall be followed in laying such sidewalk, curb or drain. The width, materials and construction of such sidewalks, curbs and drains shall fully conform to standard specifications for such work. No drainage piping shall be allowed to discharge onto the surface of any public right-of-way.

3. Town of Union, New York, Code Chapter 178-1, Streets and Sidewalks:

Sidewalk Construction Rules and regulations. All sidewalks constructed within the Town of Union outside the corporate limits of the Villages of Endicott and Johnson City shall be constructed in accordance with the following rules and regulations:

A. All sidewalks shall be built in accordance with standard sidewalk specifications, copies of which are on file with the Town Clerk and Director of Planning at the Town Office Building, 3111 East Main Street, Endwell, New York.

B. Any property owner may request a sidewalk along his premises.

C. When 51% of the property owners on the same side of the street request sidewalks, the construction of sidewalks for the entire block shall be mandatory. When requested, the Town shall act as agent for this construction, supplying the specifications, engineering and inspection services, engaging the contractor and acting as the collecting and remitting agent, which services may be chargeable to the property owners.

D. Engineering and inspection services relative to any new sidewalk construction shall be mandatory and such services shall be furnished by the Town of Union, which service may be chargeable to the property owner.

E. All requests for engineering service shall be in writing to the Town Board at least 10 days previous to the anticipated starting date, and in special cases where a complete block of sidewalk is being constructed the request for construction should be filed with the Town Clerk previous to May 1.

F. Property owners shall engage only responsible contractors who have the necessary machinery and equipment for such purpose.

G. Inspection during construction shall be made by the Town Engineer.

H. Payment shall be made by the property owner direct to the contractor, except in special cases the Town may act as receiving agent for the contractor.

4. Town of Penfield, New York, Sidewalk Policy:

It is the intent of the Town of Penfield to install sidewalks along all Minor Arterial, Major Collector and Minor Collector roads to develop safe pedestrian mobility and enjoyment. This policy encourages the installation of sidewalks along all local streets, including but not limited to new subdivisions. This network of sidewalks is intended to provide a safe linkage of major residential developments to commercial, civic, recreational, educational, and employment centers for residents and visitors.

Bicycle Parking

1. City of Rochester, New York, Charter and Code Chapter 120-173, Zoning, Off-Street Parking:

C. (3) Bicycle parking. Bicycle parking shall be provided equal to 10% of the vehicle parking requirements for the property, for a minimum of two bicycles, for all multifamily housing (over 10 units), commercial and industrial uses. [Amended 7-27-2004 by Ord. No. 2004-240]

G. Design of bicycle parking. (1) Bicycle parking shall be located and clearly designated in a safe and convenient location, at least as convenient as the majority of auto spaces provided. (2) Facilities shall be designed to accommodate U-shaped locking devices and shall support bicycles in a stable position without damage to wheels, frame or other components and shall be securely anchored and of sufficient strength to resist vandalism and theft.

2. Town of Warwick, New York, Zoning Ordinance Section 164.43.2, Off-Street Parking and Loading Requirements:

[Requirements for large parking lots] Provide pedestrian and bicycle amenities, such as benches, shade, human-scale lighting, and bicycle racks.

3. Town of Red Hook, New York, Zoning Ordinance Section 143-116:

Site plan design criteria.

(L)(3) Facilities shall be provided, where deemed applicable by the Planning Board, for bicycle travel within the site and to adjacent areas and for the short-term parking of bicycles.

Automobile Parking to Include Pedestrian Accommodations

1. Town of Malta, New York, Zoning Ordinance Chapter 167, Site Plan:

The Planning Board may approve, approve with modifications or disapprove such site plan review application and, in doing so, shall consider the following objectives: ... (c) The maximum adequacy of interior circulation in parking and loading facilities with particular attention to vehicular and pedestrian safety.

2. Town of Warwick, New York, Zoning Ordinance Section 164.43.2, Off-Street Parking and Loading Requirements:

Reduce visual impacts by breaking up large parking lots into smaller parking groves and parking courts with a significant number of shade trees and surrounded by low hedges, stone walls, or attractive fencing. Avoid more than 15 parking spaces in a continuous row and more than 60

spaces in any single parking area defined by landscaping...(i) Landscaping should be used to delineate vehicular and pedestrian patterns. Clear and legible signs, different color and texture paving materials, raised or inverted areas, and other techniques should be used to further direct the flow of both vehicular and pedestrian traffic within the lot... (n) In large parking lots, separate pedestrian walkways should be provided to allow safe movement within the lots. These facilities should generally be oriented perpendicular to and between parking bays. Adjacent to the walks, trees should be planted. Coordinate pedestrian walkways with access for public transit if available or planned. The following walkway guidelines also apply: [1] One walkway can serve as a collector for up to four bays of parked cars. [2] The walkway should be a minimum of four feet wide, allowing an additional 30 inches on each side for overhanging of automobiles. [3] All walkways should be raised to a standard sidewalk height and should be constructed of different paving material than the parking lot. [4] Provide pedestrian and bicycle amenities, such as benches, shade, human-scale lighting, and bicycle racks.

Automobile Parking Site Location

1. City of Batavia, New York, Code Section 190-39, Parking requirements:

   Purpose: The City finds that large and highly visible parking areas represent one of the most objectionable aspects of commercial development. Such parking lots may damage the historic layout and architectural fabric of historic areas, harm the natural environment and visual character of the community, interfere with pedestrian safety and accessibility and reduce the quality of life in developed areas, as measured by the City's Visual Preference Survey™. However, the City also recognizes that inadequate parking can diminish quality of life by creating traffic congestion, safety hazards and inconvenience. The City therefore seeks to balance the need for adequate parking with the need to minimize harm resulting from the provision of parking and to avoid the negative impacts of excessive parking requirements....

   Design, layout and construction of parking areas.

   (1) Location and screening. (a) All off-street parking shall be located behind or to the side of the principal building. Parking spaces located in a side yard shall, if possible, be screened from public view. Adjoining parking areas shall be connected directly to one another or to a service road or alley wherever feasible to reduce turning movements onto roads. (b) Within the C-2 District only, a maximum of two rows of parking may be located in the front of the principal building. Such parking shall be set back from the front lot line by a landscaped buffer at least 10 feet in width. Any green space or landscaping can be included in the percentage calculation of § 190-34, Landscaping and buffering, of this chapter. (c) Parking areas shall be designed and landscaped to avoid long, uninterrupted rows of vehicles.

2. City of Lackawanna, New York, Code Section 230-36, Parking, loading and stacking:

   Location.

   (1) Required off-street parking shall be located on the same lot as the building to which it is an accessory use, except as herein provided.

   (2) All off-street parking facilities shall be located to the side or rear of the principal use building except in the Central Business District, where off-street parking shall be restricted to the rear yard.

   (3) Off-street parking facilities shall not be located within the required setback areas.

   (4) Permanent front and rear yard parking areas in residential zones, other than driveways accessing a garage or designated parking area, are prohibited.

APPENDIX

I. PLANNING BOARD MOBILITY CHECKLIST

PLANNING FOR ACTIVE MOBILITY

Planning for active mobility requires thinking about many different facets of design. Beyond providing facilities such as sidewalks and bike parking, the best designs will make people feel safe and welcome in the landscape. Planning for active mobility creates user friendly designs that benefit residents and visitors, making the site a popular destination for years to come.

	Planning For Active Mobility Checklist	Yes	No	N/A	Comments
1	**Pedestrians**				
1.1	Have sidewalks been provided?	❑	❑	❑	
1.2	Are sidewalks built to current standards for safety and accessibility?	❑	❑	❑	
1.3	Is there a buffer strip between the curb and sidewalk?	❑	❑	❑	
1.4	Are sidewalks expanded near buildings to highlight building entrances, link streets with parking lots, and provide safe and obvious pedestrian routes?	❑	❑	❑	
1.5	Are crosswalks highlighted by use of materials or prominent stripes?	❑	❑	❑	
1.6	Is the pedestrian route between the street and building entrances clear and continuous?	❑	❑	❑	
1.7	Have resting points for pedestrians equipped with benches been provided at reasonable intervals?	❑	❑	❑	
1.8	Are benches placed in well lit, public areas, near activity and pedestrian flows?	❑	❑	❑	
1.9	Are there benches near amenities such as bus shelters, kiosks, news stands, etc.?	❑	❑	❑	
1.10	Is site location identified in the municipal Active Transportation Plan or other community planning documents?	❑	❑	❑	
2	**Bicyclists**				
2.1	Is there bicycle parking within 100 feet of the main entrance?	❑	❑	❑	
2.2	Is bicycle parking easy to find, in plain sight, and out of the way of cars?	❑	❑	❑	
2.3	Are there 5-10% as many bicycle parking spaces as spaces for cars?	❑	❑	❑	
2.4	Is bicycle parking compatible with U-Locks?	❑	❑	❑	
2.5	Is there covered bicycle parking?	❑	❑	❑	
2.6	Does the roadway have an existing bicycle facility including bike lanes or shoulder 4’ or greater?	❑	❑	❑	
2.7	Is the site location identified in the municipal Active Transportation Plan or other community planning documents?	❑	❑	❑	

	Planning For Active Mobility Checklist	Yes	No	N/A	Comments
3	**Transit**				
3.1	Is the proposed project along an existing transit route?	❑	❑	❑	
3.2	Does the proposed project include a transit stop?	❑	❑	❑	
3.3	Are transit stops ADA accessible?	❑	❑	❑	
3.4	Do transit stops incorporate a concrete pad and benches?	❑	❑	❑	
3.5	Are transit stops connected to building entrances by an ADA accessible pedestrian route such as sidewalks & marked crosswalks?	❑	❑	❑	
3.6	Are transit stops as near building entrances as possible?	❑	❑	❑	
3.7	Are transit stops covered?	❑	❑	❑	
3.8	Are Park&Ride lots, bus shelters, or other commuter services included in the construction & rebuilding of large commercial areas?	❑	❑	❑	
3.9	Is the site location identified in the municipal Active Transportation Plan or other community planning documents?	❑	❑	❑	
4	**Access and Parking**				
4.1	Is the parking lot designed for average parking demand, not peak demand? Is the parking area as small as possible?	❑	❑	❑	
4.2	Are there clear vehicular movement patterns?	❑	❑	❑	
4.3	Will landscaping be included in parking areas?	❑	❑	❑	
4.4	Will planting islands be provided at a minimum of every 20 spaces?	❑	❑	❑	
4.5	Are parking lanes oriented to building entrances?	❑	❑	❑	
4.6	Are commercial areas planning to share parking areas and curb cuts?	❑	❑	❑	
4.7	Is back street access available as an alternative for vehicular traffic?	❑	❑	❑	
4.8	Is parking located A) behind buildings, B) within the required set-back, or C) along the side of the building?	❑	❑	❑	
4.9	Are there additional side and back entrances, or alleyways to front entrances to make back parking lots more attractive to customers?	❑	❑	❑	
4.10	Do parking bays and driveways meet minimum and maximum widths to ensure safety and flow while avoiding excessive paving?	❑	❑	❑	
4.11	Have curb cuts been consolidated to simplify access and reduce conflicts with pedestrians?	❑	❑	❑	
4.12	Is internal circulation logically configured to serve the buildings?	❑	❑	❑	
4.13	Have green infrastructure practices been incorporated into the parking design for stormwater management?	❑	❑	❑	

	Planning For Active Mobility Checklist	Yes	No	N/A	Comments
5	**Landscape and Open Space**				
5.1	Will landscaping be included in parking areas?	❑	❑	❑	
5.2	Were street tree species selected from a list approved by the municipality or from a list of trees appropriate for street use such as the Cornell Urban Street Tree list?	❑	❑	❑	
5.3	Were plants selected that are tolerant of site conditions?	❑	❑	❑	
5.4	Are planting islands large enough to support mature plantings?	❑	❑	❑	
5.5	Are large canopy trees incorporated into the site design?	❑	❑	❑	
5.6	Does the proposed development take advantage of opportunities to link new and existing open spaces?	❑	❑	❑	
5.7	In existing commercial strips, will green space and plantings be used to improve site aesthetics?	❑	❑	❑	
5.8	Are plazas, outdoor dining areas, fountains, sculptures or other amenities provided to create an attractive human scale sense of place for users in commercial projects?	❑	❑	❑	
5.9	Will planting islands be provided at a minimum of every 20 parking spaces?	❑	❑	❑	
5.10	Do plantings incorporate many species, including native species, in order to create habitat for birds and pollinators?	❑	❑	❑	
5.11	Is there a maintenance plan for plantings?	❑	❑	❑	
5.12	Will existing shade trees be preserved?	❑	❑	❑	
5.13	Will street trees be planted in the space between sidewalks and the street?	❑	❑	❑	
5.14	Is their adequate soil volume for the trees to thrive (approx. 300 ft^3 for a 14’ canopy tree, 600 ft^3 for a 24’ canopy tree, 1000 ft^3 for a 32’ canopy tree)?	❑	❑	❑	
5.15	Were permeable pavings, structural soil, or other Green Infrastructure practices incorporated in the site design to maximize the water and soil available to the trees?	❑	❑	❑	

	Planning For Active Mobility Checklist	Yes	No	N/A	Comments
6	**Lighting**				
6.1	Is pedestrian scale lighting being provided?	❑	❑	❑	
6.2	Are smaller light fixtures used in higher quantities to reduce the intensity of individual fixtures?	❑	❑	❑	
6.3	Does the pedestrian level lighting consist of free-standing fixtures located along the sidewalks?	❑	❑	❑	
6.4	Are parking lot fixtures between 15-25 feet in height?	❑	❑	❑	
6.5	Are the parking and circulation light fixtures a cutoff type luminaire that prevents spillage of light above the fixture?	❑	❑	❑	
6.6	Do shields or hoods screen outdoor light and prevent glare on adjacent premises?	❑	❑	❑	
6.7	Are lights energy efficient LED lights (100+ lumens/Watt)?	❑	❑	❑	
6.8	Is light color temperature 4,000K or less?	❑	❑	❑	
6.9	Is light color rendering index 75 or above?	❑	❑	❑	
6.10	Does plan avoid high pressure sodium lighting and metal halide lighting?	❑	❑	❑	
7	**Buildings**				
7.1	Are all entrances fully ADA compliant?	❑	❑	❑	
7.2	Do the buildings and plantings form an attractive edge to the roadway?	❑	❑	❑	
7.3	Is there a variety of building types, massing, and small variations in set-back?	❑	❑	❑	
7.4	Does the proposed building respect the common setback distance of the neighboring buildings or work with the desired setback?	❑	❑	❑	
7.5	Are distances between buildings minimized to connect uses?	❑	❑	❑	
7.6	Is an interesting facade or window scheme used to create a pleasant pedestrian experience?	❑	❑	❑	
7.7	Are buildings facing the street and located appropriately within the setback?	❑	❑	❑	
7.8	Are rear parking and vacant spaces screened?	❑	❑	❑	
7.9	Are new buildings scaled down into smaller, human-scale environments?	❑	❑	❑	
7.10	Are there strategic openings in building lines to allow access to important vistas and public spaces?	❑	❑	❑	