SUSTAINABLE STREETS – SIDEWALKS

REFERENCE DOCUMENT

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CONTENTS

1. INTRODUCTION

Sidewalks improve pedestrian safety, encourage otherwise sedentary people to walk and are not extremely expensive to construct. In areas developed after the 1940s, however, sidewalks are not the norm, even in neighborhoods that are otherwise "walkable", in the sense of having clusters of homes, businesses and other destinations within walking distance of one another. Retrofitting these areas with sidewalks presents funding, planning and maintenance issues. New development, site redevelopment or roadway reconstruction can provide more opportunities for adding sidewalks and pedestrian amenities, but these amenities add to the overall cost of the project, and may mean that the scope of the project is decreased, or that the final cost of a new home or commercial space is higher.

This guide is intended to make the process of adapting infrastructure to pedestrian needs easier by identifying the areas where pedestrian demand is likely to be highest and where there long-term benefits of adding sidewalks are most likely to outweigh the costs. It is also intended to provide a source of information and a catalog of references for anyone confronting the complexities of sidewalk planning, funding, construction or maintenance. There are thousands of pieces of research, plans, studies, guidebooks, ordinances and other documents related to sidewalks available online; the hyperlinks in this document will reduce the time it takes for users to do their own research.

1.1. Scope

The subject of this research is the individual traveling by foot, stroller, walker or wheelchair along a street or on a walkway within a community, rather than a hiker in the woods. On a per capita basis, Americans walked about a third of a mile every day in 2009. About three-fourths of walking trips are "for utilitarian purposes such as getting to work, school, shopping, visiting friends, and accessing public transport." (Pucher, 2011) This guidance is oriented around these trips, rather than on developing recreational trails or intercommunity pedestrian connections.

This is also not a guidebook on intersection design: intersection facilities *are* critical to pedestrian movement, but intersections are planned, designed, financed, constructed and maintained by highway departments. As a result, there is plentiful guidance available on how best to design, build and maintain these facilities for pedestrian safety (see the Design Standards section, below). Sidewalks, on the other hand, are built by many different entities, both public and private, and are typically maintained by individual property owners. There are several permutations on how a given sidewalk slab got to be, or failed to be, constructed and/or maintained.

Geographically, this research is focused on Onondaga County and Central New York. Examples and data are drawn from cities and counties in other states and in other countries, but the frame of reference is the SMTC's Metropolitan Planning Area. This includes 43 individual governments, primarily in Onondaga

1. INTRODUCTION

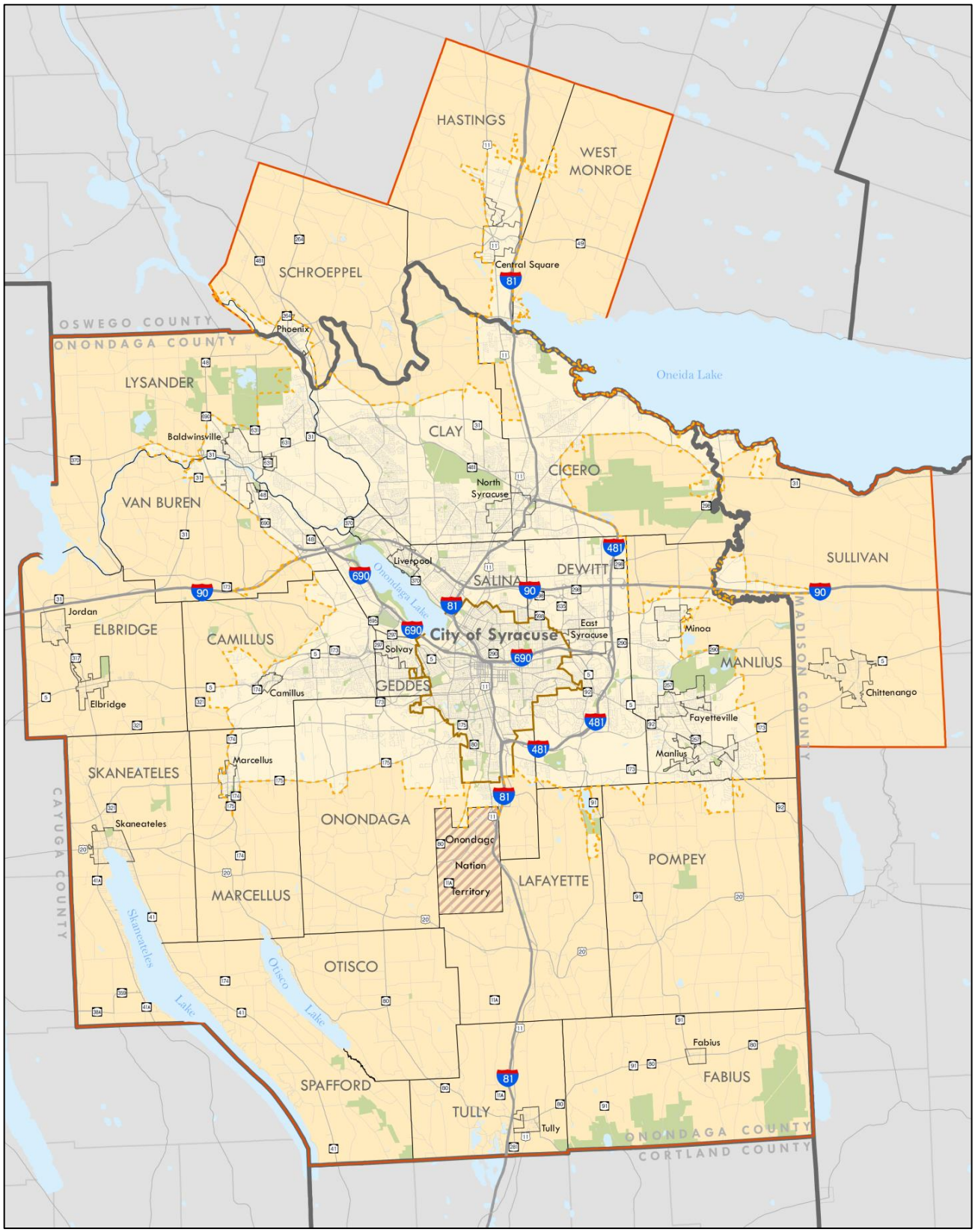

Figure 1 - SMTC Planning Area

County but also including the Villages of Phoenix and Central Square in Oswego County and the Village of Chittenango in Madison County. (See Figure 1 – SMTC Planning Area)

1.2. Purpose

The purpose of this document is to collect information on a wide variety of subjects related to sidewalks, from the legal framework in which decisions are made, to suggestions for how to plan for and prioritize sidewalks, to financing and maintenance options. It is generally geared toward decision-makers and residents at the municipal or neighborhood level considering pedestrian accessibility, as opposed to technical guidance for designers or engineers.

Figure 2 - Sidewalks on Falls Boulevard in the Village of Chittenango

The existing literature on sidewalk planning, financing, design and construction is extensive. This document is not intended to reiterate data that is readily available in numerous sources. Rather, it attempts to identify best resources and best practices. Additionally, this document provides data that is unique to the study area, including existing sidewalk ordinances and mapping showing Priority Zones for sidewalk infrastructure. This study is intended to serve three purposes:

1.) To point the user toward the best sources for information on subjects that are already well documented and summarized, such as facility design,
2.) Provide a summary and list of best practices and references for subject areas in which there is less readily available guidance, such as legal issues, planning and the use of porous pavements,
3.) Provide a summary of existing conditions and a set of Priority Zones for pedestrian infrastructure in the study area.

1.3. Planning Context

New York State's Complete Streets Law

New York State's Complete Streets Law (S5411A-2011), enacted in 2011, is a milestone in terms of the inclusion of sidewalks and pedestrian facilities in highway projects in New York. Roadway rehabilitation or reconstruction may be the single best opportunity to add a substantial amount of sidewalk mileage to an existing corridor, and this law ensures that pedestrians' needs, as well as those of bicyclists and transit users, are considered when these projects are being planned.

For example, several of the Priority Zones identified in this document include suburban areas that are accessed by major roadways. The mix of land uses that have developed along some of these corridors are highly walkable, in terms of distance, but the lack of sidewalks and crosswalks makes them

uninviting to pedestrians. Under the Complete Streets Law, sidewalks will likely be included as part of the eventual reconstruction of these corridors.

The law states:

> (a) For all state, county and local transportation projects that are undertaken by the Department or receive both federal and state funding and are subject to Department of transportation oversight, the department or agency with jurisdiction over such projects shall consider the convenient access and mobility on the road network by all users of all ages, including motorists, pedestrians, bicyclists, and public transportation users through the use of complete street design features in the planning, design, construction, reconstruction and rehabilitation, but not including resurfacing, maintenance, or pavement recycling of such projects.
>
> (B) Complete street design features are roadway design features that accommodate and facilitate convenient access and mobility by all users, including current and projected users, particularly pedestrians, bicyclists and individuals of all ages and abilities.

The law includes an exception for situations where the "cost would be disproportionate to the need", based on factors such as "land use context; current and projected traffic volumes; and population density", or where there is a demonstrated lack of need or community support. This underscores the importance of undertaking a community-wide evaluation of the type discussed in Chapter 4 in the "Pedestrian Demand Model" section. The Priority Zones identified in this document are areas in which the benefits of building a complete street are most likely to outweigh the costs.

New York State law identifies the following as elements of a "complete street":

- *Sidewalks*
- *Paved shoulders suitable for use by bicyclists*
- *Lane striping*
- *Bicycle lanes*
- *"Share the road" signs*
- *Crosswalks*
- *Traffic signals for pedestrians*
- *Bus pull outs*
- *Curb cuts*
- *Raised crosswalks*
- *Traffic calming measures*

Bicycle and Pedestrian Plan, SMTC

The SMTC's 2005 *Bicycle and Pedestrian Plan* sets forth the SMTC's policy on bicycle and pedestrian facilities, including:

1.) Bicycle and pedestrian ways should be established in new construction and reconstruction projects in all urbanized areas unless one or more of three conditions are met:

- Bicyclists and pedestrians are prohibited by law from using the roadway.
- The cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use.

- Where sparsity of population or other factors indicate an absence of need.

2.) In rural and suburban areas, paved shoulders should be included in all new construction and reconstruction projects on roadways used by more than 1,000 vehicles per day.

3.) Highway and transit facilities should be designed, constructed, operated and maintained so that all pedestrians, including people with disabilities, and bicyclists can travel safely and independently.

Goals for the MPA identified in this plan include:

1.) To encourage the use of bicycling and walking as legitimate modes of transportation.

2.) To improve the safety of bicyclists and pedestrians.

3.) To educate bicyclists, pedestrians, motorists, law enforcement officers, and others regarding traffic laws and safety measures.

4.) To promote the improvement of travel and tourism and business opportunities along bicycle and pedestrian infrastructure.

5.) To encourage planners and municipalities to develop bicycle and pedestrian resources.

6.) To develop a methodology for tracking bicycle and pedestrian improvements.

Find the SMTC's Bicycle and Pedestrian Plan in the Final Reports section of SMTC's website: www.smtcmpo.org

Long Range Transportation Plan, SMTC

The SMTC's Long Range Transportation Plan (LRTP) provides a review of existing conditions in the MPA and a set of goals and objectives for improving the region's transportation system. According to the 2011 LRTP Update, four percent of workers over age 16 in the MPA walked or biked to work in the year 2000. The LRTP states that: "The region lags behind the rest of the state, where 6.2% of workers walked to work and 0.8% used other means in 2000. Of those who walked or bicycled to work in the MPA, 70.8% lived within the City of Syracuse. The next highest percentage, 4.2%, lived in Salina." (Syracuse Metropolitan Transportation Council, 2011)

One of the LRTP's Mobility Objectives is:

> To reverse the decline in the share of trips made by modes other than the single occupant vehicle by 2000 and to increase the share of trips made by high occupancy vehicles (including fixed and demand-responsive transit), bicycle, and walking by 25% collectively, by the year 2020.

The LRTP also includes the following Land Use Objective: "To support development patterns, densities and design options that are conducive to transit service, pedestrian and bicycle travel." This is in contrast to recent development seen in the rural areas of the MPA that frequently has the characteristics of suburban sprawl: "unmanaged, low density development patterns that lack a sustainable environmental, economic, and social balance".

Sustainable Development Plan, Onondaga County

Onondaga County's *Sustainable Development Plan* also discusses sidewalks and pedestrian infrastructure. As the plan points out, "Generally, the more densely developed the area, the more likely it is to be walkable and have sidewalk infrastructure." (Syracuse-Onondaga County Planning Agency, 2012)

This plan also states that "Complete Streets policy and practice, which rethinks the design and function of roadways to incorporate a more multi-modal approach for all segments of the population, has been noted as having numerous social, fiscal and environmental community benefits."

Local Plans and Ordinances

In general, it is the local (city, town or village) ordinance that determines sidewalk location, maintenance responsibility, material, and width. Local ordinances are summarized in this document for reference (see Chapter 3).

1.4. Design Standards

Discussions with highway engineers and local departments of public works have indicated that design guidance is readily available and that presenting it in this document would be duplicative. One exception is the use of permeable pavements in the construction of pedestrian facilities, which has only come into widespread use within the past 10 years or so. For information on pedestrian facilities and porous materials, see Appendix D. The following annotated list identifies some of the essential resources on designing pedestrian facilities.

- *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*, Institute of Transportation Engineers (ITE)
  The ITE's approach is based on four context zones: Suburban, General Urban, Urban Center

and Urban Core. It cross-references these context zones with several street types, such as boulevard, avenue and street and provides specific recommendations for numbers of lanes and pedestrian facilities for each street type in each context zone.

- *Design and Safety of Pedestrian Facilities*, Institute of Transportation Engineers (ITE)
  This 1998 guidance provides details on the technical aspects of designing pedestrian facilities and makes a good complement to the ITE's guidance on context sensitivity.

- Chapter 18 – Pedestrian Facility Design, *Highway Design Manual*, New York State Department of Transportation
  This guidance from NYSDOT provides the state's standards for a variety of features, including:

  - Americans with Disabilities compliance
  - Guidelines for locating sidewalks in developed areas
  - Minimum sidewalk widths (five feet is standard, but four foot sidewalks are allowable if conditions require it)
  - Crosswalk striping patterns
  - When to install crosswalks
  - Sidewalk width needed for various levels of pedestrian activity

- *PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System*, FHWA
  This online reference includes an interactive countermeasure selection system, designed to assist users in picking out a design solution for an existing issue. This site also provides information on how to plan for pedestrian infrastructure.

- *Highway Design Handbook for Older Drivers and Pedestrians*, FHWA
  Detailed design guidelines for roads and pedestrian facilities, based on the increased likelihood of various physical limitations (such as slower reaction time and reduced visual acuity) that can accompany aging. This document includes references to standard design guidelines throughout.

- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, American Association of State Highway and Transportation Officials (AASHTO)
  An overview of accepted practices in the planning and design of pedestrian facilities.

- *Stormwater Management Handbook*, US Environmental Protection Agency
  Chapter 5 of this handbook presents examples of streetscape improvements that minimize stormwater runoff, including porous pavement sidewalks and street trees.

- Examples of guidance from other states and cities:

  - *Pedestrian Facilities Guidebook*, Washington State Department of Transportation
    This source includes a chapter on designing sites for pedestrian access, including walkways in parking lots.

- *Pedestrian and Streetscape Guide*, Georgia Department of Transportation
  A comprehensive handbook for pedestrian facility design.

- *Urban Street Design Guidelines*, City of Charlotte, North Carolina
  Charlotte's *Urban Street Design Guidelines,* like ITE's *Context Sensitive Solutions* guidance, focuses on making sure that complete streets solutions "fit" adjacent land uses. The guidelines are based around a set of street classifications, with associated speed limits and cross-sections, and a six-step process to match land use and transportation facility recommendations.

- *Comprehensive Pedestrian Plan*, City of Raleigh, North Carolina
  Raleigh's pedestrian plan uses a geographic model to prioritize sidewalk investments, similar the SMTC's Priority Zone modelling (see Chapter 4). This plan also includes design specifications for pedestrian facilities.

1.4.1 Additional Information and References

- New York State Complete Streets Law
  http://open.nysenate.gov/legislation/bill/s5411a-2011

- SMTC Bicycle and Pedestrian Plan
  www.smtcmpo.org/docs/bike-ped/Final_Report/FINAL_REPORT.pdf

- SMTC Long Range Transportation Plan
  http://www.smtcmpo.org/lrtp.asp

- Onondaga County Sustainable Development Plan
  http://future.ongov.net/

- City of Syracuse Sustainability Plan
  http://www.syrgov.net/Sustainability_Plan.aspx

- Statewide Bicycle and Pedestrian Plan, New York State Department of Transportation
  https://www.dot.ny.gov/display/programs/bicycle/maps/app_repository/bike_and_ped_plan.pdf

- John Pucher, *Walking and Cycling in the United States, 2001 - 2009: Evidence from the National Household Travel Surveys*, American Journal of Public Health, 2011
  http://policy.rutgers.edu/faculty/pucher/NHTS_TRB_25Jan2011.pdf

2. LEGAL ASPECTS

2.1. Overview

The four major sources of legal guidance for pedestrian infrastructure are:

- New York State law
- Tort law
- Americans with Disabilities Act (ADA)
- Municipal ordinances

This chapter is primarily concerned with the first two sources; municipal ordinances are addressed in Chapter 3, and the ADA has been extensively addressed in other readily available resources. New York State law touches on several aspects of pedestrian mobility, including which levels of government construct sidewalks and who is responsible for maintaining sidewalks. State law also relates to the question of whether or not children walk to school, since State law establishes the distance that students must be bused to school.

Tort law related to the accidental injury of pedestrians is a large and ever-shifting body of law, based primarily on rulings in specific cases. Generalizing policy or design standards on the basis of case law can be complicated and should not be done without guidance from a legal professional. However, basic concepts are presented in order to provide an orientation to this type of law.

2.2. Disclaimer

The portions of this document relating to liability and legal issues are intended to provide a brief and simple overview of some points of intersection between federal, state and local law and transportation planning. It is not intended to be legal advice, does not constitute legal advice and should not be used as a substitute for qualified legal advice from a competent, experienced attorney licensed to practice law. Any person or entity reading this document should retain a lawyer to seek his or her advice with respect to any information or legal issues discussed in this document.

While every effort is made to ensure accuracy and to keep this information current, agency details, law and procedure outlined herein can change constantly. No responsibility is accepted for any loss, damage or injury, financial or otherwise, suffered by any person or organization acting or relying on this information or anything omitted from it.

2.3. New York State Law

2.3.1 Highway Law

Sidewalk definition

New York State law defines a sidewalk as *"*That portion of a street between the curb lines, or the lateral lines of a roadway, and the adjacent property lines, intended for the use of pedestrians." *New York State Vehicle and Traffic Law, Title 1, Article 1, Section 144*

State law addresses some, but by no means all, aspects of sidewalk construction and maintenance. Compiling state law for reference can become convoluted, since a given section of the law may be addressing a specific level of government (state, county, city, town or village), a specific type of highway (for example, a state highway outside a city or village), and a specific function (construction or maintenance). No single compilation of state laws related to sidewalks was found as part of the development of this document, but this would be a welcome reference. State laws applicable to sidewalk construction are found primarily in State Highway Law, in a variety of sections.

Sidewalks on State Highways

CONSTRUCTION

The New York State Department of Transportation can build sidewalks adjacent to state highways in towns (outside city and village boundaries) where necessary, as described in State Highway Law, Article 2 (State Commissioner), Section 10.22:

> The commissioner of transportation shall:
>
> 22. Provide for the construction of sidewalks adjacent to state highways outside of cities and incorporated villages, when he is of the opinion the same are necessary. He shall have full authority to determine the type, width, location with respect to the highway, and the general construction details of such sidewalks. The expense of such construction shall be a proper charge against funds available for the construction, reconstruction or maintenance of state highways. *State Highway Law, Article 2 (State Commissioner), Section 10.22*

County Government

Counties can build "walks or paths" for pedestrians along state highways. *State Highway Law, Article 3, Section 54* provides a process whereby a town's board can request that the county build a sidewalk or path along a state highway. If the county's board of supervisors agrees to this request, the county then works with the state to develop a plan for the construction of these improvements. Upon state and county approval of the project, the county constructs the project on the state's highway. Under this

section of state law, the county funds construction and right-of-way acquisition and the requesting town is responsible for reimbursing 35 percent of these costs to the county.

Town Government

Town governments can construct sidewalks along state and county roads, with the permission of the State Commissioner of Transportation or the County Superintendent of Highways, as appropriate. Towns must pay for these sidewalks themselves. *State Highway Law, Article 7, Town Superintendents, Section 151*

MAINTENANCE

As the following examples show, state law places the burden for maintenance on municipal entities. However, these municipalities (towns, villages and cities) are not restricted from then placing the burden for sidewalk maintenance on individual property owners; frequently this is done through local ordinances. Chapter 3 provides an inventory of local ordinances and discusses their requirements.

City Government

Under State law, cities are charged with the maintenance of sidewalks constructed by the state along state arterial highways. Following construction by the state: "Such sidewalks, facilities and appurtenances shall be maintained or shall be continued to be maintained, as the case may be, by the city in which they are located, or by the agency or unit owning or having control and jurisdiction thereof." *New York State Highway Law, Article 12-B, Section 349-C*

Read the full text of NYS's Complete Streets Law on the NY Senate Open Legislation website: http://open.nysenate.gov/legislation/bill/s5411a-2011

Town Government

Under New York State Highway Law, it is the town superintendents' responsibility to ensure maintenance of all sidewalks along state and county roads. The town superintendent shall: "Maintain all sidewalks in the town constructed by the state adjacent to state highways and all sidewalks in the town constructed by the county adjacent to county roads and, when authorized by the town board, cause the removal of snow therefrom, and the cost thereof shall be paid from the miscellaneous or other town funds." *New York State Highway Law, Article 7, Section 140*

Village Government

For a state highway in a village, the maintenance of everything along a state highway other than the pavement and drainage facilities falls to the village. Specifically: "Any sidewalks, sewers, water mains, curbs, paved gutters, conduits, facilities and appurtenances … shall be maintained … by the village in

which they are located, or by the agency or other unit owning or having control and jurisdiction thereof except the state shall maintain any drainage ditches and storm sewer facilities which are constructed primarily to service the state highway facility." *State Highway Law, Article 3, Section 46*

Sidewalks on County Highways

COORDINATION REQUIREMENT

County highway superintendents are responsible for determining the type and location of sidewalks along county roads, but they need the consent of the municipality (town, village or city) in which the sidewalk would be constructed. *State Highway Law, Article 5, County Superintendents, Section 102.15* states: "No such sidewalk shall be constructed in that portion of a town outside a village unless the town board consents thereto. No such sidewalk shall be constructed within any city or village unless the governing body of such city or village consents thereto."

Town-Village Sidewalk Maintenance

State Highway Law Article 7, Section 142-c allows towns to do sidewalk maintenance, including snow removal, in villages, based on terms agreed to by the town board and the village's board of trustees. This section of the Highway Law also specifies that towns can share tools and equipment with villages located wholly or partly within their boundaries. Villages are not required to pay for these services, nor does state law identify a formula for determining their value: towns and villages must come to an agreement.

2.3.2 Property Maintenance Code

New York State's *Property Maintenance Code* states that "The owner of the premises shall maintain the structures and exterior property in compliance with these requirements…." The Code goes on to identify sidewalks (and driveways) as exterior property areas that "shall be kept in a proper state of repair, and maintained free from hazardous conditions." *New York State Property Maintenance Code, Sections 301 and 302.3*

In many cases, local ordinances expand upon this requirement, making individual property owners responsible for maintaining sidewalks (including ice and snow removal) adjacent to their property. See Chapter 3 for more information on local ordinances.

2.3.3 Sidewalk Planning and Construction

New York State's Complete Streets Law (S5411A-2011) states that "it shall be the policy of the state to consider people all ages and abilities and all appropriate forms of transportation when planning roadway projects." This policy applies both to New York State Department of Transportation (NYSDOT)

projects, and to county and other local projects that receive state and federal funding. *S5411A-2011, Section 1*

New York State's Smart Growth Public Infrastructure Policy Act codifies the state's interest in "minimizing unnecessary costs of sprawl development including environmental degradation, disinvestment in urban and suburban communities and loss of open space". The law identifies publicly-supported infrastructure, like roads, sewers, water lines, wastewater treatment facilities and schools, as facilitating sprawling development patterns. To the extent that this law encourages more compact and infill development, it may result in greater demand for and use of pedestrian facilities, since it would promote development at a walkable scale. *Smart Growth Public Infrastructure Policy Act*

2.4. Town Law

New York State Town Law, Article 12, Section 198 provides for the creation of sidewalk snow removal districts and sidewalk districts for sidewalk construction and maintenance:

> 7. Snow removal districts. After a snow removal district shall have been established, the town board may contract for a term not exceeding ten years for the removal of snow from all the sidewalks in said district or such portion thereof as the board may determine. Whenever the town board shall have awarded a contract for the removal of snow from a portion of the sidewalks in any such district, the town board may contract for the removal of snow from additional sidewalks in said district from time to time as the said town board in its discretion may determine advisable. Whenever the town board may determine it advantageous so to do, it may employ a sufficient number of persons and provide the necessary equipment to remove snow from sidewalks within the district, at the expense of said snow removal district. NYS Town Law, Section 198, 7
>
> 10-b. Sidewalk districts. After a sidewalk district shall have been established, the town board may construct or contract for the construction of sidewalks within the district as it may determine to be necessary or desirable. The board shall also have authority to provide for the maintenance thereof. NYS Town Law, Section 198, 10-b

While some villages in the Study Area will perform sidewalk snow clearance, no instances of a town establishing a sidewalk snow removal district were identified during the preparation of this guidance.

2.5. Americans with Disabilities Act (ADA)

Title II of the Americans with Disabilities Act (ADA), together with the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG), sets minimum standards for accessibility to buildings, facilities, rail passenger cars, and vehicles for individuals with disabilities.

The ADA requires that all new and altered public sidewalks and street crossings be accessible so that people with disabilities can use the pedestrian routes that connect buildings, facilities and transportation modes. Title II of the ADA specifically requires that curb ramps be provided when sidewalks or streets are newly constructed or altered. Curb ramps should be designed to minimize the grade, cross-slope and changes in level experienced by users. The transition between the ramp and the street surface should be flush, since any height transition can create difficulties for individuals with disabilities.

ADAAG requires that sidewalks be designed with a minimum width at any given point of 32 inches, but with a continuous width of 36 inches, in order to accommodate wheelchairs.

The ADA does not require that sidewalks be constructed where none exist. However, it does require that existing sidewalks be retrofitted to include curb ramps. The ADA allows facility owners (including state departments of transportation and municipalities) to phase-in these improvements over time. As the SMTC's *Bicycle and Pedestrian Plan* states: "Each Town and Village within the MPO should have its own schedule or implementation plan for replacing non-ADA compliant sidewalks and curb ramps."

For more information about ADA standards as they relate to sidewalks, visit FHWA's online guide Designing Sidewalks and Trails for Access

2.6. Tort Law and Municipal Liability

Sidewalk and other walkway projects are sometimes opposed by local decision-making bodies because of the fear of municipal liability for accidents that may occur on these facilities. A relatively minor mishap, for example someone slipping in an icy parking lot or tripping on a sidewalk, can lead to expensive medical bills and the possibility of a lawsuit.

Legally speaking, when an individual suffers harm as a result of someone else's "wrong", that individual has recourse to a lawsuit to attempt to recover damages from the wrongdoer. The "wrong" is known legally as a tort. A lawsuit that results from a tort is a civil lawsuit, as opposed to a criminal action. The goal is to determine the degree of "fault" to assign to the individual or entity who is being accused of causing the tort.

In the case of a publicly-owned and maintained sidewalk, where the municipality has not shifted the burden of sidewalk liability to adjacent property owners, the municipality would likely be the subject of tort lawsuits for accidents occurring on those sidewalks, such as tripping or slipping on ice.

There is often an assumption that exposure to a lawsuit would be reduced if there were no sidewalk on which to trip. In general, however, a municipality has greater legal protection when it addresses an accessibility issue than when it does not.

As previously stated, this document is not intended as a substitute for guidance from a qualified attorney. However, the following concepts can be useful in understanding the guidance provided by a qualified attorney and can be helpful to citizens or municipal officials who are interested in learning more on this subject:

- **Qualified immunity:** a highway official's design decisions or highway improvements plan *can* be insulated from tort liability under the "qualified immunity" principle. (Gelormini, 2011)
- **Inaction does not equate to immunity:** municipalities and agencies can be liable for what they do *not* do to accommodate all potential roadway users.
- **Written notice laws limit maintenance liability:** Determining legal liability for problems arising from facility maintenance (as opposed to design or planning) can be extremely complicated and will vary from case to case. Laws requiring written notice of a maintenance issue can limit municipal liability for roadway and sidewalk maintenance.

2.6.1 Qualified Immunity

Qualified immunity is a legal concept that assumes that an expert's analysis should not be reversed by a judge or a jury, because these people lack the expert's technical knowledge and experience.

A recent US Supreme Court case described qualified immunity in the following terms: "Qualified immunity balances two important interests—the need to hold public officials accountable when they exercise power irresponsibly and the need to shield officials from harassment, distraction, and liability when they perform their duties reasonably." (Pearson v. Callahan, 2009)

In the context of designing roadway facilities, such as bicycle and pedestrian facilities, the legal theory of qualified immunity in New York State essentially ensures that the court system will not attempt to second-guess design decisions made by engineers. The courts have taken up the question of whether or not adequate study went into a given decision, but if it can be demonstrated that a design solution was properly studied and developed, the design itself will not (generally) be dissected by the court.

For a thorough discussion of qualified immunity as it relates to highway departments, see:

- A Highway Department's Legal Liabilities
- *New York State Qualified Immunity - Complete Streets Primer*

The following text is from the report *A Highway Department's Legal Liabilities*, prepared by the Cornell Local Roads Program (*A Highway Department's Legal Liabilities*):

> "A highway official's decisions about designing or planning highway improvements or implementing operational practices may be insulated from tort liability under the so-

called 'qualified immunity' principle first enunciated in Weiss v. Fote, 7 NY2d 579, 586-588 (1960).

A municipality may be entitled to this 'qualified immunity' where its highway official has reasonably and properly studied a certain highway safety issue and decided on how to respond to it. Id.

The Court of Appeals reasoning was: "that the traditional reliance on a jury verdict to assess fault and general tort liability is misplaced where a duly authorized [public official] has entertained and passed on the very same question of risk as would ordinarily go to the jury." Weiss, supra, 7 NY2d at 579.

Therefore, "when [a municipality] studies a dangerous condition and determines as part of a reasonable plan of governmental services that certain steps need not be taken, that decision may not form the basis of liability." Freidman v. State of New York, 67 NY2d 271, 286 (1986).

The New York State Court of Appeals case in which this idea was originally developed is the 1960 case of *Weiss v. Fote*. The case involved a collision at a signalized intersection. The plaintiff attributed the accident to a traffic signal's clearance interval being too short and sued the municipality that had set the signal's timing. The Court of Appeals ruled in favor of the municipality out of "a regard for sound principles of government administration and a respect for the expert judgment of agencies authorized by law to exercise such judgment". (Weiss v. Fote, 1960) (Tri-State Transportation Campaign, 2012) The ruling in this case specifies that qualified immunity does not protect a municipality when it can be proven that a plan was developed without adequate study or did not have a reasonable basis.

According to the *New York State Qualified Immunity - Complete Streets Primer,* prepared by the Tri-State Transportation Campaign in October 2012, "A governmental entity implementing Complete Streets designs in traffic planning should be entitled to qualified immunity unless its study and determination is plainly inadequate or there is no reasonable basis for its traffic plan." (Tri-State Transportation Campaign, 2012)

"Highway and recreational facilities that fail to fully incorporate the needs of all users increase the likelihood of potential court settlements in favor of those who are excluded."

FHWA University Course on Bicycle and Pedestrian Transportation

Challenges to qualified immunity can arise when a municipality has not adequately considered, planned or designed facilities for pedestrians or cyclists. New York State courts have said that "immunity can be overcome by showing that a particular design, signage or signal configuration was built or installed without adequate study or a reasonable basis." (Kane v. State of New York, 2005) For example, if a municipality claims qualified immunity for the design of an intersection where a pedestrian has been injured, the success of the claim may depend on whether or not the municipality can demonstrate that pedestrians were considered in the intersection's design.

Often, scarcity of funding will mean a substantial lag time between the identification of a problem and the implementation of a solution. The Court of Appeals has granted qualified immunity when a solution, such as a signal, was identified as necessary but was not implemented at the time of an accident. In this case, immunity was granted because a process and schedule were in place for implementing improvements based on specific criteria for prioritization and funding availability. (Kane v. State of New York, 2005)

2.6.2 Inaction

As the Federal Highway Administration has put it, "Doing nothing is not an option…. More and more governments are being sued for failing to recognize public needs and taking actions to meet them." (Federal Highway Administration, 2006) Ignoring maintenance or design issues has not provided municipalities with the same degree of legal protection as studying existing problems and developing a reasonable plan for correcting them.

2.6.3 Prior Written Notice

In New York State, qualified immunity applies to the design and planning of facilities, but it typically does not provide protection from liability for accidents caused by improper maintenance. Given that a city, or even a small village, may not be able to maintain all of its street and sidewalk mileage in perfect condition on an annual basis, the exposure to liability seems massive. Municipalities can give themselves some protection by putting laws in place that require prior written notice of a maintenance problem in order to be held liable for it.

As the Cornell Local Roads Program's *A Highway Department's Legal Liabilities* states:

> "A written notice law 'represents the Legislature's solution to the vexing problem of municipal street and sidewalk liability' concerning maintenance of municipal highways and sidewalks. Barry v. Niagara Frontier Transit System Inc., 35 NY2d 629, 633 (1974).
>
> Therefore, in cases based on improper highway maintenance (as opposed to highway design or signage), a written notice law establishes the rule that no liability against a municipality can arise unless a written notice was received by the

In 1982, trial lawyers in New York City started the Big Apple Pothole and Sidewalk Protection Committee to map sidewalk and street defects. These maps put the City on notice of thousands of sidewalk defects, thus circumventing an existing prior written notice law, and attempting to make the City liable for slip and fall accidents.

As many as 5,000 maps per year were created until a 2003 ordinance shifted liability for sidewalk maintenance to adjacent property owners. New York City paid out $600 million in sidewalk injury cases from 1997 to 2006.

"Ruling deals a setback to sidewalk injury lawsuits in New York", New York Times, January 3, 2009

> designated municipal officer and it failed to remedy the condition within a reasonable time after receipt of notice. Barry v. Niagara Frontier Transit System Inc., 35 NY2d 629, 633-634 (1974)." (Gelormini, 2011)

The nuances of written notice law are extremely complicated. For example, if a municipality has "actual notice" of a defect, it is probably liable for that defect. Actual notice "means that a responsible municipal employee had actual knowledge of the defective or dangerous condition in that specific information concerning the defect was brought to the attention of the municipality or its agents or employees prior to the occurrence." (Gelormini, 2011) Similarly, municipalities can be held liable for defects when they have "constructive notice" of the defect. Constructive notice essentially means that a problem was so clearly visible that the municipality *should* have known about it.

2.7. Tort Law & Private Liability

Many of the municipalities in the Study Area have language in their local ordinances stating that proper sidewalk maintenance is the responsibility of the owner of the property adjacent to the sidewalk and that the property owner is liable for injuries sustained to users of the sidewalk. (See Chapter 3 for more details on local ordinances) In a residential setting, this means that a homeowner is responsible for the sidewalk in front of his house – including removal of snow and ice. Failure to keep up with this maintenance can mean that the property owner is held responsible in the event that someone using the sidewalk is injured. Often, this becomes a negotiation between the holder of the homeowner's property insurance and the injured party.

2.8. More Information

2.8.1 Law and Liability

- *A Highway Department's Legal Liabilities*, Cornell Local Roads Program, September 2011, http://www.clrp.cornell.edu/workshops/pdf/Hwy_Depts_Legal_Liability_2012_web.pdf.
- *Federal Highway Administration University Course on Bicycle and Pedestrian Transportation*, July 2006. Available at: http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/
- *New York State Qualified Immunity Complete Streets Primer*, Tri-State Transportation Campaign, October 2012, page 1. http://tstc.org/reports/licsbx/liability-memo.pdf
- *Hausser v. Giunta*, 88 N.Y.2d 449, 669 N.E.2d 470, 646 N.Y.S.2d 490 (1996)
  New York State case law that discusses homeowner's liability for sidewalk maintenance when local ordinance explicitly places onus of responsibility on property owner
  http://www.law.cornell.edu/nyctap/I96_0103.htm

- *Assessing the Fiscal Impact of Lawsuits on New York State Municipalities*, Rockefeller College of Public Affairs and Policy, University at Albany
  http://www.albany.edu/polis/pdf/Municipal%20Lawsuit%20Report%20One.pdf

- Laws of the State of New York
  Highway Law: http://codes.lp.findlaw.com/nycode/HAY
  Town Law: http://codes.lp.findlaw.com/nycode/TWN
  Village Law: http://codes.lp.findlaw.com/nycode/VIL

2.8.2 Prior Written Notice

- "Ruling deals a setback to sidewalk injury lawsuits in New York", *New York Times*, January 3, 2009
  http://www.nytimes.com/2009/01/04/nyregion/04pothole.html?pagewanted=all

2.8.3 ADA and Accessibility

- *Designing Sidewalks and Trails for Access*, Federal Highway Administration. Available at:
  http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/

- 2010 ADA Standards for Accessible Design, US Department of Justice
  http://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf

- Guidance on the 2010 ADA Standards for Accessible Design
  http://www.ada.gov/regs2010/2010ADAStandards/Guidance_2010ADAStandards.pdf

- Department of Justice/Department of Transportation Joint Technical Assistance on Title II of the Americans with Disabilities Act Requirements to Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing
  http://www.ada.gov/doj-fhwa-ta.htm

3. MUNICIPAL CODES

3.1. Issue Area

As publicly-owned thoroughfares that traverse what many property owners think of as their front yards, sidewalks can be legally complicated. Sidewalks are often publicly constructed and are frequently located in the public right-of-way, but in many cases they are maintained by a private property owner.[1] Questions of liability, construction or replacement costs, and responsibility for snow clearance can all be answered (or left unclear) through the wording of the city, town or village's ordinances.

3.2. Local Ordinance Inventory

1.1.1. Introduction

85 percent of the local governments in the Study Area have ordinances pertaining to sidewalks.

Of the 42 individual governments in the Study Area, 36 have some form of ordinance pertaining to sidewalks. Regulations of this kind generally serve two purposes: to define the duties of the individual property owner (particularly as compared to and contrasted with those of the municipality), and to define how and where sidewalks should be constructed. Appendix B is a compilation of excerpts from local ordinances pertaining to sidewalks.

Many of the municipalities in the Study Area have regulations that describe the property owner's obligations, versus those of the municipality, when it comes to sidewalk maintenance. These regulations sometimes specify that the municipality is not liable for sidewalk conditions or for any accidents that occur as a result of sidewalk conditions. Additionally, sidewalk ordinances often include specifications on where and how new sidewalks should be built.

3.2.1 Inventory Methodology

The municipal ordinance review for this project involved a combination of reviewing online resources, such as "e-codes" accessed through municipal websites, and contacting individual towns and villages, as well as the Onondaga Nation, to determine what their offices had on file under the category of

[1] [1] Terms like "often", "generally" and "usually" are used throughout this guide as reminder that the facts surrounding the construction and maintenance of any given block of sidewalk can vary. Some are constructed by a private entity like a developer, others are built by a municipality, such as a village, and still others are built during roadway construction or reconstruction by a department of transportation. In New York, maintenance practices and responsibilities vary by community, as defined by local ordinance.

Table 3.1(a) – Summary of municipal ordinances related to sidewalks or pedestrian facilities

	City of Syracuse	Town of Camillus	Town of Cicero	Town of Clay	Town of Geddes	Town of Hastings	Town of LaFayette	Town of Lysander	Town of Manlius	Town of Marcellus	Town of Onondaga	Town of Pompey	Town of Salina	Town of Skaneateles	Town of Spafford	Town of Tully	Town of Van Buren	Town of West Monroe
Liability: Prior Written Notice		Y	Y	Y	Y			Y	Y		Y		Y	Y		Y	Y	
Liability: Explicit to owner				Y							Y		Y					
Maintenance: Required Upkeep	Y	Y	Y	Y	Y						Y		Y	Y		Y	Y	Y
Maintenance: Clear snow & ice	Y			Y	Y						Y		Y	Y			Y	
Maintenance: Penalty	Y	Y	Y	Y	Y						Y							
Planning: Arterial/Subdivision		Y	Y	Y			Y	Y	Y	Y		Y	Y			Y		Y
Planning: Mobile Home Parks/Courts			Y	Y		Y		Y						Y				Y
Planning: Long block considerations		Y						Y										
Planning: Specific Zone(s)	Y					Y					Y				Y			
Planning: Local authority reserved	Y			Y			Y	Y	Y	Y		Y	Y	Y	Y			Y
Design: Width			Y	Y		Y	Y	Y			Y	Y		Y				Y
Design: Material	Y		Y			Y	Y	Y			Y			Y				Y
Design: ADA/Accessibility	Y									Y								

Note: no code specific to sidewalks could be found for the Onondaga Nation Territory or for the Towns of Elbridge, Fabius, Otisco, Schroeppel, or Sullivan.

Table 3.1(b) – Summary of municipal ordinances related to sidewalks or pedestrian facilities

	Village of Baldwinsville	Village ofCamillus	Village of C.Square	Village of Chittenango	Village of E. Syracuse	Village of Elbridge	Village of Fabius	Village of Fayetteville	Village of Jordan	Village of Liverpool	Village of Manlius	Village of Marcellus	Village of Minoa	Village of N. Syracuse	Village of Phoenix	Village of Skaneateles	Village of Solvay	Village of Tully
Liability: Prior Written Notice		Y						Y		Y		Y	Y	Y	Y	Y	Y	
Liability: Explicit to owner	Y														Y			Y
Maintenance: Required Upkeep	Y	Y			Y			Y		Y	Y	Y	Y		Y	Y	Y	Y
Maintenance: Clear snow & ice	Y	Y		Y	Y			Y		Y	Y	Y	Y		Y	Y		Y
Maintenance: Penalty	Y	Y		Y	Y			Y		Y	Y	Y			Y	Y	Y	Y
Planning: Arterial/Subdivision			Y	Y		Y	Y	Y		Y			Y	Y				
Planning: Mobile Home Parks/Courts																		
Planning: Long block considerations						Y												
Planning: Specific Zone(s)				Y		Y	Y	Y		Y				Y				
Planning: Local authority reserved			Y	Y		Y	Y	Y	Y	Y		Y		Y				
Design: Width			Y		Y	Y	Y	Y	Y	Y								
Design: Material	Y	Y			Y	Y	Y		Y	Y					Y			
Design: ADA/Accessibility																		

Note: no code specific to sidewalks could be found for the Onondaga Nation Territory or for the Towns of Elbridge, Fabius, Otisco, Schroeppel, or Sullivan.

sidewalks or sidewalk ordinances. In two cases, this involved SMTC staff visiting municipal offices to obtain the appropriate code section.

Five towns and the Onondaga Nation reported not having any codes or ordinances relevant to sidewalks. One town, Otisco, reported having no zoning code.

No municipal legal officials were contacted during the collection of these ordinances: this inventory relies on online resources and the input of clerks' offices and code enforcement officers. As such, it reflects the local ordinances with which local officials are most likely to be familiar. It is possible that additional regulations exist elsewhere.

3.2.2 Local Ordinances - Major Elements

Local ordinances cover four main subjects related to sidewalks:

- Liability
- Maintenance
- Planning
- Facility design

Local sidewalk ordinances can be broken into four major subject areas: liability, maintenance, sidewalk planning and facility design. Every ordinance in the Study Area does not address all four of these subject areas. Refer to Table 3.1 to identify the municipalities being enumerated in the text below.

Liability

PRIOR WRITTEN NOTICE

Twenty-two of the municipalities in the Study Area have adopted some form of prior written notice ordinance. See Chapter 2 for more information on Prior Written Notice ordinances.

LIABILITY – EXPLICIT TO OWNER

Five municipalities in the Study Area have specific language in their sidewalk ordinances stating that it is the owner of the property adjacent to a sidewalk who is responsible for sidewalk maintenance and who will be held liable for injuries sustained to sidewalk users, not the municipality. For example, the Village of Tully's Code, Section 94-11, states:

> "Notwithstanding any other provision of law, the owner of real property adjoining any sidewalk, or the agent or occupant to whom the owner has delegated responsibility, shall be liable for any injury to property or personal injury, including death, proximately caused by the failure of such owner, agent, or occupant to maintain such sidewalk in a reasonably safe condition."

This code section goes on to say that the Village itself "shall not be liable" for injuries that result from improper maintenance of sidewalks.

Maintenance

REQUIRED UPKEEP

New York State's Property Maintenance Code, Section 302, specifies that property owners have an obligation to maintain the exterior of their property. *Section 302.3, Sidewalks and Driveways*, states: "All sidewalks, walkways, stairs, driveways, parking spaces and similar areas shall be kept in a proper state of repair, and maintained free from hazardous conditions."

Over half of the sidewalk ordinances in the Study Area either reiterate this obligation or enlarge upon it, placing the responsibility for sidewalk upkeep on property owners. The Village of Minoa, for example, requires property owners to repair or otherwise eliminate "ground surface hazards or unsanitary conditions such as holes, excavations, breaks, projections, objections and excretion of pets and other animals on paths, walks, driveways, parking lots and parking areas".

23 municipalities in the Study Area place the responsibility for sidewalk maintenance on property owners; 18 specify that the owner is responsible for snow and ice clearance.

CLEAR SNOW & ICE

Eighteen of the municipalities in the Study Area, including the City of Syracuse, have ordinances specifying that it is the property owner's responsibility to clear ice and snow from sidewalks on their property. These ordinances vary widely in detail. Some, like the Town of Clay's, simply specify that the property owner is responsible for snow removal and would be liable if someone were to be injured on a snowy sidewalk:

> "The owner or occupant of lands fronting or abutting on any street in the Town of Clay shall maintain and repair the sidewalks adjoining said lands and keep the sidewalk free from obstruction, including snow and ice. Such owner or occupant shall be liable for any injury or damage by reason of omission, failure or negligence to maintain or repair such sidewalks or to keep them free of obstructions, including snow and ice." *Chapter 197, Article II, Number 197-5*

Others, like ordinances in the City of Syracuse and the Town of Onondaga specify a timeframe for snow removal. In the City, it is 6 p.m. of the day following accumulation of snow. In the Town of Onondaga, it is 12 hours following the "cessation of snowfall".

PENALTY

Just under half of the municipalities that have sidewalk ordinances institute some form of penalty for non-compliance with the ordinance. In most cases, this penalty can be construed as a fee for services: if the municipality fixes or cleans the sidewalk after the property owner fails to respond to written

requests to take action, then the property owner pays the municipality its repair or cleaning costs. In the Village of East Syracuse, the payment can include an additional 25 percent fee. In most cases, these fees can be rolled onto the property's tax assessment and are paid over time. Some municipalities, such as the City of Syracuse, specify a rate of interest (seven percent in the city) that is applied to any costs rolled onto the property's assessment.

Many municipalities retain the right to levy a fine, without spelling out the particulars in their ordinance. The Village of East Syracuse's ordinance, for example, states that "Any one violating this Part shall be subject to a fine set by resolution of the Village Board". *(Village of East Syracuse Municipal Code, Section 341.42)*

Table 3.2 summarizes penalties as described in local ordinances.

Planning

ARTERIAL/SUBDIVISION

In many cases, local municipalities' subdivision regulations specify that sidewalks are either necessary or can be required by local authorities in new subdivisions.

Frequently, the trigger for considering sidewalks is the presence of an adjacent arterial street. The Town of Camillus' Subdivision Regulations, for example, state that: "Where the subdivision abuts or fronts on arterial streets, sidewalks may be required and shall be of size and type as approved by the Planning Board." *(Town of Camillus Subdivision Regulations, Section 39.31)* This ordinance is typical, in that it leaves the ultimate decision with the municipality.

MOBILE HOME PARKS/COURTS

Characterized by high population densities (relative to their rural or suburban surroundings) and relatively low automobile traffic, mobile home parks represent an opportunity for a pedestrian-friendly environment. Amenities within or adjacent to the mobile home park, such as a community center, laundry room, bus stop or mailboxes, are likely to be within a short walk from most homes in the park.

Recognizing this, six of the towns in the Study Area have ordinances that require or encourage the use of paved walkways within mobile home parks. The Town of Lysander's code devotes a chapter to Mobile Home Parks, including the following:

> All mobile home parks shall provide safe, convenient, pedestrian access of adequate width for intended use, durable and convenient to maintain, between individual mobile homes, the park streets and all community facilities provided for park residents." *Chapter 91, Section 16, Part A*

Table 3.2 – Penalties for failure to comply with municipal ordinances

Municipality	*Condition*	*Penalty*
City of Syracuse	Obstructions or defects in sidewalks, as reported to the Public Works Commissioner by the Police Department	Costs + 7% interest
Town of Camillus	Failure to remedy Uniform Code violation	Max. $250 fine and/or 15 days in jail for each violation
Town of Cicero	Failure to comply with Zoning Officer's order	Max. $250 fine or 30 days in jail for each week of violation
Town of Clay	Violation of any chapter, rule or regulation in the Code	Max. $250 fine or 15 days in jail or both
Town of Geddes	Any violation of an ordinance in Chapter 185, Streets and Sidewalks	Max. $250 fine or 15 days in jail or both
Town of Onondaga	Any violation of snow & ice removal article (e.g., failure to remove snow and ice)	Reimbursement of Town's snow/ice removal costs; max. $250 fine and/or 15 days in jail
Village of Baldwinsville	Any violation of specific sections of Streets and Sidewalks code, including snow and ice removal	Reimbursement of Village's snow removal costs; max. $50 fine for each day a violation exists
Village of Camillus	Failure to remove snow and ice within a reasonable time following written notice by the Village	Reimbursement of Village's snow removal costs; max. fine of $250 and/or 15 days in jail
Village of Chittenango	Any violation of sections of Streets and Sidewalks code, including snow and ice removal	Max. $250 fine or 15 days in jail or both
Village of East Syracuse	Any violation of the Public Pedestrian Thoroughfare ordinances	Fine set by resolution of Village Board; reimbursement of Village's costs to do work plus 25%
Village of Fayetteville	Failure to keep sidewalks clear of grass, weeds, snow and ice	Reimbursement of Village's weed, grass, snow or ice removal costs
Village of Liverpool	Damage to sidewalk resulting from neglect or carelessness of adjacent property owner	Reimbursement of Village's repair costs
Village of Manlius	Any code violation	Max. $250 fine and/or 15 days in jail
Village of Marcellus	Failure to keep sidewalks clean and free from rubbish, obstructions, snow & ice	Reimbursement of Village's sidewalk clearing expenses
Village of Phoenix	Failure to remove snow and ice within 24 hours after snowfall / within 24 hours of being notified in writing to remove snow/ice	Reimbursement of Village's sidewalk clearing expenses; general violations of Sidewalk ordinance are punishable by a fine of $50 for each day a violation exists
Village of Skaneateles	Failure to maintain sidewalk	Reimbursement of Village's costs
Village of Solvay	Any violation of Streets and Sidewalks ordinance	Max. $250 fine and/or 15 days in jail
Village of Tully	Failure to remove snow within 24 hours after snowfall /or within 4 hours of notice to remove snow	Cost of Village's labor, equipment and material costs; violations of ordinance are punishable by a $500 fine for each day of continued violation; Village reserves right to "institute any action … to compel compliance"

LONG BLOCK CONSIDERATIONS

The Towns of Camillus and Lysander provide specifications for mid-block crossings of long blocks (Camillus defines this as a block over 800 feet long; the Town of Lysander refers to "exceptionally long blocks") to provide pedestrian access to schools, parks and shopping centers.

The Village of Elbridge includes in its Subdivision Ordinance a provision to allow walkways that connect through blocks that are more than 600 feet long, particularly in order to provide access to schools, playgrounds or shopping centers.

SPECIFIC ZONES

Local ordinances vary in their approaches to matching up sidewalks and/or walkways to specific land uses.

The Town of Spafford's Site Plan Review code, for example, states that sidewalks should be included in site plans for development on lots within 1,000 feet of a school, park or residential concentration. (This code section notwithstanding, the sidewalk inventory carried out for this project did not identify any sidewalks in the Town of Spafford.)

Similarly, the Village of Elbridge's Subdivision Code states that sidewalks may be required if a sidewalk segment would link "pedestrian generators," would continue a walk on an existing street, or would link areas of probable future development, as outlined in the Village's Master Plan.

In the Town of Hastings, sidewalks (and street trees) are required adjacent to multi-family homes and nonresidential uses in specific zoning districts.

Local ordinances typically delegate the final decision about sidewalk placement and design to a local board or municipal official (such as a Planning Board or Town Engineer).

The Village of Liverpool's Zoning Code is explicit in associating sidewalks to community character. It states that single-family, two-family and multiple-family residential districts "should exemplify the peace and quiet of our traditional, walkable, friendly neighborhoods and be interconnected by a well-maintained system of sidewalks that enhance the traditional Village character of this area."

LOCAL AUTHORITY RESERVED

More than half of the municipalities in the Study Area that have sidewalk ordinances include language similar to the following (from the Village of Jordan's code): "Sidewalks shall be installed on one or both sides of a street or road **as the Board may require**, depending on local conditions or public safety." (*Subdivision Regulations, Section C, Part 1)[Emphasis added]*

These local ordinances leave the final decisions on sidewalk placement and design up to a decision-making body, such as a Planning Board, or up to an engineer, such as Public Works Director, or both. These clauses provide flexibility in dealing with unusual site conditions and other unforeseeable situations.

Design

WIDTH AND MATERIALS

Not all sidewalk ordinances include specifications describing what a sidewalk should look like or how wide it should be. In many cases, the ordinance refers the reader to the Town Engineer, Public Works Director or Planning Board for these details. Typically, when width and material requirements are specified, sidewalks are to be four feet wide and made of concrete. Width can vary depending on context: wider (five feet) in industrial or commercial areas or, as in the case of the Village of Elbridge, near pedestrian generators like schools. Alternate materials such as brick or crushed stone are identified as options in the Village of Elbridge's code. In no cases do local sidewalk ordinances mention the use of porous pavement.

In many cases, sidewalk specifications are provided in the subdivision regulations, rather than the general ordinances on streets and sidewalks (where, for example, maintenance requirements are spelled out). This may suggest that the existing sidewalk network is perceived as needing maintenance rather than completion, while new development presents an opportunity for creating a new pedestrian network.

No local ordinances currently address the use of porous pavement in sidewalks.

Unique Elements

While local ordinances share a common set of core characteristics, they have evolved over time to suit the needs and preferences of individual communities. The following is by no means a comprehensive accounting of local ordinances' unique elements, but may be helpful in understanding the level of variability available to towns and villages interested in modifying their ordinances.

CITY OF SYRACUSE

The City's code includes the details of how individual property owners are assessed for sidewalk construction costs. The City's code also includes a section on Special Assessment improvements that can be made upon petition from abutting property owners. Under this regulation, if the owners of at least a third of the property fronting on a street petition for new or reconstructed sidewalks, the City will construct it and assess property owners for the costs.

Table 3.3 – Sidewalk Material and Width Specifications from Municipal Ordinances				
Municipality	*Width*	*Material*	*Specifications apply to…*	*Notes/other details*
City of Syracuse	n/a	Concrete	Residential areas	Required as of 9/1/03
Town of Cicero	4’	Concrete	Along arterial Streets (Subdivision Ordinance)	Brewerton Rd. Corridor Regulating Plan also requires sidewalks in Brewerton’s Downtown Core District
Town of Clay	2’	n/a	Walkways - Mobile home parks	
Town of DeWitt	5’	Concrete, modular unit pavers	Parking lot walkway - Off-Street Parking	Applies within Hamlet Districts
Town of Hastings	4’ / 5’	Hard surfaced	Within / external to mobile home parks	
Town of La Fayette	4’ / 5’	Concrete or other approved material	Residential / Commercial areas	
Town of Lysander	4’ / 2’	Concrete: 3,000 pound min. strength	Common walks / private walks – Mobile home parks	Source: Subdivision Ordinance
Town of Onondaga	5’	Various materials, colors and textures	Walkways - West Seneca Turnpike corridor	
Town of Pompey	4’	n/a	Along arterial Streets	Source: Subdivision Ordinance
Town of Skaneateles	3’ / 2’	Smooth, hard, paved surface	Common walks / private walks – Mobile home parks	
Town of West Monroe	4’ / 5’	Concrete or other approved material	Residential / Commercial Areas	Source: Subdivision Ordinance
Village of Baldwinsville	n/a	Concrete		Superintendent of Public Works establishes specifications
Village of Camillus	n/a	Concrete		
Village of Central Square	4’	n/a	Subdivision Ordinance	
Village of East Syracuse	n/a	Concrete		
Village of Elbridge	4’ / 5’	Class C Concrete	Wider near “pedestrian generators” and employment centers; 5’ when sidewalk is adjacent to curb (Subdivision Ordinance)	4,500 pounds min. strength ; Gravel, crushed stone, brick, etc., may be permitted
Village of Fabius	4’ / 5’	Concrete	Residential / Commercial Areas	Other materials, as approved (Source: Subdivision Ordinance)
Village of Fayetteville	4’	n/a	Along arterial Streets	Source: Subdivision Ordinance
Village of Jordan	4’	Concrete		3,000 pounds min. strength, 1-2-4 mix (Source: Subdivision Ordinance)
Village of Liverpool	4’	Portland Cement Concrete		Detailed specs in sidewalk ordinance
Village of Phoenix	n/a	Concrete	n/a	

TOWN OF CICERO

Like several other municipalities, the Town of Cicero specifies that in new subdivisions, sidewalks will be provided along arterial streets. The size and type of sidewalk is left up to the Town's discretion.

It should also be noted that the summary provided in Table 3.2 does not include the language from the Town of Cicero's Zoning Code (Article XIII) that provides streetscape specifications and lot standards for Route 11 in Brewerton. This code section applies to the portion of Route 11 (Brewerton Road) from Bennett Street, adjacent to Oneida Lake, to Orangeport Road to the south. One of the objectives of the development of regulations for this corridor is to "create a public realm conducive to pedestrian activity." This includes the following characteristics in the Downtown Core District (Brewerton Road between Bennett and Jerome Streets):

1.) Two- to four-story buildings;
2.) Small-scale retail, office, service and restaurant use with upper floor residential use;
3.) A shallow Build-To-Line and frontage build-out requirement that supports a pedestrian-friendly street;
4.) On-street parking, tree lawn with street trees, sidewalks and streetlights;
5.) Flat roofs with cornices or pitched roofs.

TOWN OF DEWITT

DeWitt's Zoning Ordinance requires concrete sidewalks within "Hamlet Districts", both along street frontages and connecting buildings' entrances to the street. The only hamlet district identified in the zoning code is the Jamesville Hamlet District, in and around the East Seneca Turnpike crossing of Butternut Creek.

TOWN OF HASTINGS

While there are no sidewalks within the portion of Hastings that is in the Study Area, this is one of the few towns to specify that sidewalks (and street trees) are required adjacent to multi-family homes and nonresidential uses in specific zoning districts.

TOWNS OF LAFAYETTE

The Town of LaFayette's code states that "in heavy traffic areas" sidewalks may be required in addition to pedestrian easements for access to schools, parks, play areas or nearby roads. (*Town of LaFayette Subdivision Regulations, Article 5, Section 535, Pedestrian Easements*)

TOWN OF ONONDAGA

The Town of Onondaga's sidewalk ordinance includes provisions to ensure that property owners keep sidewalks cleared of ice and snow whether or not the sidewalk is in the public right-of-way. This extends

to sidewalks on private roads in areas of new development. Additionally, Section 285-32 of Onondaga's Zoning Code describes desired pedestrian amenities that should be included in site designs for the West Seneca Turnpike Corridor overlay zone. This includes sidewalks, as well as pedestrian walkways in parking areas.

TOWN OF SPAFFORD

Spafford's Site Plan Review code states that sidewalks should be included in site plans for development on lots within 1,000 feet of a school, park or residential concentration.

VILLAGE OF BALDWINSVILLE

The Village of Baldwinsville's code provides details on what constitutes a "defective sidewalk" (including differences in elevation between sidewalk blocks of more than ½ an inch). The Village also assumes responsibility for clearing snow and ice on sidewalks in the downtown area, near the intersection of Routes 370/31 and Route 48.

VILLAGE OF CAMILLUS:

The Village of Camillus is unusual in that the Village bears the costs of sidewalk repairs, unless the need for repairs is the result of damage done by an adjacent property owner, in which case the village will repair the damage and bill that property owner.

VILLAGE OF ELBRIDGE

The Village of Elbridge's subdivision code provides for the possibility that sidewalks may be required if a sidewalk segment would link "pedestrian generators," would continue a walk on an existing street, or would link areas of probable future development, as outlined in the Village's Master Plan.

Cost Sharing for Sidewalk Repairs

A shared cost program for sidewalk repair can be an effective way for municipalities to both take the sting out of sidewalk maintenance costs and ensure that repairs are being made.

The Village of Phoenix's code (Article I, Section 165-13.1) spells out a shared cost strategy in which the property owner pays (at least) 50 percent of repair costs and the Village provides sufficient materials and/or Public Works man-hours to make up the remainder. This code section also allows the Village to prioritize sidewalk repairs based on the sidewalk's location and its degree of disrepair.

Green Infrastructure

Green infrastructure refers to the use of natural systems, and engineering solutions designed to mimic and/or enhance natural systems, to manage stormwater and wastewater. Green infrastructure is frequently contrasted with so-called "grey" infrastructure, which relies on storm drains, sewer pipes and centralized water treatment plants. Collecting the stormwater that runs off a road through a drain and into a pipe and then transporting it to a wastewater treatment plant is an example of a grey infrastructure solution. Green infrastructure might use a bioswale (essentially a vegetated ditch) to capture this stormwater, allowing it to filter into the groundwater through engineered layers of rock.

In the context of sidewalks, porous pavements are increasingly being investigated as a means of capturing stormwater on-site. Appendix D includes a description of porous pavements and how they apply to sidewalk planning and construction.

As Table 3.3 shows, no local ordinances identify porous pavements as a recommended sidewalk material and, in a few cases, the specifications for sidewalk materials would preclude the use of porous pavement.

3.3. Model Ordinances

Appendix C provides two variations on model sidewalk ordinance language, as well as a copy of the Town of Penfield's ordinance. During this research, the SMTC was not able to identify any single source of model ordinance language that both addresses all of the major elements identified in local ordinances

(liability, planning, design and maintenance) and also included key elements of green infrastructure, such as encouraging the use of porous pavements in sidewalks and identifying suitable locations for their use.

The Environmental Protection Agency's Water Quality Scorecard recommends that municipalities enact regulations to encourage green infrastructure elements in roadway design. This could include:

- Adopting green infrastructure retrofit standards for major street projects.
- Adopting technical specifications and design templates for green infrastructure in private and public rights-of-way.
- Requiring all local road projects to allocate a minimum amount of the total project cost to green infrastructure elements.
- Adopting requirements that some percentage of parking lots, alleys, or roads in a development utilize pervious materials.
- Ensuring that development approvals that allow/require the use of pervious materials include requirements for continuing maintenance/cleaning of porous surfaces.

3.3.1 Guidelines for New York State Communities

http://www.albany.edu/ihi/files/NY_Planning_And_Policy_Models_iHi.pdf

The Institute for Healthy Infrastructure at the University at Albany offers a number of resources designed to make it easier for New York State's municipalities to improve conditions for walking and bicycling. The 2007 document *Planning and Policy Models for Pedestrian and Bicycle Friendly Communities in New York State* provides guidelines for language to include in comprehensive plans and local codes.

3.3.2 Sidewalk Policy, Town of Penfield, Monroe County

http://www.penfield.org/index.php?pr=dpt-engineer-sidewalks

The purpose of the Town of Penfield's Sidewalk Policy is to "install sidewalks along all Minor Arterial, Major Collector and Minor Collector roads". The Policy identifies two sidewalk systems within the town: a "Primary" and a "Secondary" system.

The Primary System is made up of the Minor Arterial, Major Collector and Minor Collector roads, but it includes local roads that serve as connectors within the community as well. The Town takes responsibility for "the maintenance, replacement, and snowplowing of all sidewalks constructed along publicly dedicated roads classified as Minor Arterial, Major Collector, and Minor Collector". (Town of Penfield, 2000) The Policy identifies the roads that comprise the Primary System.

The Secondary Sidewalk System is made up of roadways within residential subdivisions and other short, low-volume roadways. According to the Town's Policy, "All new development within the Town of Penfield is required to install sidewalks along both sides of all local roads". (Town of Penfield, 2000) Developers of new subdivisions can waive this requirement but are required to both grant the Town a seven-foot-wide easement along all roads in the subdivision for future sidewalks and to pay a fee of $500 per dwelling unit, in the case of residential properties, and $4,000 per lot in the case of commercial properties. The money paid in waivers is then used to fund sidewalk projects through a Sidewalk Capital Account.

Additionally, the Sidewalk Policy provides for the formation of Intensified Sidewalk Districts in all new residential subdivisions that include sidewalks, in order to fund the sidewalks' long-term maintenance. Each home in an Intensified Sidewalk District pays $25 per year into this fund, which is then dedicated to sidewalk maintenance and/or replacement in that subdivision. These sidewalks are considered part of the Town's "Secondary Sidewalk System", however, which means that the Town does not clear the snow from these sidewalks.

3.3.3 Site Design and Pedestrian Circulation, Holly Springs, NC

http://www.hollyspringsnc.us/DocumentView.aspx?DID=952

As part of its Unified Development Ordinance, which regulates all aspects of new development, the Town of Holly Springs, North Carolina includes a substantial set of regulations on pedestrian-friendly site design. This ordinance provides an example of code language on elements such as:

- Walkways within subdivisions to connect houses to open space.
- Pedestrian links from residential areas to public open space.
- Ensuring connections between commercial/industrial areas and planned or existing public greenways.
- Maximizing the connectivity of parking areas and internal driveways to surrounding uses.

This code section also includes language on what a developer would need to do in order to be granted a waiver of these requirements.

From Town of Holly Springs, NC Unified Development Ordinance, Section 7.09 Pedestrian Circulation and Vehicular Area Design

3.3.4 A Model Ordinance for Pedestrian- and Bicycle-Friendly Site Design in the Green Bay Metropolitan Area

http://www.public.applications.co.brown.wi.us/Plan/Planningfolder/Transportation/Model%20STP%20Ordinance%20FINAL%20071712.pdf

The Department of Planning and Land Services in Brown County, Wisconsin, prepared a set of guidelines in order to foster pedestrian access during the design review process. While not written as an ordinance, per se, the *Model Ordinance for Pedestrian- and Bicycle-Friendly Site Design in the Green Bay Metropolitan Area* provides a wealth of guidance for municipalities interested in improving their review process as it relates to pedestrian access. This document includes an appendix with numerous examples of how to retrofit existing developments, particularly retail developments, with improved pedestrian access.

4. PLANNING

4.1. Issue Area

As stated in the SMTC's *Bicycle and Pedestrian* Plan, roads in urbanized areas should generally include some form of pedestrian accommodation. In the city of Syracuse, in villages, and frequently in hamlets, major streets typically have sidewalks.

Residential and commercial areas developed since the 1950s sometimes include sidewalks but frequently do not. Without facilities with which to connect, it may seem nonsensical for an individual project to include sidewalks. However, the Federal Highway Administration advises that "Lack of a seamless system is no excuse not to provide parts of the system." (Federal Highway Administration, 2004)

Retrofitting roads with sidewalks can be challenging, particularly when property owners have made improvements to the public right of way that would be used for pedestrians. Prioritizing sidewalk projects and making them part of a larger, planned system can help stakeholders understand the need for new facilities.

A critical first step in assessing the need for new sidewalks is to ensure that there is an up-to-date inventory of existing sidewalks. The amount of detail in the inventory can vary. Many municipalities are wary of inventories that could expose them to liability under prior written notice statutes (see the Prior Written Notice section in Chapter 2). In the case of the Sustainable Streets Project, a block-level rating was utilized for the inventory of sidewalks within the City of Syracuse in order to provide an overall assessment of the degree to which a block's sidewalks complied with the City's sidewalk ordinance.

Sidewalks are not equally important on every street. A side street in a residential subdivision may see more use from kids on skateboards and parents pushing strollers than from cars and trucks, whether or not there are sidewalks. Most rural roads see so little pedestrian activity in a year that sidewalks would be underutilized. At the other end of the spectrum, a road that connects an apartment complex to a nearby school or grocery store is a relatively high priority for pedestrian facilities. Planning processes and tools are available to help communities with the many different cases in between these extremes, where it can be difficult to prioritize among needed improvements.

4.1.1 Sidewalk Inventory

The SMTC's 2005 *Bicycle and Pedestrian Plan* included an inventory of sidewalks for towns and villages in the Metropolitan Planning Area. The Sustainable Streets Project updated this inventory and also added an inventory for the City of Syracuse (see Appendix E). The inventory was based on aerial photos,

supplemented by site visits and online mapping resources such as Google's Street View tool (www.google.com) and Bing map's Bird's Eye view (http://www.bing.com/maps/).

The inventory of city sidewalks included a block-level rating, based primarily on two factors: continuity and material. Rating criteria were assigned on a scale of 0 to 100 and were based on the degree to which the sidewalk segment complied with the City's regulations, which state that sidewalks should be made of concrete, not asphalt, and should be continuous along the length of a block. Based on these requirements, the rating criteria were as shown in Table 4.1.

Table 4.1 – Sidewalk Rating Criteria for City of Syracuse Sidewalks

Rating	Criteria
0	NO SIDEWALK. No signs of sidewalk being present or having been present.
25	POOR COMPLIANCE. Large segments of the block are missing sidewalks, but not the entire block.
50	MODERATE COMPLIANCE. Mix of concrete and asphalt or completely paved with asphalt; small sections of block missing; sidewalk broken up by most driveways.
75	VERY GOOD COMPLIANCE. No gaps in paved surface and majority of block is paved with concrete; sidewalk broken up by some driveways.
100	PERFECT COMPLIANCE. No gaps visible in concrete surface, including driveways.

4.1.2 Sidewalk Inventory Results

City of Syracuse

As noted in the SMTC's *Bicycle and Pedestrian Plan*, most of the City's streets have sidewalks. Nearly 600 miles of sidewalk were evaluated, and an additional 204 miles of street were identified as not having sidewalks (including nearly nine miles of roads in parks that do not have, but probably do not need, sidewalks).

The majority of sidewalks in the city are being maintained more or less according to City ordinances. Fifty-seven percent of blocks in the city have scores of 75 or 100, indicating that they are continuous the length of the block. Nearly 300 miles of roadway in the city lacks continuous, maintained sidewalks.

Table 3.1 – Sidewalk Inventory – City of Syracuse

Sidewalk Inventory - City of Syracuse			
Block-level Rating		Sidewalk Mileage	Percent
0	No sidewalk present	204[2]	26%
25	Partial sidewalk present	78	13%
50	Minor sidewalk gaps, mix of materials	174	30%
75	No gaps, mix of materials	206	35%
100	Continuous concrete sidewalk	128	22%
	TOTAL:	**586**	**100%**

Towns and Villages

There are 245 miles of sidewalk in the towns and villages in the Study Area. These sidewalks are primarily concentrated in villages (164 miles). Villages have historically had a combination of both dense housing and multiple destinations in a relatively small area, making them highly walkable. As seen in Chapter 2, most of the villages in the Study Area have a sidewalk ordinance of some kind.

[2] "No sidewalk present" mileage not included in total sidewalk mileage.

Sidewalks in towns are frequently, but not exclusively, found either in hamlets or in areas adjacent to villages or the City of Syracuse. In the Town of DeWitt, for example, ten of its 21 miles of sidewalk are located either in the Dewittshire neighborhood, the hamlet of Jamesville, or in a neighborhood adjacent to the Village of East Syracuse. There are also six miles of sidewalk along major corridors: West Genesee Street, Jamesville Road, Erie Boulevard and Thompson Road. The other five miles are scattered throughout the town, in school campuses or in residential areas.

The 17 miles of sidewalk identified in the Town of Lysander are primarily comprised of walkways within the Radisson community. These walkways provide connections within a largely residential area, but also between homes, businesses, parks and playgrounds. Radisson's walkways are unusual in that they are maintained by a single private entity (the Radisson Community Association) rather than private homeowners, and they primarily serve a recreational purpose.

Table 3.2 – Sidewalk Inventory – Towns and Villages

In order by total mileage in inventory

Municipality/Government	Sidewalk Mileage	Percent	Municipality/Government	Sidewalk Mileage	Percent
Village of Solvay	26	11%	Village of Elbridge	3	1%
Town of DeWitt	21	9%	Town of Camillus	3	1%
Town of Salina	19	8%	Village of Camillus	3	1%
Village of Baldwinsville	18	7%	Village of Tully	3	1%
Town of Lysander (Radisson)	17	7%	Town of Geddes	3	1%
Village of Liverpool	16	7%	Town of Cicero	3	1%
Village of East Syracuse	15	6%	Village of Fabius	3	1%
Village of Fayetteville	14	6%	Town of Van Buren	2	1%
Village of Skaneateles	13	5%	Town of Clay	1	1%
Village of Phoenix	10	4%	Town of Manlius	1	1%
Village of Manlius	9	4%	Town of Lafayette	<1	0%
Village of North Syracuse	9	3%	Town of Lysander	<1	0%
Town of Onondaga	8	3%	Town of Marcellus	<1	0%
Village of Marcellus	7	3%	Onondaga Nation	<1	0%
Village of Jordan	5	2%	Town of Fabius	<1	0%
Village of Minoa	5	2%	Town of Skaneateles	<1	0%
Village of Central Square	5	2%	Town of Elbridge	<1	0%
			TOTAL:	**245**	100%

Source: SMTC Sidewalk Inventory. Towns with zero sidewalk mileage in the Study Area are not included: Towns of Hastings, Otisco, Pompey, Schroeppel, Spafford, Sullivan, Tully and West Monroe.

4.1.3 SMTC's Pedestrian Demand Model

In 2013, the SMTC developed a Pedestrian Demand Model for its Metropolitan Planning Area (MPA). This model uses a combination of factors, such as proximity to schools, parks and grocery stores, as well as population density, employment density and demographic characteristics, to identify places that are "walkable" and, therefore, would be considered Priority Zones. Walkable, in this context, means that homes, businesses and public areas (such as schools, parks and libraries) are situated near one another, within a relatively short walk – generally considered to be less than a half-mile.

The model does not take into consideration whether or not there are existing pedestrian facilities, such as cross-walks, sidewalks and pedestrian signals. The Pedestrian Demand Model measures the degree to which land uses are clustered in such a way as to make them attractive to potential users. If a school, a park and a large apartment complex are all located within a half-mile of one another, this model will likely identify this area as a Priority Zone. This Priority Zone's geography can then be compared to the sidewalk inventory undertaken for this project, particularly along the roads with the highest speed limits and the most number of vehicles.

A detailed description of the Pedestrian Demand Model is provided in Appendix A. The model is based in geographic information systems (GIS) and uses a weighted overlay approach. The model was developed using GIS data layers, with each layer – such as a 1/4-mile buffer around all grocery stores – receiving a specific value. The entire study area was then split into "cells" (10 meter by 10 meter squares). When the values for all 18 of the layers in the model are added up for a specific cell, the total represents that cell's score on a scale of 0 to 100. See Table 4.3 for a list of the layers used in this analysis.

Table 4.3 – Pedestrian Demand Model Input Layers

Destinations	Neighborhood Characteristics
Schools	Population Density
Grocery Stores	Employee Density
Pharmacies	HHs w/o vehicles
Libraries/Community Centers	Percent Walking to Work
Post Offices	Percent Over Age 65
Town/Village/City Hall	Percent Under Age 18
Parks	Refugee Resettlement Areas
Convenience Stores	
Transit Stops	**Pedestrian Detractors**
Community Core	Pedestrian/Vehicle Collision Density

For example, farmland generally would receive a low score. A specific farm might get some points if it happened to be near a cluster of homes, but without other nearby destinations, such as schools or community centers, it would receive a score under 10 points, suggesting no significant demand for pedestrian facilities.

On the other hand, a cell in the middle of a village would likely receive a high score, because of proximity to destinations, housing and public spaces. With the exception of the Village of Jordan, every village in the study area has a Priority Zone associated with it.

The model's results can be displayed as a "heat map" (see Figure 4.1) that graphically represents the relative walkability of different places within the Study Area. The rural parts of the Study Area, such as the Towns of Otisco, Pompey and Spafford, have low scores and show as "cold" areas on the heat map: homes, businesses and other destinations are spread out. The City of Syracuse, particularly downtown Syracuse and the city's north side, are "hot". Scores are highest in these areas, in the high 80s and low 90s, indicating dense housing and destinations, such as schools and convenience stores, are clustered together.

Based on these outputs, the SMTC has identified Priority Zones, defined by the highest scores in the Study Area. The threshold for evaluating an area as a possible Priority Zone was a score of 40 points. To reach a score of 40, a cell had to have a combination of the items listed in Table 3.3, such as being near several destinations (a school, a pharmacy, a grocery store, etc.) and having certain demographic characteristics, such as a high population density and a higher than average proportion of households without vehicles.

The model identified most of the City of Syracuse as a single, large Priority Zone. In order to identify the areas in the City with the greatest potential for pedestrian activity, a secondary analysis was conducted using a threshold of 66 points. This threshold defines a core area within the city. This area is likely to already have sidewalks, and should be considered a focus area for maintenance activities.

EVALUATION OF NEEDS

The Priority Zones identify road segments that are likely to see a substantial pedestrian demand and, therefore, warrant some type of accommodation for pedestrians. This does not necessarily mean that every segment in a Priority Zone requires sidewalks. The most appropriate pedestrian treatment for individual road segments within a Priority Zone may vary depending on the characteristics of the road.

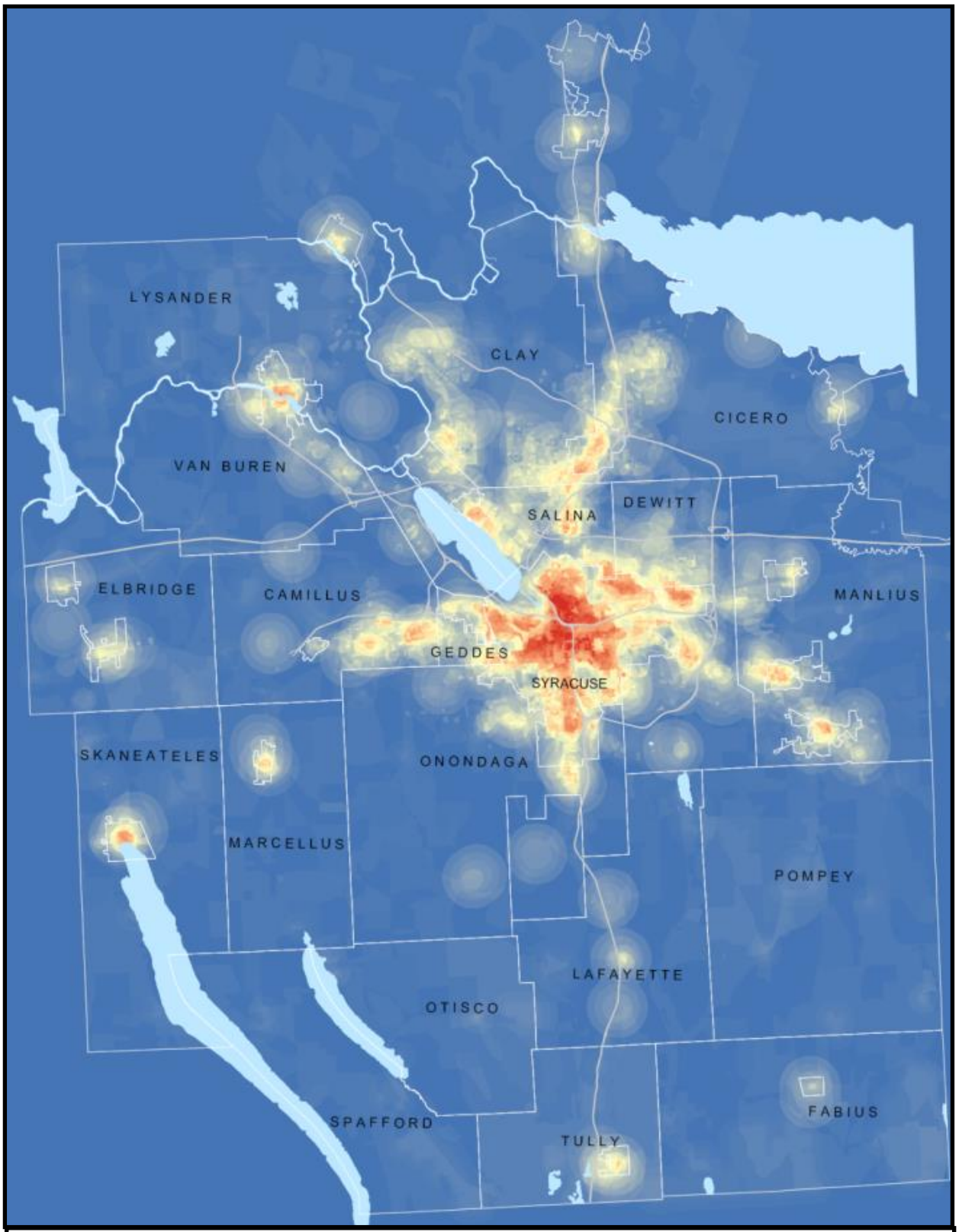

Figure 4.1 – Pedestrian Demand Model Results

Areas shown in dark red have the highest pedestrian demand scores, indicating the greatest potential for people to use sidewalks. Light yellow and blue areas have low pedestrian demand scores.

Roads that carry more cars and that have higher speed limits often need additional design elements to secure a sense of safety for pedestrians. On local roads with lower traffic volumes and lower speeds, it is easier for pedestrians and drivers to avoid conflicts with one another, even if the only facility available for pedestrians is the roadway's shoulder.

The following evaluation is recommended for streets in Priority Zones:

1.) Is it currently safe and comfortable for pedestrians?
Major roads that lack sidewalks and have speed limits at or over 45 mph, and/or where there is no buffer between the curb and the sidewalk should be the top priority for a review.

2.) Are there sidewalks to schools, community centers, senior centers, medical facilities and libraries?
The pedestrian demand model takes numerous destinations into consideration, but the destinations that attract children, the disabled, and the elderly should receive special attention.

3.) Would a sidewalk and/or off-road path provide useful connections within or between zones?
The Priority Zone boundaries can be helpful in providing a geographic focus for analyzing possible connections on local roads, along abandoned rights of way, or through parks. Safe and attractive pedestrian connections within these Zones can link multiple origins and destinations. The roads that connect adjacent Zones should be evaluated to determine the probable level of pedestrian demand on critical connections.

Transportation planners classify roads into three broad categories: arterials, collectors and local roads. Local roads are spread throughout a community and frequently form a redundant network: several local roads may all lead to the same collector road. Collector roads, as the name suggests, collect local traffic and connect local roads to arterials. Arterials are the major thoroughfares in a community, providing connections from one side of a community to another, as well as between communities. Both arterials and collectors qualify as "major" roads in most cases and should be the first routes to be analyzed for gaps in the sidewalk network.

The Federal Highway Administration's online PEDSAFE Pedestrian Safety Guide and Countermeasure Selection System provides an excellent summary of pedestrian planning and sidewalk prioritization: http://www.pedbikesafe.org/PEDSAFE/guide_implementation.cfm.

MUNICIPAL SIDEWALK PLANNING

The Priority Zones should be considered a starting point for discussions related to sidewalk and pedestrian infrastructure planning. Municipal leaders, community groups, and transportation agencies should evaluate these Zones based on their own knowledge of the routes that residents use to access key destinations. Such scrutiny can serve as the basis for a long-term pedestrian plan at the town or

village level that identifies gaps in the existing network and outlines a plan for improving both sidewalks and street crossings.

A pedestrian plan should address:

- The responsibility of new development or redevelopment to include pedestrian connections.
- The municipality's role in maintaining pedestrian facilities and in enforcing property owners' responsibility to maintain these facilities.
- Short-term improvements needed to close gaps.
- Long-term improvements needed to ensure safe pedestrian routes throughout the municipality.

Additional information will be needed to develop a thorough pedestrian plan for a community. Specifically, three important categories of information could not be included in the model and should be considered by any municipality interested in using the Priority Zones as the basis for planning:

1.) Detailed facility information: The SMTC's model uses functional class as a proxy for elements such as roadway width and vehicle speed, recommending that municipalities look first at making improvements to pedestrian facilities along arterials and collectors. Additional existing conditions information will help communities identify the locations where the greatest potential for pedestrian demand overlaps with the most critical gaps in the sidewalk network. Useful information might include: the presence, absence, and quality of amenities (such as street lights, curb ramps, and crosswalks), traffic volumes and traffic speeds.

2.) Local Plans and Proposed Development: Municipalities may have their own plans that identify locations for sidewalks or other pedestrian accommodations based on specific community goals, such as revitalization of a waterfront district or hamlet area. These existing plans should be incorporated into an overall pedestrian plan along with the Priority Zones. The pedestrian demand model identifies the locations likely to have the greatest pedestrian demand, but does not preclude the installation of pedestrian accommodations outside of the Priority Zones.

   Also, the model does not capture proposed future development. The addition of a high-density residential subdivision or apartment complex can dramatically increase the number of people walking or interested in walking in a given area. Future projects should be considered in sidewalk planning decisions.

3.) Pedestrian habits or destinations that are unique to a community or a destination. Sites that regularly draw large crowds, like Paper Mill Island in Baldwinsville or the Regional Market in Syracuse, may have a greater need for well-developed pedestrian facilities than the model is capable of predicting. Municipalities should identify special use sites such as these and develop appropriate pedestrian circulation plans for them.

SIDEWALKS IN STATE OR COUNTY PROJECTS

The New York State Department of Transportation and county highway departments can use this set of Priority Zones to evaluate the need for pedestrian facilities in given projects. Under New York State's Complete Streets law, pedestrian access and mobility must be considered in the planning and design of highway projects that reconstruct or rehabilitate a roadway, unless one of four criteria are met:

1.) Pedestrians are not allowed on the roadway.
2.) The cost would be disproportionate to the need.
3.) There is a "demonstrated lack of need" based on land use, current and projected traffic volumes, population density, or a lack of community support.
4.) Use of the design features would adversely impact public safety.

The set of Priority Zones can be used to identify places in which the second and third of these criteria will not be true. However, as with municipal sidewalk planning, the Priority Zones are an evaluation done at the macro level; projects located outside of Priority Zones should be evaluated for specific pedestrian needs, such as access to a school or other destination.

4.2. Resources & Best Practices

4.2.1 Pedestrian Demand Models

The SMTC's model was based on similar models from around the country. Information on these plans and models can be found below.

***Pedestrian Master Plan**, City of Sacramento*

http://www.cityofsacramento.org/transportation/dot_media/street_media/sac-ped-plan_9-06.pdf

***Pedestrian Mobility Planning**, City of* San Diego

http://www.sandiego.gov/planning/programs/transportation/mobility/pedestrian.shtml

***Pedestrian Planning**, Duluth-Superior Metropolitan Interstate Council*

http://www.dsmic.org/default.asp?PageID=334

***Pedestrian Master Plan**, City of Seattle*

http://www.seattle.gov/transportation/pedestrian_masterplan/

4.2.2 Planning

Bicycle and Pedestrian Plan, Syracuse Metropolitan Transportation Council

See the "Planning Context" section in Chapter 1 for a description of the SMTC's 2005 *Bicycle and Pedestrian Plan*.

PEDSAFE Pedestrian Safety Guide and Countermeasure Selection System, FHWA

The FHWA's PEDSAFE resource available online provides a wealth of information on both solving specific technical problems related to pedestrian safety and getting a pedestrian plan started.

- PEDSAFE
  http://www.walkinginfo.org/pedsafe/moreinfo_sidewalks.cfm.

Complete Streets Planning Checklist, NYSDOT

New York State's Complete Streets Law (S5411A-2011) requires that appropriate pedestrian accommodation be included in the design of all roadway projects that receive state and federal funding. In order to determine the need for pedestrian facilities in projects, NYSDOT has developed the "Complete Streets Planning Checklist".

- Complete Streets Planning Checklist (Draft)
  https://www.dot.ny.gov/programs/completestreets/repository/DRAFT_Complete_Streets_Checklist_9-20-13.pdf

Urban Street Design Guidelines, City of Charlotte

Like New York State's Complete Streets policy, the policy of the City of Charlotte, North Carolina is to apply its Urban Street Design Guidelines to new and modified streets in the city. The City's Urban Street Design Guidelines provide criteria for assigning a given street segment to a specific category: Main Street, Avenue, Boulevard, Parkway, or one of several categories of Local Street. The Guidelines provide a cross-section for each type of roadway, as well as a six step decision-making process to be followed.

- Urban Street Design Guidelines

  http://charmeck.org/city/charlotte/transportation/plansprojects/pages/urban%20street%20design%20guidelines.aspx

- Policy Document

  http://charmeck.org/city/charlotte/Transportation/PlansProjects/Documents/USDGPolicyRecommendationsOctober2607.pdf

Evaluation Process for New Pathway Investment, Town of Bethlehem

The Town of Bethlehem has developed an "Evaluation Process for New Pathway Investment" to rate possible sidewalk investments. This tool compares the anticipated benefit of the sidewalk to its anticipated costs and gives each proposed investment a letter grade (A through F) depending on the cost-benefit ratio. A relatively expensive project (over $1 million) has to provide a substantial benefit (grade C or better) in order to "pass" this evaluation.

Elements used to rate a project's benefits include:

- Inclusion in a previously prepared plan or study
- Roadway functional class and average annual daily traffic volume
- Existing roadway speed
- Number of intersections and roadway crossings included
- Number of driveways crossed
- Presence or absence of existing bicycle and pedestrian accommodation
- Nearby destinations (within ½ mile)
- Residential population density
- Potential users nearby (schools, parks, etc.)
- Record of investment in bike and pedestrian facilities in an area

The documentation for this approach provides a detailed explanation of how the Town came up with its scoring system for each criteria.

- Evaluation Process for New Pathway Investment
  http://www.townofbethlehem.org/DocumentCenter/Home/View/3728

Worth Walking, Village of Rhinebeck Pedestrian Task Force

The Village of Rhinebeck's Pedestrian Task Force prepared a comprehensive report on the state of its sidewalks and steps that could be taken to improve them. In addition to providing an excellent look at sidewalk maintenance funding issues at the village level, this study is valuable for its treatment of a frequently vexing issue: conflicts between tree roots and sidewalk slabs. The Task Force conducted an inventory of existing tree-sidewalk conflict points, including an evaluation of both the tree (its health and attractiveness) and the adjacent sidewalk. This helped clarify the set of alternatives being considered in each case to resolve the conflict.

- Worth Walking
  http://www.rhinebecknyvillage.org/PDF/Documents/2011/02-28-11SidewalkWorthWalkingReport.pdf

A Citizen's Guide to Better Streets, Project for Public Spaces

This guide developed by the Project for Public Spaces is subtitled "How to engage your transportation agency." Its purpose is to act as a guide "to help citizens interact collaboratively and productively with their DOT." It serves primarily to provide the layman with the vocabulary and knowledge of planning and engineering processes needed to get involved with the transportation planning process. It also includes information on the role of MPOs in the planning process.

- A Citizen's Guide to Better Streets, Project for Public Spaces
  http://www.pps.org/pdf/bookstore/How_to_Engage_Your_Transportation_Agency_AARP.pdf

Case Study Compendium, Pedestrian and Bicycling Information Center

Brief summaries of 100 different case studies are included in this resource. Case studies are split up according to major issue addressed: education, engineering, planning, or encouragement of non-motorized transportation. Each case study provides an overview of a problem, relevant background information, the solutions the community implemented and the results.

- Case Study Compendium
  http://www.walkinginfo.org/case_studies/

5. BENEFITS

5.1. Overview

This chapter focuses on the health, safety and economic benefits of pedestrian accessibility, and provides information on the cost-benefit analyses reported in other studies. Background data on walking to school is provided primarily to inform discussions of this topic; the benefits of improving kids' journey to school are addressed under the topics of health and safety.

The 2011 report *Making the Case for Investment in the Walking Environment: A review of the evidence* is a compilation of some of the best academic research and real-world case studies on the many and far-reaching benefits of improving conditions for pedestrians. (Sinnett, 2011) It summarizes cost-benefit findings from several reports, examining a range of possible benefits, including:

- Reduced road collisions
- Reduced congestion, fuel and other costs
- Reduced noise and air pollution
- Reduced carbon dioxide emissions
- Health benefits from a more physically active population
- Greater accessibility to facilities and services
- Increased social capital
- Increased economic activity
- Reduced public costs of providing transport infrastructure and services

This report draws several important conclusions, including:

- Investments in the walking environment are **good value for money** – even accounting for the fact that most **evaluations only consider a small number of potential benefits**. Cost-benefit analyses are underestimating the value of the walking environment, because very few studies have accounted for the impacts of increased walking on road casualties, congestion, fuel costs and other motorized travel costs, noise and air pollution, carbon dioxide and reduced public costs of providing for motorized transport. There are likely to be substantial benefits arising in these areas where investment in walking leads to modal shift.
- The most **significant measured benefit of investments in the walking environment is better health from increased physical activity**, and again, this is despite the fact that the only part of the total health benefit has been assessed.

- **User experience (often referred to as journey ambience) is the second largest benefit**. This represents the improved travel experience of users of a walking environment
- **All the evidence reviewed of evaluations of walking environments showed positive cost-benefit ratios**, of up to 37.6 (Sinnett, 2011)[emphasis in original]

5.1.1 Health Benefits

Walking is good exercise. The US Centers for Disease Control and Prevention (CDC) recommends that adults engage in 150 minutes a week of moderate-intensity aerobic activity, such as brisk walking. (Centers for Disease Control)

Numerous studies have assessed the health benefits of walking. As reported in *The New York Times Magazine*:

> A recent meta-analysis of studies about exercise and mortality showed that, in general, a sedentary person's risk of dying prematurely from any cause plummeted by nearly 20 percent if he or she began brisk walking (or the equivalent) for 30 minutes five times a week. (Reynolds, 2011)

In recent years, researchers have focused on the links between land use patterns that rely on automobile transportation, decreased rates of physical activity and increased rates of obesity and heart disease. For example, a 2002 article in the *American Journal of Preventive Medicine* found that "Residents of homes built before 1974 in urban or suburban areas were more likely than residents of newer homes to walk ≥20 times per month." (Berrigan & Troiano, 2002). This research used the construction year of 1974 as a proxy for neighborhood design. The paper states: "Neighborhoods containing older homes in urban areas are more likely to have sidewalks, have denser interconnected networks of streets, and often display a mix of business and residential uses."

A 2004 article in the *Journal of Planning Literature* makes the case, based on a review of 20 public health studies, that there is a link between the way neighborhoods and streets are built and health outcomes. This article concludes:

> During the past several decades, the lack of sufficient coordination between land use and transportation planning and the limited public expenditures in nonmotorized facilities - less than 2 percent of total federal transportation budgets are allocated for pedestrian and bicycle facilities and programs (FHWA 2002) - have contributed to creating urban environments where walking and biking are marginalized or disregarded as transportation modes. The studies' findings imply that, to enhance the health and well-being of the population, infrastructure for walking and biking needs to become an integral part of public transportation systems and services. (Lee & Moudon, 2004)

A good deal of recent research has focused specifically on the health benefits for children who walk to school. Encouraging kids to walk to school has become an increasingly high priority for public health officials who are concerned about an increase in childhood obesity. In 2009, the National Centers for Disease Control reported that:

> Walking to and from school has been demonstrated to increase physical activity among children during the commute, leading to increased energy expenditure and potentially to reduced obesity. However, the percentage of students walking to school has dropped dramatically over the past 40 years, partially due to the increased distance between children's homes and schools. (Centers for Disease Control, 2009)

The CDC's top recommendation, as presented in this report, is to site schools in neighborhoods rather on the community's edge, in order to eliminate a key deterrent to walking: distance. In most places in the Study Area, reconsidering school siting would a very long-term solution, since new communities and new schools are not being built. Locally, the emphasis is on improving routes to school. (See "Journey to School", below, for more information on walking to school.)

5.1.2 Safety Benefits

There were 960 vehicle collisions with pedestrians in the Study Area in the four-year period from January 2008 to December 2011. A pedestrian was killed in 20 of these collisions. As seen in Table 4.1, nearly 70 percent of these collisions were in the City of Syracuse. The Towns of Clay, Cicero, Salina and DeWitt each had at least 30 pedestrian-vehicle collisions in this period.

According to the FHWA's "Toolbox of Countermeasures and their Potential Effectiveness for Pedestrian Crashes," building sidewalks in order to get pedestrians out of the roadway can reduce the incidence of car-pedestrian collisions by 88 percent (Federal Highway Administration, 2008). Based on this rating system, the only type of project that is more effective in making a facility safe for pedestrians is the construction of a pedestrian overcrossing or underpass.

Pedestrian safety is important for all roadway users, but particularly so for populations that have limitations in their ability to use motorized vehicles, such as children, disabled populations and the elderly. According to the report *Aging Americans: Stranded without Options*, older pedestrians are more vulnerable to injury than younger people: "Older people are among the first to suffer increased injuries and fatalities when streets and highways are not safe." (Bailey, 2004)

There are many resources available on the safety benefits of sidewalks and designing roadways and pedestrian facilities to improve pedestrian safety. See the links provided in the "More Information" section below for more information on how to assess roads for pedestrian safety and how to plan and design roadways for greater safety.

Table 5.1 –Vehicle-Pedestrian Collisions in the Study Area, January 1, 2008 to December 31, 2011

Municipality	Total Number	Percent
City of Syracuse	655	68%
Town of Cicero	42	4%
Town of Clay	37	4%
Town of Salina	34	4%
Town of De Witt	30	3%
Town of Manlius	23	2%
Town of Camillus	17	2%
Town of Geddes	15	2%
Town of Onondaga	13	1%
Village of Baldwinsville	12	1%
Village of North Syracuse	12	1%
Village of Solvay	11	1%
Town of Skaneateles	8	1%
Town of Lysander	6	1%
Village of East Syracuse	6	1%
Village of Liverpool	5	1%
Village of Minoa	5	1%
Onondaga Indian Reservation	4	0.4%
Village of Central Square	4	0.4%
Town of LaFayette	3	0.3%
Town of Pompey	3	0.3%
Village of Fayetteville	3	0.3%
Town of Elbridge	2	0.2%
Town of Hastings	2	0.2%
Town of Tully	2	0.2%
Town of Van Buren	2	0.2%
Village of Phoenix	2	0.2%
Town of Marcellus	1	0.1%
Town of West Monroe	1	0.1%
TOTAL	960	100%

Source: Accident Location Information System data

5.1.3 Journey to School

When the route that children would use to walk or bike to school is perceived as too dangerous, the most immediate solution is to use school buses and family vehicles to get students between home and school. But the health benefits of walking and biking, and the safety benefits associated with improved facilities, argue for investments in improved facilities.

A recent analysis of the benefits of walking to school states: "Studies show that children who walk and bicycle to school are more physically active, have lower body mass index scores, lower obesity levels and are more likely to meet physical activity guidelines than students who are driven or bused to school." (Safe Routes to School National Partnership, 2012)

This source also states that the direct costs of treating childhood obesity nationally are as high as $14 billion annually.

More research is needed locally to determine the possible cost savings and safety benefits that could be realized through improvements to pedestrian access to school.

Background Information

According to a survey conducted by the National Center for Safe Routes to School, more than three-quarters of elementary and middle-school children in the United States take either a family car (45 percent) or a bus (37 percent) to get to school. Eleven percent walk to school (the survey did not specify whether or not children were walking alone, with an adult or in a group). The trip home from school has slightly different percentages: 35 percent of students take a family car, 42 percent ride a bus and 15 percent walk. (National Center for Safe Routes to School, 2010) This survey also asked parents why they do or do not allow their children to walk or bike to school. The six issues most frequently cited by parents were:

- Distance, 62%
- Traffic speed, 55%
- Traffic volume along the route, 55%
- Intersection and crossing safety, 48%
- Weather, 44%
- Crime and violence, 38%

According to this survey's results, 41 percent of students who live within a ¼ mile of their school walk to school. This proportion drops to 18 percent for students who live between ¼ mile and a half-mile from their school, and to 9 percent for students who live between ½ mile and a mile from school. Two percent of students who live more than a mile from school walk. (National Center for Safe Routes to School, 2010)

While sidewalks cannot alter the weather or make a two-mile walk to school substantially shorter, good planning and design can reduce the risks that parents perceive in letting their children walk next to and across high-speed, high-traffic roadways.

Busing Costs

Beyond health implications, adding sidewalks to make routes to school safer can save school districts (and taxpayers) money by reducing transportation costs. According to a report from the Citizens Budget Commission, "School districts in New York spent $1,100 per pupil on average on transportation in 2010, more than any other state and 140 percent above the U.S. average of $459." (Citizens Budget Commission, 2012)

New York State Education Law Section 3635 provides the framework for how school districts provide transportation to and from school. The law requires Boards of Education of non-city school districts to provide transportation for all eligible resident pupils in grades K-8 who live more than two miles from school, and for pupils in grades 9-12 who live more than three miles from school, up to a distance of 15 miles. (New York State Department of Education, 2009) School districts are then reimbursed for up to 90 percent of the cost of busing students who live within the mandated busing radii.

Child Safety Zones

Section 3635-b of the Education Law allows Boards of Education to identify "Child Safety Zones" within the radii specified above. These safety zones are based on whether or not students must traverse a known hazardous area in order to reach their school.

The guidelines for establishing these zones provide a scoring system for the hazards that students must traverse while walking to school (New York State Department of Education, 2009). Three types of hazard are identified: highways without sidewalks or with inadequate shoulders, highway intersections and highway-railroad grade crossings. Points are assigned depending on several variables; for a roadway with narrow shoulders, factors include the length of the roadway, the speed limit and traffic volume. Depending on the score and the type of school, specific routes or areas can be classified as Child Safety Zones. The school district then becomes eligible for state funding for busing the student or students who would otherwise be forced to walk or bike through these zones, even if these students are within the radii specified under State law. There is not a single, comprehensive data source on which school districts use this mechanism to fund supplemental bus services, so it is not known how extensively Child Safety Zones are utilized locally.

One of the elements considered in this evaluation is the presence or absence of sidewalks and adequate (five-foot wide) shoulders. For example, a half-mile long stretch of road with a 45 MPH speed limit, without sidewalks or adequate shoulders and with moderate traffic volumes (50 vehicles in a 15-minute period) would likely be eligible to be a Child Safety Zone, if used by students getting to a K-8 school.

Adding sidewalks to this portion of the road during a road reconstruction project could have the effect of dramatically improving safety and reducing a hazard, making it possible for more students to walk to school.

Safe Routes to School

Between 2005 and 2012, the US Department of Transportation provided over a billion dollars to state departments of transportation through the National Safe Routes to School program to improve safety on walking and bicycling routes to schools. With the approval of a new transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21) in July 2012, Safe Routes to School ceased to have a dedicated share of the national transportation budget and has become one of the types of project funded by a new category, known as Transportation Alternatives Programs (TAP) (see Chapter 5, Finances).

Cost-Benefit Analyses

Improved air quality, better health and safer streets are goals in and of themselves, but each of these has a quantifiable financial aspect as well. For example, health benefits may be seen in fewer sick days, number of hospitalizations and lower medical bills. Recent research has quantified the costs and benefits of improving bicycle and pedestrian facilities and finds that benefits far outweigh costs.

A 2010 study that focused on one Wisconsin county estimated that the cost of making sidewalks available to everyone in the county (ensuring sidewalks on at least one side of all streets) would cost $450 million, but would yield benefits to residents in terms of health and improved air quality over a ten-year period on the order of $800 million, for a cost-benefit ratio of 1.7. (Guo & Gandavarapu, 2010)

A 2008 study that compiled the results of 16 research projects found that, while the cost-benefit ratios identified in these papers vary widely, the average cost-benefit ratio for bike and pedestrian improvements was 1:5. In the studies reviewed, benefits were primarily health related (quantified in terms of hospitalization, absenteeism, etc.), but also included reduced risk of accidents, reduced congestion and improved air quality. (Cavill, Kahlmeier, & Rutter, 2008)

5.2. More Information

Health & Social Benefits

- *Recommended Community Strategies and Measurements to Prevent Obesity in the United States* , Centers for Disease Control
  http://www.cdc.gov/obesity/downloads/community_strategies_guide.pdf

- "How much physical activity do adults need?", Centers for Disease Control and Prevention webpage
  http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html

- The Association between Urban Form and Physical Activity in US Adults
  http://www.ajpmonline.org/article/S0749-3797(02)00476-2/fulltext

- Correlates of Walking for Transportation or Recreation Purposes
  http://www.activelivingresearch.org/files/JPAH_6_Lee_0.pdf

- Destinations that matter: associations with walking for transport
  http://www.ipenproject.org/documents/publications_docs/CERIN%20destinations_H&P.pdf

- Linking Objectively Measured Physical Activity with Objectively Measured Urban Form: Findings from SMARTRAQ
  http://www.ncbi.nlm.nih.gov/pubmed/15694519

- Operational Definitions of Walkable Neighborhood: Theoretical and Empirical Insights
  http://activelivingresearch.com/files/JPAH_7_Moudon.pdf

- Social Capital and the Built Environment: The Importance of Walkable Neighborhoods, *American Journal of Public Health*
  http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448008/pdf/0931546.pdf

- "What's the single best exercise?", *New York Times Magazine*
  http://www.nytimes.com/2011/04/17/magazine/mag-17exercise-t.html?pagewanted=all&_r=0

Safety Benefits

- Aging Americans: Stranded without Options, Surface Transpotation Policy Project
  http://www.transact.org/report.asp?id=232

- PEDSAFE, Pedestrian Safety Guide and Countermeasure Selection System, FHWA
  Comprehensive online source for pedestrian safety planning and design
  http://www.walkinginfo.org/pedsafe/

- A Guide for Reducing Collisions Involving Pedestrians, National Cooperative Highway Research Program Report 500
  Data and analysis on accidents, as well as a catalog of safety improvements and steps to implementation.
  http://safety.transportation.org/guides.aspx?cid=29

- Dangerous by Design, Transportation for America
  This resource focuses primarily on data that indicate dangerous roadways in America.
  http://www.transact.org/PDFs/2009-11-09-Dangerous%20by%20Design.pdf

- How to Develop a Pedestrian Safety Action Plan, FHWA, NHTSA, Pedestrian and Bicycle Information Center
  Summary of steps to take in coming up with a pedestrian plan focused on safety. Appendix B

is an excellent resource on conducting pedestrian counts. Appendix D lists funding sources. http://safety.fhwa.dot.gov/ped_bike/ped_focus/docs/fhwasa0512.pdf

- A Review of Pedestrian Safety Research in the United States and Abroad, FHWA
  Review of research and analysis of how, where and why vehicle-pedestrian collisions occur and which measures are most effective at eliminating or reducing collisions.
  http://www.fhwa.dot.gov/publications/research/safety/pedbike/03042/

- Pedestrian and Bicycle Collisions in Onondaga County, Tri-State Transportation Campaign
  This is not the source of the collision data in this report, but this is a good source for information on collisions between vehicles and non-vehicles in New York State.
  http://org2.salsalabs.com/dia/track.jsp?key=-1&url_num=1&url=http%3A%2F%2Ftstc.org%2Freports%2Ffactsheets%2FOnondaga_2013.pdf

Journey to School

- *Safe Routes to School: Helping Communities Save Lives and Dollars*, Safe Routes to School National Partnership 2011 Policy Report
  http://www.saferoutespartnership.org/sites/default/files/pdf/SRTSNP-2011-Policy-Report.pdf

- Developing a Walking School Bus
  http://www.walkingschoolbus.org/

- *Better Targeting New York's Pupil Transportation Aid,* Citizens Budget Commission
  Provides background information on the costs of busing students to and from school in New York State.
  http://www.cbcny.org/sites/default/files/REPORT_SchoolTransport_12122012.pdf

- *Safe Routes to School Travel Data,* National Center for Safe Routes to School
  http://www.sacog.org/complete-streets/toolkit/files/docs/NCSRTS_SRTS%20Travel%20Data.pdf

- Pupil Transportation Policy, New York State Department of Education
  http://www.p12.nysed.gov/schoolbus/Parents/htm/general_info_intro.htm

- Calculating School Transportation Reimbursement
  https://stateaid.nysed.gov/trans/calculated.htm

- Child Safety Zone Regulations, New York State Department of Education
  http://www.p12.nysed.gov/schoolbus/BusinessOfficial/htm/Part_191.html#p191.8

Economic Benefits

- *Making the Case for Investment in the Walking Environment*, Living Streets
  http://www.livingstreets.org.uk/expert-help/resources/

- "Economic analyses of transport infrastructure and policies including health effects related to cycling and walking: a systematic review", *Transport Policy*
http://www.euro.who.int/__data/assets/pdf_file/0010/53857/E92660.pdf

- *Walking the Walk: How Walkability Raises Housing Values in US Cities*, Joe Cortright and CEOs for Cities
http://www.ceosforcities.org/pagefiles/WalkingTheWalk_CEOsforCities.pdf

- "An economic evaluation of health-promotive built environment changes" (the Wisconsin sidewalk study), *Preventive Medicine*
http://www.ncbi.nlm.nih.gov/pubmed/19840817

- "The Walkability Premium in Commercial Real Estate Investments", *Real Estate Economics*
http://cala.arizona.edu/sites/default/files/faculty_papers/The%20Walkability%20Premium%20in%20Commercial%20Real%20Estate%20Investments,%202011.pdf

6. SIDEWALK FINANCES

6.1. Issue Area

Any effort to plan for new sidewalks should include a consideration of anticipated costs and possible sources of revenue for both construction and long-term maintenance. Accurate cost estimates are difficult to make until the specifics of a given design are known. However, for planning purposes, an average sidewalk construction of $92 per linear foot (five-foot width), or $485,760 per mile, can be assumed.

This chapter also includes references to possible funding sources, including information based on the changes to federal highway funding made under the most recent round of federal transportation funding legislation, the Moving Ahead for Progress in the 21st Century Act (MAP-21).

6.2. Average Costs

Sources vary on the average costs for sidewalk construction. The following provides information from the FHWA, NYSDOT and the Vermont Agency of Transportation[3] to serve as references. The per-unit estimate for sidewalk construction of $92 per linear foot is based on NYSDOT estimates.

6.2.1 Construction

FHWA

The Federal Highway Administration's (FHWA) report "PEDSAFE: Pedestrian Countermeasure Selection Guide" provides the following estimate and discussion:

> The cost of constructing sidewalks alone is relatively low; typical bids run between $24 and $36 per meters squared ($20 to $30 a square yard), which roughly translates to $43 to $64 per lineal meter ($12 to $20 per lineal foot) for 1.8-m- (6-ft-) wide sidewalks. Therefore, sidewalks on both sides of the roadway can run roughly between $93,000 and $155,000 per kilometer ($150,000 and $250,000 per mile) (costs from Oregon DOT, 1999).
>
> Factors to consider when calculating the cost of sidewalks:

[3] The Vermont Agency of Transportation was selected for comparison purposes because it is a cold-weather state and because it provides a "fully loaded" cost estimate for sidewalk construction.

1. Presence of curb and gutter: The costs of providing curb and gutter, which presumes the need to also provide a street drainage system, run much higher than the cost of sidewalk alone. … Yet, on many urban streets, this work must be performed prior to installing sidewalks. If this is the case, only the cost of sidewalks and curb ramps should be attributed to expenditures for pedestrians – catch basins are provided to drain the roadway surface used by motor vehicle traffic.
2. Number of driveways: To comply with ADA, many existing driveways must be replaced with ones that provide a level passage at least 0.9 (3 ft) wide. It can also be advantageous to inventory all existing driveways to see if any can be closed, resulting in a cost-savings.
3. Number of intersections: While intersections represent a reduction in the sidewalk, curb ramps are required where sidewalks cross intersections and the cost of providing additional traffic control at each intersection should be considered.
4. Obstacles to be removed: The cost for moving or removing obstacles such as utility poles, signposts, and fire hydrants vary too much to be itemized here; however, they are required to be moved if they obstruct access. These costs must be calculated individually for each project.
5. Structures: While minor sidewalk projects rarely involve new structures such as a bridge, many projects with significant cuts and fills may require retaining walls and/or culvert extensions. The costs of retaining walls must be calculated individually for each project.
6. Right-of-way: While most sidewalk projects can be built within existing rights-of-way (especially infill projects), some may require some right-of-way easement. An alternative to acquiring right-of-way is to narrow the roadway, which should consider the needs of bicyclists (e.g., through bike lanes or shoulders, at a minimum of 1.5 m (5 ft).
7. Miscellaneous factors: Planters, irrigation, benches, decorative lampposts, and other aesthetic improvements cost money, but they are usually well worth it if the impetus for the project is to create a more pleasant and inviting walking environment.

   When project costs appear to be escalating due to one or more of the above-listed items, especially retaining walls or acquiring right-of-way, consideration may be given to narrowing the sidewalk in constrained areas as a last resort. The full sidewalk width should be resumed in non-constrained areas—this is preferable to providing a narrow sidewalk throughout, or dropping the project because of one difficult section.

   Tips to Reduce Total Costs:

1. Stand-alone vs. integrated within another project: Sidewalks should always be included in road construction projects. Stand-alone sidewalk projects cost more than the same work performed as part of a larger project. Sidewalks can be piggybacked to projects such as surface preservation, water or sewer lines, or placing utilities underground. Besides the monetary savings, the political fallout is reduced, since the public doesn't perceive an agency as being inefficient (it is very

Sidewalk construction costs fall when sidewalks are included in other projects, such as road construction projects, and when several small sidewalk projects are bundled into one large project

noticeable if an agency works on a road, then comes back to do more work later). The reduced impacts on traffic are a bonus to integration.

2. Combining Projects: A cost-savings can be achieved by combining several small sidewalk projects into one big one. This can occur even if the sidewalks are under different jurisdictions, or even in different localities, if they are close to each other. The basic principle is that bid prices drop as quantities increase.

New York State Department of Transportation

To assist applicants with their Safe Routes to School grant applications, NYSDOT has developed the Safe Routes to School Quick Estimate tool (https://www.dot.ny.gov/divisions/operating/opdm/local-programs-bureau/srts/repository/SRTS%20Quick%20Estimate.xls). This listing provides per unit costs for a variety of pedestrian amenities, as shown in Table 6.1.

Note that, according to this estimate, the cost of a cast-in-place concrete curb is more per linear foot than the cost of a concrete sidewalk.

Using this estimating tool, the cost to add pedestrian signals, curb ramps and crosswalks to a signalized intersection (without adding sidewalks) is on the order of $30,000.[4]

[4] This assumes the addition of: eight pedestrian push buttons and curb ramp (two per corner) and four crosswalks.

Table 6.1 – Selected Cost Estimates from NYSDOT Safe Routes to School Quick Estimates

Item	*Unit Price*	*Cost Breakdown*
4-foot wide sidewalk	$33/LF	Sidewalk: $23/LF
		Excavation & disposal: $5/linear foot
		Subbase Course Type II: $5/linear foot
5-foot wide sidewalk	$39/LF	Sidewalk: $27/LF
		Excavation & disposal: $6/linear foot
		Subbase Course Type II: $6/linear foot
10-foot wide multiuse asphalt path	$74/LF	Includes subgrade preparation, saw cutting and tack coat; doesn't include curbing, grading or turf establishment
ADA Curb Ramp	$1,250/each	Includes site survey, demolition, saw cutting, excavation, etc.
Crosswalk (ladder bar w/standard striping)	$770/each	White epoxy reflectorized pavement symbols: $.42/LF
		Pavement cleaning and preparation: $.68/LF
		Assumes 700 LF of striping per crosswalk
Concrete Curbing	$53/LF	Cast in place concrete curb: $32/LF
		Cost estimate includes saw cutting, excavation & disposal, embankment in place, subbase, top course and foundation concrete
Raised Crosswalk	$15,000/EA	
Pedestrian Push Button – Existing Signal	$2,005/EA	Includes audible signal, conduit, LED signal, demolition, excavation, repairs to asphalt, signal system components, adjustments to utilities and finish work
Pedestrian Push Button – New Signal	$6,580/EA	Includes items from Existing Signal, as well as signal pole, pullbox and conduit excavation

Estimates do not include: moving utilities/mailboxes, incidental alteration of drainage structures, driveway aprons, pruning, clearing and grubbing, maintenance and protection of traffic (M&PT) or planting.
Abbreviations: LF = Linear Foot; EA = Each
Source: New York State Safe Routes to School Quick Estimates

Vermont Agency of Transportation

The Vermont Agency of Transportation produced a report in 2010 that provides cost estimates for a variety of pedestrian path options, based on recent bids and cost estimating software. This report is particularly useful since it gives both "basic" costs and "total" costs in another cold-weather state. The report describes these as follows:

> 'Basic' costs of sidewalk construction are only the items that are required to build the sidewalk itself, such as gravel sub-base, concrete, and granite curbing, as well as the excavation of the area in which the sidewalk is built. The 'total' cost reflects the

combined cost of sidewalk construction with other costs that are incidental to the construction. For example, pavement markings, new signs, traffic control, drainage, and landscaping are included in the non-basic costs.

Table 6.2 provides relevant information from this report.

Table 6.2 – Per-Foot Costs of Sidewalk Construction Items, 2010

Sidewalk/curb configurations (5-feet wide)	*BASIC* cost per foot	*TOTAL* cost per foot
Concrete walk with granite curb	$ 79	$ 218
Concrete walk with concrete curb	$ 65	$ 180
Concrete walk with no curb	$ 47	$ 131
Bituminous walk with granite curb	$ 67	$ 185
*Bituminous walk with concrete curb	$ 53	$ 148
*Bituminous walk with no curb	$ 36	$ 99
*Aggregate walk with granite curb	$ 58	$ 160
*Aggregate walk with concrete curb	$ 44	$ 123
*Aggregate walk with no curb	$ 27	$ 74

**No projects of this kind completed in study period*
Source: VTrans Bicycle and Pedestrian Program Unit Cost Database

These estimates underscore how variable cost estimates can be for pedestrian facilities: the Vermont Agency of Transportation's "Total" per foot estimate works out to $950,400 for a mile of sidewalk with concrete curbs, while NYSDOT's estimates put the cost of a mile of sidewalk and curb, with eight curb ramps, eight push button signals and four crosswalks, at $514,880. FHWA's estimate of $250,000 per mile (actually two miles of sidewalk, because it assumes sidewalks on both sides of the street) is substantially lower than either of these estimates, but does not include curbs, curb ramps or any additional elements, such as crosswalks or pedestrian signals. This is useful as a "minimum" estimate of sidewalk costs.

For planning purposes, this report assumes that the best available estimate for the cost of a mile of five-foot wide sidewalk will also include the costs of adding a curb and should be based on the NYSDOT estimate of $92 per linear foot, or $485,760 per mile.

6.2.2 Maintenance Costs – Sidewalk Snow Removal

SIDEWALK SNOW REMOVAL

The cost of clearing snow from sidewalks depends on several factors, including the magnitude and type of snow event, the type and age of the equipment being used, and whether the workers doing the snow

clearing are public or private-sector employees. Locally, several villages clear snow from their sidewalks periodically. Determining the cost of this service is difficult, because it is typically combined with other snow and ice removal activities undertaken by public works departments, such as plowing roads and clearing snow at parks and in municipal parking lots. An estimate from the Village of Skaneateles put the cost of clearing the village's 20 miles of sidewalks at $85 per snowfall, with an average rate of nearly seven miles of sidewalk cleared per hour. (Jacobs, 2000) The City of Rochester's sidewalk snow removal program splits the city into plowable routes of roughly 15 miles, with each route taking about five hours to plow, for an overall rate of approximately three miles per hour. (City of Rochester, 2012)

In the winter of 2009/2010, the University Neighborhood Partnership Committee in the City of Syracuse hired a private contractor to clear snow from 4.75 miles of sidewalk in the Syracuse University neighborhood. For the winter of 2009/2010, the cost of this contract was $10,000 and included up to 26 plow runs. This works out to an average cost of approximately $2,100 per mile per season.

Seasonal, per-mile sidewalk snow clearing costs vary widely, from a low of around $50 in the Village of Skaneateles to a high of $2,100 for a private contract at the neighborhood level.

Number of Plowable Events

Several sources consulted used a standard average of 12 major snowfall events per season. While Syracuse receives more snow than the average community in the northeast, data from the National Oceanic and Atmospheric Administration (NOAA) indicate that the long-term average for the area is to have around six days a year with snowfall over five inches and 13 or 14 days a year with snowfall of three inches or more. (National Oceanic and Atmospheric Administration, 2011) To be on the safe side, this guidance recommends planning for 15 "plowable" events per year, bearing in mind that this is not intended to produce bare pavement all winter, but to make the sidewalks passable.

OTHER MAINTENANCE ACTIVITIES

FHWA's document *A Guide for Maintaining Pedestrian Facilities for Enhanced Safety* provides detailed information on the following maintenance techniques, including an estimate of costs:

- Patching
- Repairs to cracks
- Wedging
- Grinding and horizontal cutting
- Mud-jacking

With the exception of mud-jacking, which can be comparable to slab replacement in cost, these are relatively inexpensive repairs. The best long-term solution for a damaged sidewalk is slab replacement. Generally, this is comparable in cost to sidewalk construction but, as with sidewalk construction, costs per foot typically decrease with the number of feet being replaced.

6.3. Funding Sources

6.3.1 Private Funding

Sidewalk Construction

The private sector's role in sidewalk construction is frequently overlooked, since many sidewalk projects are planned and constructed either by municipalities or transportation agencies. But large institutions, like college campuses, business parks and retail centers, frequently include sidewalks. Residential developments also may include sidewalks.

Regulations that require sidewalks help ensure continuity between new and existing developments. A set of sidewalk ordinances that require sidewalks can be a cost-effective way to create a sidewalk system, particularly within a residential subdivision or adjacent to a large commercial development. Additionally, design regulations and site review can improve pedestrian circulation within a development, such as a large commercial or multi-family residential development. For more information on sidewalk ordinances, see Chapter 3.

Maintenance

With rare exceptions, the owner of property adjacent to a sidewalk is the source of some or all of the funds to repair that sidewalk. As stated in the article *Fixing Broken Sidewalks: "*A survey of 82 cities in 45 states found that 40 percent of the cities require property owners to pay the full cost of repairing sidewalks, 46 percent share the cost with property owners, and only 13 percent pay the full cost of repairing sidewalks." (Shoup, 2010)

In many cases, then, 100-percent of the cost of a sidewalk repair or replacement project would fall on the owner of the adjacent property, as spelled out in local ordinances. New York State law allows municipalities to create programs to share the costs of sidewalk repairs with property owners; locally, the Village of Baldwinsville has such a program (see Chapter 7, Maintenance).

Homeowners frequently contract through their local department of public works to have sidewalk repairs done and, in some cases, can finance these repairs through an additional assessment to their property, repaying over several years. This varies by local ordinance.

POINT-OF-SALE/CERTIFICATE OF OCCUPANCY REQUIREMENT

In New Jersey, many municipalities include the condition of sidewalks in the property inspection conducted prior to issuing a Certificate of Occupancy. The result is that: "If a sidewalk is found to be damaged, the current property owner will be required to make necessary repairs before the property can be sold."

In a 2010 article in the *Journal of Urban Planning and Development*, author Donald Shoup argues for what he refers to as "point-of-sale" programs similar to a Certificate of Occupancy program. A property inspection conducted by the municipal government as a condition of the sale of the property sale would include the sidewalks fronting the property. Sidewalk repairs would be required prior to the sale. This allows the property's owner to use funds from the sale of property to pay for these improvements. Shoup states that "If Los Angeles has adopted a point-of-sale program in 1995, about half of the city's 4,600 miles of broken sidewalks would have been repaired by 2007." (Shoup D. , 2010)

6.3.2 Public Funding

Federal Funding Sources

TRANSPORTATION FUNDING

As the state designated Metropolitan Planning Organization for the Study Area, one of the SMTC's key activities is the development and maintenance of the area's Transportation Improvement Program (TIP). The TIP is a listing of all capital projects that are programmed to utilize federal transportation funding over a four to five year period in the Study Area. Required by federal law, the TIP represents the transportation improvement priorities of the Syracuse Metropolitan Area. The list of projects is multi-modal and includes highway and public transit projects, as well as bicycle and pedestrian projects. The SMTC created the "Transportation Improvement Program Guidebook" to assist prospective applicants in the TIP development and application process (TIP Guidebook).

Transportation Alternatives Program

Federal transportation funding is periodically reshaped and restructured by the federal legislation that allows money to be spent. In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA), which created a category of transportation projects called Transportation Enhancements. As described in the National Transportation Alternatives Clearinghouse's *Transportation Enhancements and Alternatives Primer*:

> Under ISTEA, Congress ensured that funding would be available for bicycle and pedestrian transportation, for the preservation and enhancement of many of the nation's scenic and historic assets, and to address and protect environmental systems that form the context for much of America's transportation infrastructure. (National Transportation Alternatives Clearinghouse, 2013)

Seven years later, Congress passed the Transportation Equity Act for the 21st Century (TEA-21), which increased funding for Transportation Enhancements and expanded the number of enhancements programs from 10 to 12. The most recent round of federal transportation funding legislation, the Moving Ahead for Progress in the 21st Century Act (MAP-21) has made some significant changes to this category of transportation project. As the National Transportation Alternatives Clearinghouse's primer states:

> MAP-21 made drastic changes to many of the multimodal programs of the Federal-aid Highway program. Several Transportation Enhancements activities were eliminated or revised and recast as Transportation Alternatives. The Transportation Alternatives were combined with the Recreational Trails Program, Safe Routes to School Program, and the creation of boulevards from former divided highways to create the Transportation Alternatives Program. The consolidation of these programs is associated with a 26.37% reduction in total funding for all three programs from FY 2009 funding levels. Additional funding from the Surface Transportation Program can also be used to fund TAP projects.

Prior to MAP-21, the Safe Routes to School and Recreational Trails programs had their own funding allocations, in addition to a larger funding allocation for Transportation Enhancements. Under MAP-21, the Recreational Trails program continues to be funded at 2009 levels (using Transportation Alternatives allocations), but Safe Routes to Schools funding is no longer a separate source of funds: it is part of the Transportation Alternatives Program (TAP).

The FHWA's guide to the Transportation Alternatives Program lists the following activities as eligible for TAP funding:

- Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation.
- Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for non-drivers, including children, older adults, and individuals with disabilities to access daily needs.
- Conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists, or other nonmotorized transportation users.
- Construction of turnouts, overlooks, and viewing areas.
- Community improvement activities, including—
    - inventory, control, or removal of outdoor advertising;
    - historic preservation and rehabilitation of historic transportation facilities;
    - vegetation management practices in transportation rights-of-way to improve roadway safety, prevent against invasive species, and provide erosion control; and

- archaeological activities relating to impacts from implementation of a transportation project eligible under 23 USC.

- Any environmental mitigation activity, including pollution prevention and pollution abatement activities and mitigation to:

  - address stormwater management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff; or

  - reduce vehicle-caused wildlife mortality or to restore and maintain connectivity among terrestrial or aquatic habitats.

Additionally, Safe Routes to School and Recreational Trails projects are eligible for TAP funding, as are projects to plan, design and construct boulevards in or largely within the right-of-way for former interstate routes or other divided highways. (Federal Highway Administration, 2012)

National Highway Performance Program (NHPP), Surface Transportation Program (STP)

The National Highway Performance Program (NHPP) is the source of many of the major improvement projects on the network of interstates and major roads known as the National Highway System. The Surface Transportation Program (STP) is also a major source of resources, used by states to fund projects on the federal-aid highway system.

The NHPP and STP together account for more than $30 billion of total MAP-21 funding available in 2014. Typically, these resources are targeted at major roadway improvement projects. These projects may include the addition of sidewalks and other improvements in pedestrian mobility, but in most cases would not be used for pedestrian mobility upgrades alone, without mainline roadway improvements.

Hazard Elimination Program/Highway Safety Improvement Program

Section 152 of United States Code 23, governing Federal Aid Highways, states that:

> Each State shall conduct and systematically maintain an engineering survey of all public roads to identify hazardous locations, sections, and elements, including roadside obstacles and unmarked or poorly marked roads, which may constitute a danger to motorists, bicyclists, and pedestrians, assign priorities for the correction of such locations, sections, and elements, and establish and implement a schedule of projects for their improvement.

In New York State, NYSDOT's Highway Safety Improvement Program (HSIP) fulfills this requirement. The HSIP program provides annual reports on capital projects that include safety elements. In the 2013/2014 federal fiscal year, approximately 19 percent of the state's HSIP funds went to pedestrian

related projects, such as pedestrian countdown timers, pedestrian safety islands and medians and sidewalks.

Additional facets of this safety program include the High Risk Rural Roads Program and funds to assist older drivers. A High Risk Rural Road is any rural major or minor collector or rural local road identified by a state in its Strategic Highway Safety Plan (SHSP) as having significant safety risks. If fatalities increase on these roads, states must increase spending on safety projects on them. Regarding older drivers, FHWA's *Highway Safety Improvement Fact Sheet* states: "If fatalities and serious injuries per capita for drivers and pedestrians over age 65 increase during the most recent 2-year period for which data are available, a State is required to incorporate strategies focused on older drivers and pedestrians in the next SHSP update." (FHWA, 2012)

Tribal Transportation Program (TTP)

Prior to MAP-21, the Tribal Transportation Program (TTP) was known as the Indian Reservation Roads program. The goal of this program is "to provide access to basic community services to enhance the quality of life in Indian country." (FHWA, 2012) Bicycle and pedestrian facility improvement projects can be funded through this program, but only on tribal lands.

OTHER FEDERAL FUNDING SOURCES

Community Development Block Grant (CDBG)

Community Development Block Grant (CDBG) funds originate with the US Department of Housing and Urban Development and can be used for a variety of purposes, including construction of infrastructure like sidewalks. It should be noted that sidewalk maintenance, such as filling cracks or making minor repairs, cannot be funded through CDBG money. (US Department of Housing & Urban Development, 2012)

New York State Funding Sources

CONSOLIDATED LOCAL STREET AND HIGHWAY IMPROVEMENT PROGRAM (CHIPS)

The Consolidated Local Street and Highway Improvement Program (CHIPS) is a significant source of local roadway maintenance funds in New York State. It is allocated annually to every city, county, town and village in the state, based on a formula that factors in the number of miles of roadway in the Local Highway Inventory (LHI) in the municipality, as well as the number of motor vehicle registrations. CHIPS funds can make up a large proportion of a small community's highway funds.

CHIPS funds can be used for a wide variety of purposes, including pedestrian facilities. State Highway Law, Section 10 describes these funds as being for the purpose of "making payments toward the construction, operation and/or maintenance of highways, bridges and highway-railroad crossings that

are not on the state highway system." Sidewalks, shared use paths and bike paths within the highway right of way are eligible for funding as part of a highway reconstruction. (New York State Department of Transportation, 2013)

Municipal Budgets

GENERAL FUND

A review of the budgets of selected villages in the Study Area indicated that few provide a line item specifically devoted to either sidewalk construction or maintenance. Several villages (including Camillus, Elbridge, Minoa and Tully) have an annual budget item for sidewalks, ranging from $3,000 to $5,000. These villages have relatively small sidewalk networks (five or fewer miles) and use their sidewalk budgets for spot repairs to sidewalks as needed.

MUNICIPAL BONDS

Like any other public infrastructure, sidewalk projects can be funded by municipal bonds. The limitations on this funding source are likely to be based on the municipality's financial condition (e.g., its bond rating) and the politics associated with creating new debt.

TAXES AND FEES

Annual Maintenance Fee

In 2013, the City of Ithaca changed its policy on sidewalk maintenance. Its previous policy had made sidewalk repair and replacement the responsibility of the adjacent property owner. As the Mayor's Sidewalk Task Force reported, this policy led to "the construction of very little sidewalk in the last twenty years (and owner resistance to sidewalk construction projects)." (Mayor's Sidewalk Task Force , 2013)

Under the new policy, the City has taken over responsibility for the long-term maintenance of sidewalks (with the exception of the Cornell University campus). The City has been divided into five Sidewalk Improvement Districts (SIDs), similar to the Town of Penfield's Intensified Sidewalk Districts (see Chapter 2). Revenues collected within each SID are spent on the sidewalks in that SID. The City is not taking over sidewalk snow removal responsibilities.

To fund public sidewalk maintenance, the City has levied an additional tax on all properties in the City, including vacant parcels. The fee for one- and two-family homes is $70 per year. Non-residential properties pay an annual fee of $140, plus an additional fee based on their square footage. The City estimates that this will raise approximately $846,000 annually. (Hill, 2013)

One of the reasons for the development of this policy was the recognition that well-maintained sidewalks provide a benefit to the entire community, not just the adjacent property.

Intensified Sidewalk District

Towns have the ability under State law to form sidewalk districts (see Chapter 2, Town Law). As seen in Chapter 3, the Town of Penfield in Monroe County requires developers to include sidewalks in new developments or to pay a fee. In cases where the developer opts to build sidewalks, the Town then creates an Intensified Sidewalk Districts for the development (for example, a residential subdivision). Revenues collected from the homeowners in that district (approximately $25 annually) give the Town a revenue source that is used to maintain and replace sidewalks in that district, as needed (not including snow removal).

Utility Tax

The City of Corvallis, Oregon, charges a Sidewalk Maintenance Fee to all City of Corvallis utility customers. The fee is currently $.80 per month, which is based on the $150,000 spent in the City's Annual Sidewalk Safety Program, divided by the number of utility customers (14,951), divided by 12. Like a shared cost program, it creates a common source of funds to rectify problems identified in an annual inventory of sidewalk defects. (City of Corvallis, 2011)

Unlike the City of Ithaca's approach, this utility fee is not a property tax – it is not paid by property owners (including landlords and property owners not living in the city). It is paid by the same person or entity that is paying the utility bill, which may be the landlord or property owner, but is more likely to be the tenant, in the case of rented or leased space. As a result, this fee would not be paid by owners of vacant or abandoned properties.

Speed Cameras

The City of Takoma Park, Maryland, has been using funds brought in by speed camera citations to fund the construction of new sidewalks and to bring existing sidewalks up to ADA standards. Takoma Park is a relatively small suburban community, with a population of 17,000. Four speed cameras were projected to bring in approximately $1.6 million in revenue annually. (Arias, 2011) Approximately 2/5 of this revenue goes toward administrative costs related to the cameras, but it nevertheless represents a substantial source of revenue for sidewalk improvements.

SNOW REMOVAL

See Chapter 7, Maintenance, for more information on public and private sidewalk snow removal efforts.

6.4. More Information

6.4.1 Construction Costs

- PEDSAFE: Pedestrian Countermeasure Selection Guide, Federal Highway Administration http://www.walkinginfo.org/pedsafe/
- Safe Routes to School Quick Estimates, New York State Department of Transportation https://www.dot.ny.gov/divisions/operating/opdm/local-programs-bureau/srts/applications
- VTrans Bicycle and Pedestrian Program Unit Cost Database, Vermont Agency of Transportation http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/Report%20on%20Share%20use%20and%20sidewalk%20costs.pdf

Maintenance Costs

- *A Guide for Maintaining Pedestrian Facilities for Enhanced Safety*, Federal Highway Administration http://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa13037/
- *Constructing, Maintaining and Financing Sidewalks in New Jersey*, Rutgers University http://bprc.rutgers.edu/wordpress/wp-content/uploads/2012/08/Sidewalks_in_New_Jersey_Final_Report.pdf

Snow Removal

- Sidewalk Snow Removal, City of Rochester http://www.cityofrochester.gov/article.aspx?id=8589936460
- Sidewalk Snow Removal, City of Waterville, Maine http://www.waterville-me.gov/departments/pw/content/1052/snow-removal---sidewalks.php
- *1981 - 2010 Climate Normals*, National Oceanic and Atmospheric Administration *Includes 20-year average precipitation rates, with snowfall levels by month.* http://www.ncdc.noaa.gov/oa/climate/normals/usnormals.html
- *Onondaga County Salary Plan,* Onondaga County Personnel Department http://www.ongov.net/employment/documents/SALARY%20PLAN%202011-2013.pdf
- Public Safety Subcommittee Minutes, Brookline, Massachusetts http://www.brooklinema.gov/index.php?option=com_docman&task=doc_download&gid=4698&Itemid=626

6.4.2 Funding Sources

Federal

- Transportation Improvement Program (TIP) Guidebook, SMTC
  http://www.smtcmpo.org/TIP/2012/Guidebook2012.singleside.pdf

- MAP-21 Fact Sheets, Federal Highway Administration
  http://www.fhwa.dot.gov/MAP21/factsheets.cfm

- *Transportation Enhancements and Alternatives Primer,* National Transportation Alternatives Clearinghouse
  Note: the NTAC was funded through a cooperative agreement between the FHWA and the Rails-to-Trails Conservancy. This cooperative agreement expired in 2013, but the website continues to function as an archive of information, particularly on the differences between pre-MAP21 and post-MAP21federal funding for pedestrian improvement projects.
  http://www.ta-clearinghouse.info/publications

- *Basically CDBG,* US Department of Housing & Urban Development
  http://portal.hud.gov/hudportal/HUD/program_offices/comm_planning/communitydevelopment/training/basicallycdbg

State

- *Consolidated Local Street and Highway Improvement Program (CHIPS),* New York State Department of Transportation
  https://www.dot.ny.gov/programs/chips

- Transportation Enhancement Activities, New York State Department of Transportation
  http://www.fhwa.dot.gov/environment/transportation_enhancements/

- Local Waterfront Revitalization Program, New York State Department of State
  http://www.dos.ny.gov/communitieswaterfronts/WFRevitalization/LWRP.html

- Brownfield Opportunity Areas Program, New York State Department of Environmental Conservation
  http://www.dec.ny.gov/chemical/8447.html

- Bicycling in New York, New York State Department of Transportation
  Includes links to funding sources for pedestrian facility projects
  https://www.dot.ny.gov/display/programs/bicycle/funding-sources/federal-funding

Local

- *Frequently Asked Questions on the Sidewalk Maintenance Fee,* Corvallis, OR
  http://www.corvallisoregon.gov/modules/showdocument.aspx?documentid=3906

- Mayor's Sidewalk Task Force Fact Sheet, City of Ithaca http://www.egovlink.com/public_documents300/ithaca/published_documents/Clerks_Office/In%20the%20news/Sidewalk%20Task%20Force%20Fact%20Sheet.pdf

Private

- "Putting Cities Back on Their Feet", *Journal of Planning and Urban Development*, Donald Shoup http://shoup.bol.ucla.edu/PuttingCitiesBackOnTheirFeet.pdf

- *Walking the Walk,* CEOs for Cities. http://www.ceosforcities.org/pagefiles/WalkingTheWalk_CEOsforCities.pdf

7. MAINTENANCE ISSUES

7.1. Background

Like any other form of public infrastructure, a sidewalk must be maintained in order to remain useful. Unlike a city street or a park, sidewalks require little in the way of annual maintenance in order to remain structurally sound. Over a period of several years, weeds, poor drainage and tree roots can erode the value of a stretch of sidewalk, but the costs of maintaining a small portion of sidewalk are low relative to the benefits that a sidewalk provides. Full sidewalk replacement is not likely to be needed more than once every 20 years and will mean a one-time cost to the average homeowner of approximately $1,560.[5] Considered in aggregate, however, at the level of a town, village or city, sidewalk maintenance costs can become quite substantial.

In Central New York, the issue of snow clearance is especially problematic. Not only can clearance of a typical snowfall of one or two feet be physically difficult for senior citizens and disabled residents, but snowfall is frequently combined with snow plowed from roads onto adjacent sidewalks, creating barriers that are difficult to eliminate without a snow blower. Other difficulties include locations where the adjacent property owner is the State or County, such as bridges on county highways or at freeway interchange ramps.

7.2. Responsibility

While there are many different ways to find funding for sidewalk construction (see Chapter 5), the problems of maintenance (snow clearance and sidewalk repair) become the responsibility of some combination of the adjacent property owner and the city, town or village in which the sidewalk is located. State law specifies that neither NYSDOT nor county departments of transportation are responsible for sidewalk maintenance (see Section 1, Legal Issues). Most of the municipalities in the MPA have ordinances that spell out that the adjacent property owner is responsible for sidewalk maintenance (see Chapter 3, Municipal Ordinances). In some villages, the Department of Public Works assists property owners with maintenance by, for example, providing snow

Most municipalities in the MPA assign responsibility for sidewalk maintenance to the adjacent property owner.

[5] Based on a 40-foot property frontage, five-foot wide sidewalks and a sidewalk replacement cost of $39 per linear foot. See Chapter 5 for average costs. Homeowners are typically not responsible for elements such as curbing.

removal and subsidized sidewalk repairs.

7.3. Lifespan

As the report *Constructing, Maintaining and Financing Sidewalks in New Jersey* says: "The preference for concrete is based on its long service life – many sidewalk slabs in older cities remain in good condition even after 75 years of service." (Alan M. Voorhees Transportation Center, 2006)

According to a 2007 survey of 35 state, local and provincial departments of transportation and public works departments, the minimum reported lifespan for a concrete sidewalk is 20 years. The average reported lifespan is 34.3 years (Markow, 2007) (see Table 7.1). Another source puts the average lifespan of a sidewalk at 30 years, but cautions that "the amount of rain or snow and fluctuations in temperature affect the life of sidewalks". (Gruenwald, 2002) Based on weather patterns in Central New York, which tend toward extreme levels of snow and rain, as well as temperatures that can fluctuate rapidly, this report assumes an average lifespan of 20 years for sidewalks.

Table 7.1 – Estimated Service Lives of Sidewalks by Material

Sidewalk Material	No. of Responses	Survey Responses (Years)				
		Minimum	Maximum	Mean	Median	Mode
Concrete	7	20	60	34.3	25	20
Asphalt	5	5	20	11.4	10	10
Brick or block	2	20	20	20	20	20
Gravel / crushed rock	1	n/a	n/a	10	n/a	n/a

Source: (Markow, 2007)

Over time, vegetation and precipitation wear away at a concrete sidewalk. When moisture from rain or melted snow infiltrates a crack in the concrete (without draining through the material, as in the case of porous pavements), the expansion and contraction caused by freezing and thawing can turn a small opening into a large fissure. Additionally, tree roots (see Tree Roots, below), grass and other vegetation can grow between or next to sidewalk blocks. Inadequately compacted subgrade can also cause sidewalk failure over time.

The result is frequently cracking of sidewalks and the lifting (vertical displacement) of one block above another. According to the FHWA, when the vertical displacement between sidewalk blocks reaches ½ an inch, this change in elevation should be beveled in order to be passable by people in wheelchairs:

> The Federal accessibility standards permit changes in level less than 6 mm (0.25 in) high to be vertical but require changes in level between 6 mm and 13 mm (0.25 in and 0.50 in) to have a maximum bevel of 50 percent, as shown in Figure 4-11. A ramp is required for changes in level that exceed 13 mm (0.50 in) (US DOJ, 1991; UFAS,U.S. DoD et al., 1984). (Designing Sidewalks and Trails for Access)

7.4. Maintenance Planning

7.4.1 Evaluation

The City of Ventura, California, has responsibility for maintaining approximately 420 linear miles of sidewalk. Faced with a dramatic decline in public funding for sidewalk maintenance, the City has developed a system for prioritizing repairs, based on the severity of the sidewalk's problem and the location's importance in the sidewalk network. For example, a sidewalk slab lifted two inches above the adjacent slab by tree roots would be a higher priority if it were near a hospital and on an arterial route than if it were in a residential neighborhood on a local street. (City of San Buenaventura Public Works, 2013)

7.4.2 Funding

For information on funding sidewalk maintenance, see Chapter 5.

7.5. Maintenance Issues

7.5.1 Sidewalk Grinding

Relatively minor sidewalk disruptions (one inch or less) can usually be addressed through sidewalk grinding. This is done with machinery such as a rotary scarifier, followed by use of a grinder to smooth out the surface. (Concrete Network, 2013) This is not work that the typical homeowner is either trained or equipped to handle, and requires either bringing in an outside contractor or, depending on the municipality, requesting public works department's assistance.

7.5.2 Mud-jacking

Mud-jacking is used to elevate sidewalk slabs that have sunken by a half-inch or more, relative to the adjacent sidewalk. The process involves drilling holes in the sidewalk and pressure injecting cement (or other material) under the sidewalk slab until it is lifted into place (see Figure 7.1). Mud-jacking must be performed cautiously, since the cause of sidewalk subsidence may be related to problems with underground utilities, such as leaking pipes, and the process of injecting a slurry under the sidewalk could exacerbate these problems.

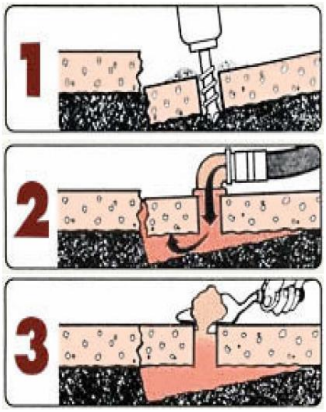

Figure 7.1 - Mud-jacking process

1. Holes are drilled into the sidewalk slab
2. Material is injected under the sidewalk
3. Excess material is removed and the sidewalk is smoothed

Source: *Guide for Maintaining Pedestrian Facilities for Safety*, FHWA

7.5.3 Tree Roots

In some ways, trees are as much a part of a complete and sustainable street as are facilities for cyclists, pedestrians, transit and motor vehicles. Dan Burden's *Urban Street Trees* lists 22 of the benefits of street trees, including the following cost-benefit statistic: "For a planting cost of $250-600 (includes first 3 years of maintenance) a single street tree returns over $90,000 of direct benefits (not including aesthetic, social and natural) in the lifetime of the tree." (Burden, 2006) Benefits reported include improvements in business activity, reductions in drainage infrastructure costs, improved cooling efficiency for adjacent buildings and added property value.

When tree plantings are designed properly, conflicts between tree roots and sidewalks can be minimized. When trees are planted too close to sidewalks, conflicts are common and both the sidewalk and the tree are frequently damaged.

Tree roots spread out in search of soil oxygen, water and minerals. Depending on the site, this can mean that they are quite close to the surface; several studies have indicated "that most roots grow in the upper 30 cm of soil, and that they spread well beyond the crown." (Morgenroth, 2011). Roots expand radially, meaning that buffer space is needed between trees and sidewalks in order to ensure the tree's well-being and the sidewalk's structural integrity. In many cases, the cause of conflicts between sidewalks and tree roots is a lack of adequate space between the two [WILL DIG UP SOME NUMBERS ON SPECIFIC DISTANCES]. Other causes are the use of fast-growing tree species and trees that are too large for the area in which they are meant to grow. (Randrup, McPherson, & Costello, 2001)

Additional resources on minimizing conflicts between sidewalks & tree roots include:

Village of Rhinebeck, Worth Walking;

University of Florida Dept. of Environmental Horticulture presentations

In some municipalities, damage done to a sidewalk by a tree located in the public right of way is the responsibility of the municipality, not the property owner. In these cases, it is because the tree itself is public property and cannot be pruned or removed by the property owner without a permit. Local public works staff should be consulted in order to make this determination. The City of Syracuse's stated policy is that the homeowner is responsible for sidewalk repairs even if a city-owned tree has damaged the sidewalk. (City of Syracuse, 2008)

Additionally, the Village of Rhinebeck's *Worth Walking* plan is an excellent resource for how to evaluate both sidewalks and adjacent trees and to develop a plan of action (e.g., grinding the sidewalk, re-designing the sidewalk around the tree, or pruning the tree's roots) based on the quality of the tree and the damage to the sidewalk.

The University of Florida's Department of Environmental Horticulture provides PowerPoint presentations online summarizing best practices in managing conflicts between sidewalks and tree trees. While much of this guidance is rooted in design practices, it recommends re-routing sidewalks around trunks without cutting large (greater than one-inch diameter) roots. Pruning or shaving tree roots is a less expensive approach, but if done improperly it can damage or kill the tree. Root pruning should be done under the supervision of an arborist. Generally, a rule of thumb is to preserve all roots within an area about five times the trunk's diameter. (University of Florida, 2007)

Figure 7-3 - Route sidewalk around tree

Other solutions include:

- Removing concrete sidewalks and replacing them with different surface materials, such as crushed rock, stone dust or porous pavers
- Using metal decking or other material to create a bridge over exposed roots

7.5.4 Do it Yourself Maintenance

Generally speaking, repairing a cracked or heaved sidewalk block is not the type of project that a homeowner is encouraged to undertake without professional assistance.

In New York City, however, the New York City Department of Transportation's website includes a page on "Do it Yourself Repairs" and provides property owners with the specifications that must be met in order to comply with the City's regulations. (New York City Department of Transportation, 2013)

Similarly, the City of Portland provides a user-friendly *Sidewalk Repair Manual* that includes estimated number of hours that a specific project could take. It also provides a list of equipment needed, an overview of the process for installing a sidewalk and the specifications that a City inspector will review prior to project approval. (City of Portland, 2013)

7.5.5 Snow Removal

Individual Property Owner

Where they are the party responsible for clearing sidewalk snow, property owners frequently discharge this responsibility themselves, using shovels, snow blowers and rock salt. They may also contract out for this service. Typical seasonal fees for this service are on the order of $200 (UNP 2009). Given a block of property owners who are either doing their own snow removal or hiring someone else to remove snow from their property, sidewalks on any given block should be completely clear within two days of a snowfall. Unfortunately, individual property owners have varying responses to this responsibility. The

owner of a vacant structure who is not paying the taxes owed on that structure is extremely unlikely to be paying someone to maintain the adjacent sidewalk.

As seen in Chapter 3, several local municipal codes make the penalty for failing to clear ice and snow from sidewalks equal to the cost of having the municipality do the ice and snow clearance. In some cases, this requires the municipality to provide property owners with written notice of noncompliance (see the Village of Camillus Code, Chapter 94, Article III, Section 94-6.1) and allow the property owner time to respond to the notice before clearing the snow and ice.

Groups of Property Owners

UNIVERSITY NEIGHBORHOOD PARTNERSHIP COMMITTEE:

During the winter of 2009/2010, the Syracuse University Neighborhood Partnership Committee (UNP), a non-profit organization made up of representatives of the University and the surrounding neighborhood, developed a plan for snow removal on a 4.75 mile stretch of sidewalks. This organization considered developing a Business Improvement District (BID), but ultimately determined that it would be less expensive and less complicated to hire a contractor, to be paid by property owners.

The program charged $70 per 40 feet of sidewalk for the season, anticipating that approximately half of the property owners along the 4.75 mile plowing route would actually pay this money. Not all property owners paid the fee, but all property owners along the route had their sidewalk plowed. The total cost of the plowing program was $10,000 for up to 26 plow runs over the winter months.

Program charges were projected to cover all the costs of the contractor's operations, including:

Sidewalk snow clearance may be accomplished by:

- **Individual property owners**
- **Groups of property owners**
  -University Neighborhood Partnership
- **Volunteers**
  -Westside Residents Coalition, Syracuse
  -Snow Corps, Chicago
- **Municipalities**
  -City of Rochester
  -Town of Penfield

- Plowing of sidewalks on the entire route once per 24-hour period when accumulation reached 3" or more between the hours of 2 a.m. and 8 a.m.
- Moving snow banks back with snow blower twice per season if large amounts of snow accumulate without a thaw. (University Neighborhood Partnership, 2010)

Salting of sidewalks was not included because of concerns over damage to sidewalks and the lack of equipment. The contractor also indicated that additional insurance would be needed if salt were applied to the sidewalks.

Volunteers

WESTSIDE RESIDENTS COALITION

During the winter of 2012/2013, the Westside Residents Coalition, based in Syracuse's Near Westside Neighborhood, began a volunteer-based sidewalk snow removal program. The program was funded in part by a $3,900 grant from a local foundation; the funds were used to buy snow shovels, hats and gloves. The community group met in December 2012 to discuss the routes most in need of shoveling and to encourage volunteers to participate. The organization is continuing this effort in the 2013/2014 winter season.

SNOW CORPS, CHICAGO

The City of Chicago began a program called Snow Corps in January 2012, to match snow shoveling volunteers to places in the city in which elderly and disabled citizens requested help clearing snow from sidewalks. City residents age 60 and over and/or residents with disabilities can request assistance by dialing "311". Volunteers sign up online and receive e-mails and assignments from the City, instructing them as to where help is needed. Volunteers commit to removing snow from these sidewalks within 24 hours following a snowstorm.

Municipal Sidewalk Snow Clearing

CITY OF ROCHESTER

The City of Rochester provides municipal sidewalk snow clearing to supplement property owners' snow clearance. This service is paid for through an "embellishment fee" added to property taxes, which also includes street cleaning, roadway snow plowing and sidewalk repair. Costs are based on street frontage. A home with the standard 40-foot frontage on a city street pays approximately $32 a year for sidewalk snow plowing; total embellishment fees for such a property are approximately $210.

The City of Rochester's website provides the following summary of its sidewalk snow plowing program:

- The City begins plowing sidewalks once new snowfall exceeds 3 inches.
- The City plows all sidewalks that are at least five feet in width.
- The City plows 878 miles of sidewalks. These miles are divided into distinct sidewalk plow runs of approximately 15 miles. Each sidewalk plow run takes about five hours to complete.
- Depending on the severity of a storm, sidewalk snow plowing policies must sometimes be altered to meet the needs of the situation.
- The City uses private contractors to plow sidewalks.

- Sidewalk plowing usually happens in the evening and early morning when pedestrian traffic is lowest, but this schedule is modified to respond to actual storm conditions.

TOWN OF PENFIELD

As noted in Chapter 3, the Town of Penfield in Monroe County has an extensive sidewalk network along major roads, and it is responsible for keeping these sidewalks free of snow. The Town divides its Primary Sidewalk Network into three snow clearing routes, with each route taking approximately 4 to 5 hours to complete, typically starting at or near schools and working outward.

INFORMAL PROGRAMS

Several villages in the Study Area provide what might be termed "informal" assistance with sidewalk snow clearance efforts by using small bulldozers (bobcats) to clear all or some village sidewalks after a heavy snowfall. In the Villages of Liverpool and North Syracuse, for example, it is not officially the Department of Public Works' responsibility to clear sidewalks on residential streets, but these villages will periodically clear them.

Road Plowing and Sidewalks

ITE's *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities* includes a brief summary of the problem that many municipalities in the Study Area face after a heavy snowfall:

> During and after a snowstorm, most snow plows operate in emergency or "hurry-up" mode, focusing on opening up lanes for vehicles. Often, when snow is scraped from the vehicular lanes, it is piled up in the bicycle lane, parking lane, or along the sidewalk, thus making it difficult for bicyclists and pedestrians to use the facilities that have been provided for them. (Institue of Transportation Engineers, 2006)

This guidance includes the following recommendations:

- Streetsides should be designed to accommodate a normal level of plowed snow behind the curb without blocking the pedestrian throughway. A wide planting strip or furnishings zone can accommodate plowed snow.
- Avoid designing objects in the furnishings zone that interfere with the ability to plow snow onto the streetside, such as large raised planters, continuous hedges and large utility and traffic control cabinets. Objects that snow can wrap around include trees, signs and light poles.

Think about snow storage when designing new roads or streetscaping projects. Wide planting strips and furnishing zones can accommodate plowed snow. Large objects in the furnishings zone can impede snow storage.

7.6. More Information

Snow Removal

- University Neighborhood Partnership Snow Removal
  http://gcr.syr.edu/com/2010_UNP_Snow_Removal_Report.pdf
- City of Rochester Sidewalk Snow Removal
  http://www.cityofrochester.gov/article.aspx?id=8589936460
- Constructing, Maintaining and Financing Sidewalks in New Jersey, Alan M. Voorhees Transportation Center
  http://www.sacog.org/complete-streets/toolkit/files/docs/NJDOT_Constructing,%20Maintain,%20and%20Financing%20Sidewalks%20in%20New%20Jersey.pdf
- Snow Corps, City of Chicago
  http://www.cityofchicago.org/city/en/depts/mayor/snowportal/snow_corps.html
- Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, Institue of Transportation Engineers

Sidewalk Maintenance

- A Guide for Maintaining Pedestrian Facilities for Enhanced Safety, FHWA (2013)
- *Sidewalk Maintenance and Repair Plan*, City of Buenaventura Public Works
  http://www.cityofventura.net/files/file/SidewalkMaintenanceandRepairPlan.pdf
- *Sidewalk Repair Manual,* Cityof Portland, Bureau of Transportation
  http://www.portlandoregon.gov/transportation/article/443054
- *Do It Yourself Repairs: New York City Specifications for Residents Installing their Own Sidewalk*, New York City Department of Transportation
  http://www.nyc.gov/html/dot/html/infrastructure/sidewalkspecs.shtml

Street Trees

- Urban Design to Accommodate Street Trees - Solutions (PowerPoint presentation), University of Florida
  http://hort.ufl.edu/woody/powerpoints/urbandesigntoaccommodatetreessidewalksolutions.ppt
- *Urban design for a wind resistant urban forest*, University of Florida.
  http://treesandhurricanes.ifas.ufl.edu/

- *Urban Street Trees - 22 Benefits, Specific Applications*, Dan Burden - Walkable Communities, Inc. http://www.michigan.gov/documents/dnr/22_benefits_208084_7.pdf

- Randrup, T., McPherson, E., & Costello, L. (2001). A review of tree root conflicts with sidewalks, curbs, and roads. *Urban Ecosystems*, 209 - 225. http://goo.gl/mj52Bx

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APPENDIX A – PEDESTRIAN DEMAND MODEL

Pedestrian Demand Model

Details

Layers & scores

APPENDIX A

APPENDIX A

APPENDIX B – SIDEWALK ORDINANCES

[Separate PDF]

APPENDIX C – MODEL SIDEWALK ORDINANCES

[Separate PDFs]

APPENDIX D – POROUS PAVEMENT SIDEWALK INFORMATION

7.6.1 Porous Pavement

Overview

A porous paved surface is one that is designed to absorb stormwater and allow it to return to the ground, as opposed to a non-porous paved surface, which is designed to repel water and direct it toward a storm drain. Porous pavements can be achieved through a variety of different materials, including pervious concrete, porous asphalt, and permeable pavers. The function of the paved porous surface is to act as a hard, durable surface that can be walked or driven on, but that also permits stormwater to pass through it into subsurface layers of crushed stone. While a typical, non-porous pavement section also sits on a bed of crushed stone, this layer is normally compacted to be as dense as possible, providing the strongest possible foundation for the paved surface. With porous pavements, the crushed stone bed is not compacted to this degree. The rock layer is deeper than in standard construction (two to four feet), and it is designed with lots of gaps between the stones: up to 40 percent of the subsurface can be "void" space. Sometimes called a recharge bed, this layer of stones allows water to filter through and into the underlying water table.

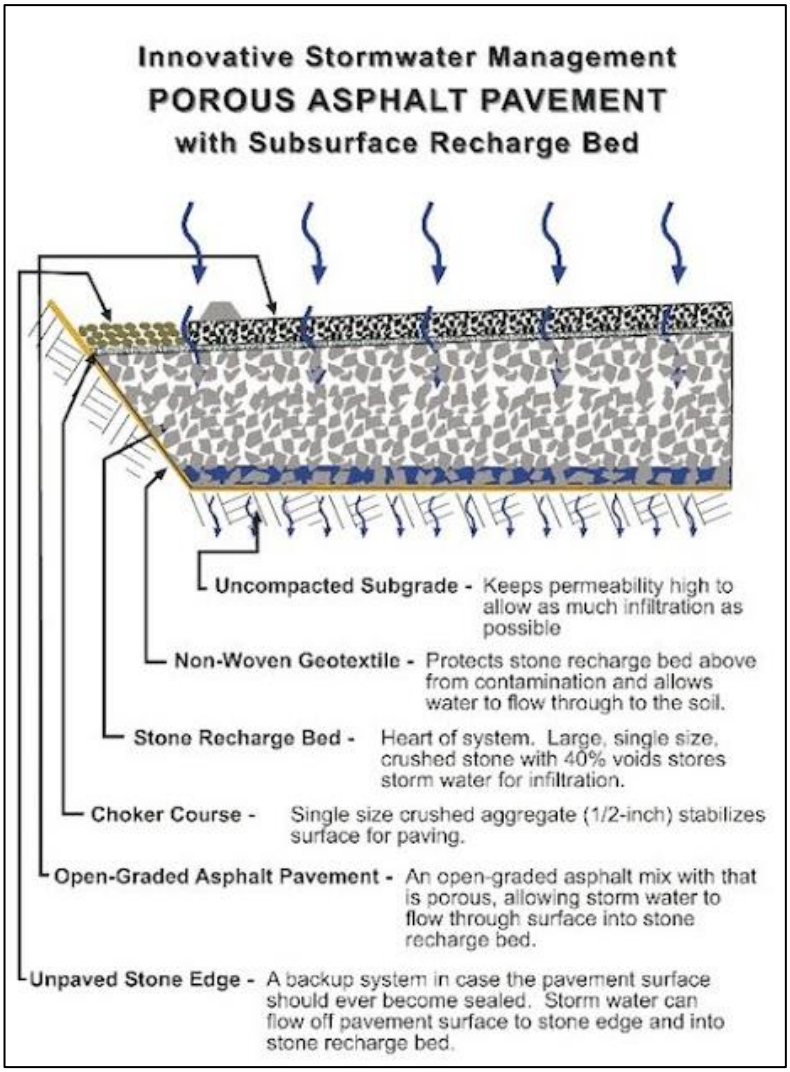

Figure A-4 - Porous Asphalt Cross-Section
Source: National Asphalt Pavement Association

Porous asphalt and concrete are frequently compared to a Rice Krispies™ treat, because they consist of relatively coarse particles of

aggregate (crushed rock) glued together with either asphalt or cement. Fine particles, such as sand, are either not used or are used in smaller proportions than in impervious surfaces. The texture of these pervious surfaces is rougher than impervious concrete or asphalt.

In the case of porous pavers, the paved surface itself is not (necessarily) porous or pervious, but the gaps between the pavers is intended to be wide enough to allow stormwater to pass through. The sand or gravel mixture between the pavers is not glued together with polymeric fillers. While this improves water infiltration, it can also mean that the material between pavers is washed away or vacuumed up during maintenance.

Because of the lack of subgrade compaction, porous pavements are not normally used in mainline roads that carry heavy truck traffic. The depth of the subgrade can be adjusted to provide greater stability, but standard applications are for parking lots, sidewalks and the parking lanes of city streets.

Benefits and Costs

There are numerous benefits associated with porous pavements, including reduced costs for off-site stormwater treatment, reduced need for salting during the winter months and increased traction. Combined with other technologies, such as structural soils or a suspended sidewalk, the use of porous pavement design can reduce or eliminate conflicts between tree roots and sidewalks.

STORMWATER TREATMENT

Porous pavements can significantly reduce stormwater treatment costs. As stated in the National Cooperative Highway Research Program's *Evaluation of Best Management Practices for Highway Runoff Control,* "Permeable pavements are a unique stormwater control technique because the infrastructure is the BMP." When implemented properly, porous pavements can reduce the need for other forms of on-site stormwater mitigation, such as retention ponds and drainage to off-site treatment plants. Many studies agree that, when combined with savings in stormwater management, the overall costs of porous pavement are similar to or lower than conventional paving materials.

ICE AND SNOW CONTROL

When snow melts on a pervious cement sidewalk, it is absorbed by the sidewalk itself and will not re-freeze on the sidewalk's surface. For this reason, standard ice control methods, such as the use of rock salt, is either not necessary or can be greatly reduced.

DURABILITY AND CLIMATE

In cold weather climates such as in Central New York, porous pavements show durability comparable to that of impervious asphalt and concrete. Because porous pavements are designed to allow water flow through, there is insufficient moisture in the paved material to result in pavement heaving or cracking as

a result of freeze-thaw cycles. Also, at least one study has shown that porous pavements have a warmer subgrade and fewer freeze-thaw cycles than impervious pavement, possibly as a result of air trapped in the base material.[6]

Figure 5 - Porous asphalt (left) and dense mixed asphalt (right) parking lots shown one hour after plowing on a 25° F day in February, 2007. Source: University of New Hampshire Stormwater Center

Figure 6 - Porous asphalt (left) and dense mixed asphalt (right) parking lots shown after a spring rain on snow event Source: University of New Hampshire Stormwater Center

PEDESTRIAN SAFETY

A study in the journal *Safety Science* concludes that there is "preliminary support for the use of pervious concrete as a slip-resistant walking surface in areas of high pedestrian traffic where slip and fall injury are likely during inclement weather."[7] The study took biomechanical readings of adults as they walked

[6] "Subgrade Temperature and Freezing Cycles in Pervious Pavements", *Cold Regions Engineering 2009, ASCE*. 2009.

[7] "Slip-related characterization of gait kinetics: Investigation of pervious concrete as a slip-resistant walking surface", *Safety Science*, January 12, 2013.

across both porous and non-porous concrete surfaces and determined that the porous surface was more slip-resistant in icy conditions. This suggests that an added advantage to the use of porous pavements in Central New York could be a reduction in pedestrian slip and fall accidents.

TREE ROOT CONFLICTS

Porous pavement systems include modifying both the walking surface and a considerable amount of subgrade material, which presents an opportunity to give tree roots room to grow without causing cracks and buckling in the sidewalk itself. "Suspended sidewalks" are built on supports that prevent the sidewalk from compacting the soil below. The area below the sidewalk can be filled with well-aerated, high-quality soil.[8]

CONSTRUCTION COSTS

Estimates of the difference in cost between porous pavement and non-porous pavement vary widely. In theory, there should be very little difference between the costs of the paving materials themselves, because they are produced using the same methods and materials as impervious pavements. However the limited demand for these products means that they must be manufactured separately and generally in smaller quantities, making it difficult to achieve the economies of scale found in the production of impervious asphalt and concrete. Similarly, the techniques used to install these materials properly can be difficult for contractors to adjust to, because the materials and construction specifications are relatively new and may be unfamiliar to individual contractors.

The question of cost difference is also confounded by the fact that, as noted earlier, porous pavements are a Best Management Practice for stormwater reduction. The stormwater captured in a porous pavement system is stormwater that does not need to be captured and managed elsewhere in a project. Properly planned, sited and constructed, a porous pavement system can mean the elimination of other infrastructure, such as pipes to a sewer system, retention ponds, and swales.

A 2007 article in the journal *Landscape and Urban Planning* identified porous pavement sidewalks and parking lots as the most cost-effective low impact development (LID) system for managing stormwater.[9] This article, focusing on options within a heavily urbanized area, compared porous pavements to green roofs, rainwater harvesting techniques and underground storage tanks.

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[8] *Urban design for a wind resistant urban forest*, University of Florida, Institute of Food and Agricultural Sciences, Florida Cooperative Extension Service, School of Forest Resources and Conservation and the Environmental

Horticulture Department, Urban Forest Hurricane Recovery Program series. September 2007.

[9] *"Rapid assessment of the cost-effectiveness of low impact development for CSO control"*, Landscape and Urban Planning, Volume 82, Issue 3, September 24, 2007.

Comparing only the cost of installing a square foot of porous pavement sidewalk, which is also a stormwater BMP, to the cost of installing a square foot of traditional concrete, which increases impervious surface and adds to total runoff, is misleading. An analysis conducted by the City of Olympia in 2005 took into consideration the total long-term maintenance costs of adding a stormwater retention pond to offset the addition of impervious surface when traditional concrete is used in sidewalks. This analysis indicated that "the cost per yard for traditional concrete sidewalk is $101.16 per square yard and the cost for pervious concrete sidewalk is $54.16 per square yard."[10] This analysis shows higher costs for the installation of a square yard of porous pavement compared to a square yard of traditional concrete: porous pavement is about 50 percent more expensive to install. However, the cost savings for a large project in an urbanized area with few alternatives for stormwater management more than offset these costs.

CONSTRUCTION ISSUES

Porous concrete is hard to batch and hard to place. A successful project needs good quality control at the batch plant, cement truck drivers who are familiar with the materials and experienced workers to do the application.[11] Locally, because the Save the Rain initiative has funded so many permeable pavement projects, it has meant that several local contractors have gained experience with these materials and processes.

"Generally the more engaged the batch plant is in the pervious concrete project, the more likely the product will be successful. A pre-batch meeting with all parties, as well as feedback about the quality of the material batched, is helpful."[12]

Conflicts with Ordinances

As seen in Chapter 2, it is not unusual for local ordinances to specify the type of material to be used in sidewalk construction. For example, in the Village of Jordan, regulations specify that sidewalks should be built out of concrete with 3,000 pounds minimum strength and a "1-2-4" mix, which specifies the proportions of cement, fine aggregates and coarse aggregates in the concrete.

To date, in Onondaga County, porous pavement sidewalk installations have occurred largely through variances and other special permissions. As these materials and processes become more widely

[10] "Traditional versus Pervious Concrete Sidewalks Construction and Maintenance Cost", memo from City of Olympia Project Engineer II Melissa McFadden to City of Olympia Stormwater Engineering Supervisor Andy Haub. February 11, 2005.

[11] "*Porous Concrete Sidewalks - How to Build Sidewalks and not Stormwater Ponds*"

[12] Ibid.

accepted as a means of both accommodating pedestrians and managing stormwater, local ordinances must adapt and include new types of materials. Until then, planned porous pavement installations should be discussed with local public works officials.

Maintenance

Over time, dirt, dust and debris can reduce porous pavements' porosity, reducing its effectiveness in absorbing stormwater. Even when clogged, however, studies have shown that "surface infiltration rates usually well exceed 1 inch per hour, which is sufficient in most circumstances for the surface to effectively manage intense stormwater events."[13]

The Onondaga County Department of Water Environment Protection (OCWEP) recommends using a power vacuum twice a year to remove sediment build-up in porous pavements, maximizing stormwater absorption. OCWEP has developed an extensive set of procedures for maintaining green infrastructure.

An analysis conducted for OCWEP put the cost of renting a small (23 to 30 inch effective vacuuming width) power-driven vacuum sweeper at $2,000 a month. This analysis also estimates the cost of buying a smaller walk-behind unit, appropriate for use on sidewalks, at between $9,000 and $10,000.

7.6.2 Location Considerations

Porous pavements work best when stormwater that falls on the porous surface has time to infiltrate into the recharge bed, and in places where sediment loading from adjacent land uses is minimal. In other words, flat areas surrounded by lots of impervious surfaces are optimal locations for something like a porous pavement parking lot. In areas where there is a lot of dirt and dust, these sediments can clog the pavement's pores, reducing infiltration and requiring increased maintenance. Additionally, less costly BMPs, such as swales, may be appropriate in areas where there is sufficient right-of-way to accommodate them into the street's cross-section.

7.6.3 More Information

- *Porous Concrete Sidewalks - How to Build Sidewalks and not Stormwater Ponds,* ITE District 6 Annual Meeting
  Documents experiences in Olympia, Washington, with porous pavement sidewalks and provides some helpful guidance on planning, constructing and maintaining porous pavements.
  http://olympiawa.gov/~/media/Files/PublicWorks/Water-Resources/ITE%20Pervious%20Concrete%20Sidewalk%20Paper.ashx

[13] USEPA Stormwater Menu of BMPs, online resource.
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=135

- *Stormwater Menu of Best Management Practices*, National Pollutant Discharge Elimination System, USEPA
  Includes a section summarizing porous pavement specifications, benefits and costs with a short bibliography.
  http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=135

- *Urban design for a wind resistant urban forest*, University of Florida
  Street tree selection to minimize conflicts between tree roots and sidewalks.
  http://hort.ufl.edu/woody/documents/EP309.pdf

- *Stormwater Management Handbook*, US Environmental Protection Agency
  Chapter 5 of this handbook presents examples of streetscape improvements that minimize stormwater runoff, including porous pavement sidewalks and street trees.
  http://www.epa.gov/dced/pdf/northern_kentucky_ch5-6.pdf