Appendix D. CUUATS

Sidewalk Network Inventory and Assessment

FOR THE CHAMPAIGN URBANA URBANIZED AREA

FEBRUARY 2016

CHAMPAIGN COUNTY REGIONAL PLANNING COMMISSION

CUUATS

CHAMPAIGN COUNTY GIS CONSORTIUM

Executive Summary

The Sidewalk Network Inventory and Assessment was an effort to create a comprehensive database of sidewalk network features within the Champaign Urbana Urbanized Area. The database was designed to assess and track the condition and Americans with Disabilities Act (ADA) compliance of the sidewalk network, and to highlight potential improvements, such as closure of sidewalk gaps and replacement of non-compliant curb ramps. The project was executed by the staff of the Champaign Urbana Urbanized Area Transportation Study (CUUATS) in cooperation with a working group with representatives from the Cities of Champaign and Urbana, the Village of Savoy, the University of Illinois, and Illinois Department of Transportation (IDOT) District 5.

Data collection for the inventory took place between May 2014 and August 2015. Field staff examined and recorded measurements for all sidewalks, curb ramps, crosswalks, and pedestrian signals within the approximately 690-mile priority collection area. The priority collection area consisted of all sidewalk network features adjacent to public streets in the urbanized area, as well as some off-street features in the University of Illinois campus area. In addition to measurements, field staff recorded the geolocation of each feature and took photographs of all curb ramps. The inventory data were compiled into a geodatabase and underwent an extensive quality assurance process consisting of automated and manual checks.

To analyze the results of the inventory, CUUATS staff developed an ADA compliance index that scored each variable on a scale from 0 to 100. A score of 100 represented full compliance with the proposed Public Right-of-Way Accessibility Guidelines (PROWAG), the standards adopted by ADA. Scores for individual variables were aggregated for each block of sidewalk, curb ramp, crosswalk, and pedestrian signal in order to summarize the overall compliance of the feature.

The analysis revealed that, in general, compliance scores tended to be highest at the periphery of the urbanized area, where the pedestrian network was constructed after the development of modern accessibility standards, and in the core of the community, where pedestrian network upgrades have been focused. The ring of neighborhoods surrounding the core of the community, many of which contain pedestrian network features that predate ADA, had the lowest levels of compliance on average. Though the compliance scores are not directly comparable among feature types, sidewalks and pedestrian signals exhibited the lowest levels of compliance, followed by curb ramps and crosswalks.

In order to evaluate the condition of sidewalks and curb ramps, CUUATS staff developed a condition index. The condition index was similar in form to the compliance index, but it evaluated condition factors not covered by PROWAG. The index was applied to sidewalks and curb ramps, the feature types for which structured condition data were collected. Field staff noted major condition issues for crosswalks and pedestrian signals, but a formal evaluation of condition was not performed for these feature types.

Overall, sidewalks at the periphery of the urbanized area and those in the core of the community scored highest on condition, while curb ramp condition scores were more scattered. Surface condition issues were the most common condition defects among curb ramps, while sidewalks were more likely to score poorly on frequency of vertical faults or number of cracked panels. In addition, field staff noted worn or faded painted marking in some crosswalks, and a small number of pedestrian signals had nonfunctional pushbuttons.

To evaluate and prioritize barriers to pedestrian connectivity, CUUATS staff performed sidewalk gap and missing curb ramp analyses. In the sidewalk gap analysis, possible missing sidewalk links were identified and mapped. Based on the length of these links and the length of existing sidewalks in the immediate vicinity, the missing links were classified by gap length ratio, an indicator of the potential increase in overall network connectivity from filling the gap. In the missing curb ramp analysis, each intersection in the priority collection area was evaluated based on the percentage of possible ramp locations that had curb ramps.

The sidewalk gap analysis found that gaps with high connectivity scores were most common in the core of the community and in older urban neighborhoods. Neighborhoods surrounding the core, and many parts of Bondville and Tolono, had larger gaps with lower connectivity value, and some areas lacked sidewalks altogether. The missing curb analysis revealed that intersections without curb ramps were most common in the suburban-style residential areas surrounding the core of the community, while intersections with partial curb ramp coverage were clustered in neighborhoods throughout the urbanized area.

To aid local agencies in prioritizing accessibility improvements, CUUATS staff performed a priority area analysis using six factors representing target populations and pedestrian trip generators. The priority area analysis identified five high priority zones in Champaign, Urbana, and Savoy. These zones represent areas with the greatest demand for accessible pedestrian infrastructure due to concentrations of people with disabilities and the elderly; housing density; transit activity; and proximity to key types of destinations.

Based on the findings of the assessment, CUUATS staff developed recommendations related to ADA compliance, condition, connectivity, priority areas, and funding. These recommendations provide concrete steps that the local agencies can take to address the key findings of the inventory and assessment process, moving the community toward a safer and more accessible sidewalk network for all pedestrians.

Acknowledgments

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Illinois Department of Transportation

City of CHAMPAIGN

CITY OF URBANA

Savoy ILLINOIS

ILLINOIS UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

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1 Introduction

The Americans with Disabilities Act (ADA) of 1990 marked the beginning of a new era of disability rights in the United States. Framed in the language of civil rights, ADA offers sweeping protections for individuals with disabilities. Title II of the Act prohibits state and local government agencies from discriminating against people with disabilities in their services, programs, and activities.

Among the services that must be accessible to individuals with disabilities are transportation facilities, including pedestrian infrastructure. Pedestrian network features fall within the public right-of-way, and their accessibility is governed by the Public Right-of-Way Accessibility Guidelines (PROWAG). The PROWAG standards were developed by the Access Board, a federal agency, and were first published in draft form in 2002. The Access Board released the proposed PROWAG in 2011, though a final rule is still pending.

Among other regulations, ADA requires that government agencies develop a transition plan to describe how they will become compliant with the provisions of the Act. The transition plan must include a self-evaluation, in which barriers to accessibility are inventoried. The plan also must prioritize barriers based on certain criteria and provide a schedule for implementing accessibility improvements. Since curbs and other pedestrian network features represent some of the greatest barriers to mobility for individuals with disabilities, they are among the most important elements in the inventory and prioritization processes.

Since ADA took effect in the early 1990s, government agencies in the Champaign Urbana Urbanized Area have developed ADA compliance plans—and more recently, transition plans—to satisfy the requirements of the Act (see *Chapter 2*). In some cases, the agencies conducted inventories of sidewalk network features in developing these plans. However, these inventories were limited in scope and were based on the federal standards of the time, making it difficult for the agencies to develop detailed transition plans that reflect current PROWAG standards.

Designed to address these limitations, the Sidewalk Network Inventory and Assessment was a two-year effort to measure and analyze the sidewalk network in the urbanized area. The project was executed by the Champaign Urbana Urbanized Area Transportation Study, a program of the Champaign County Regional Planning Commission, in partnership with a working group representing five agencies:

- City of Champaign
- City of Urbana
- Village of Savoy
- University of Illinois
- Illinois Department of Transportation, District 5

The inventory and assessment process was designed to achieve several goals shared by the working group agencies. These goals included:

- Creating a comprehensive database of sidewalk network features
- Assessing the condition and Americans with Disabilities Act (ADA) compliance of sidewalk network features
- Identifying sidewalk gaps, missing curb ramps, and priority areas for sidewalk network improvements
- Making policy recommendations for sidewalk maintenance, improvement, and funding

INTRODUCTION

Data collection for the inventory took place within a priority collection area consisting of approximately 690 miles of sidewalks (see *Chapter 3*). The priority collection area included all sidewalks adjacent to public streets in the urbanized area, as well some off-streets sidewalks and pedestrian paths in the University of Illinois campus area. Within the priority collection area, field staff collected data for four types of features:

- Sidewalks
- Curb ramps
- Crosswalks
- Pedestrian signals

Based on the data collected, pedestrian network features were analyzed to determine their level of ADA compliance (see *Chapter 4*). Using a compliance index, each feature was assigned a score between 0 and 100 based on its compliance with PROWAG standards. The compliance index evaluated factors such as dimensions, slopes, obstructions, and vertical fault size, providing a snapshot of the accessibility of the feature.

Factors such as surface condition, frequency of vertical faults, and number of cracked panels were evaluated using a condition index (see *Chapter 5*). Like the compliance index, the condition index assigned each feature a numeric score based on the data collected. Though not directly based on accessibility standards, the condition index highlighted features in need of maintenance or replacement.

The overall connectivity of the sidewalk network was examined using two tools: sidewalk gap analysis and missing curb ramp analysis (see *Chapter 6*). These analyses identified new features needed to complete the sidewalk network and assessed the contribution of each potential feature to overall connectivity.

To aid local agencies in prioritizing features for improvement, priority areas were identified in the urbanized area (see *Chapter 7*). These priority areas were based on demographic and built-environment criteria specified by ADA and represented the zones with the greatest demand for accessible pedestrian infrastructure.

The findings from the inventory and analysis yielded a variety of recommendations related to compliance, condition, connectivity, priority areas, and funding (see *Chapter 8*). These recommendations can be used by the local agencies to make the sidewalk network safer and more accessible for all pedestrians.

2 Background

The Sidewalk Network Inventory and Assessment builds on decades of previous work to create an accessible pedestrian network. This work has taken place at the federal, state, and local levels and has produced a web of interrelated plans, policies, regulations, and standards governing accessibility. This chapter describes each of these elements and situates the current standards for accessible pedestrian infrastructure, PROWAG, within the landscape of accessibility protections.

Since the mid 1960s, federal laws have required communities to consider the needs of individuals with disabilities in planning and constructing the built environment. Initially implemented as narrow architectural standards, these protections were later expanded as part of sweeping civil rights measures that guaranteed equal access to people with disabilities.

Enacted in 1990, the Americans with Disabilities Act (ADA) is the most comprehensive of these accessibility laws and requires local governments to develop transition plans for becoming compliant. The Access Board is the agency charged with developing ADA standards, which are subsequently adopted by other federal departments. To apply ADA to the pedestrian network, the Access Board developed proposed Public Right-of-Way Accessibility Guidelines (PROWAG), though more than ten years after the publication of the first draft, the final rule is still pending.

At the state level, the 1965 Facilities for the Handicapped Act and the 1985 Environmental Barriers Act paved the way for statewide accessibility standards. These standards, the Illinois Accessibility Code (IAC), include provisions for pedestrian network elements. Since the 1970s, the Illinois Department of Transportation (IDOT) has developed and updated standards for accessible curb ramps. IDOT also developed its first ADA transition plan in 1992 and published a revised transition plan in 2014.

At the local level, municipalities in the Urbanized Area have implemented a variety of sidewalk improvement and maintenance programs since the 1980s. Most of the municipalities also have enacted their own ordinances governing the placement and physical characteristics of sidewalks. Several of these regulations reference ADA or PROWAG standards, but some also contain outdated provisions that conflict with the current federal standards.

Of the agencies in the Champaign Urbana Urbanized Area, only the City of Champaign has a stand-alone pedestrian plan. Other municipalities rely on comprehensive plans, complete streets policies, and other planning documents to guide sidewalk network development.

Sidewalk inventory and assessment procedures are usually developed locally and vary significantly from one city to another. Two previous inventories—conducted in Bellevue, Washington and Lee's Summit, Missouri—served as examples in developing the methodology used in the Champaign Urbana Urbanized Area. In Bellevue, data collection was partially automated using a scooter-mounted collection device, and staff analyzed the data using activity and impedance scores. In Lee's Summit, a private consultant performed the data collection manually and developed defect scores and priority areas. The analysis for Lee's Summit also identified and prioritized missing sidewalk segments.

Federal Policies and Standards

Over the last five decades, state and federal regulators have enacted increasingly comprehensive protections for people with disabilities (see *Table 2-1*). These policies and standards form the backdrop for accessibility policies at the local level.

Americans with Disabilities Act

Federal accessibility policy has its origin in the Architectural Barriers Act (ABA) of 1968. The Act required limited accessibility provisions in buildings purchased or leased with federal funds.

During the 1970s, Congress enacted sweeping protections for individuals with disabilities. The Rehabilitation Act of 1973 prohibited discrimination on the basis of disability by federal agencies and contractors and required new or altered facilities used for federally-funded programs to be accessible. Unlike previous legislation, the Act framed accessibility as a civil rights issue, paving the way for the Americans with Disabilities Act. It also established the Access Board, a federal agency responsible for developing accessibility standards and investigating complaints. In 1988, the Civil Rights Restoration Act extended the protections of the Rehabilitation Act to all programs of agencies that receive federal funds.

The latest and most comprehensive federal legislation protecting individuals with disabilities is the 1990 Americans with Disabilities Act (ADA). Building on the civil rights protections of the Rehabilitation Act, ADA guarantees equal access to areas such as employment, public facilities, transportation, and government services. Among other provisions, ADA requires state and local agencies to develop a transition plan that includes a self-evaluation of existing facilities and a prioritized list of future accessibility improvements.

During the 1990s and 2000s, the Access Board developed the ADA Accessibility Guidelines (ADAAG) describing the standards for accessible buildings and facilities. These standards were adopted by the U.S. Department of Transportation and the U.S. Department of Justice in 2006 and 2010, respectively, giving them the force of law. Under ADA, the standards apply to state and local government facilities, transportation facilities, and most private commercial establishments.

Public Right-of-Way Accessibility Guidelines

Public rights-of-way, including the pedestrian network, are required to be accessible to people with disabilities under Title II of ADA. In 1992, the Access Board proposed guidelines for government facilities that included standards for the public right-of-way. Based on public comments, however, the Board deferred action on the pubic right-of-way standards and instead formed the Public Rights-of-Way Access Advisory Committee (PROWAAC) to make recommendations.

Following PROWAAC's 2001 report, *Building a True Community*, the Access Board published the draft Public Right-of-Way Accessibility Guidelines (PROWAG) containing standards for pedestrian access routes in the public right-of-way. The draft guidelines were revised in 2005, and proposed guidelines were published in 2011. The public comment period for PROWAG ended in 2012, and a final rule has not yet been released.

Illinois Statutes and Policies

In 1965, the Illinois General Assembly enacted the Facilities for the Handicapped Act, which required accessible features in buildings open to the public. The statute required public buildings and sites to conform to the Standard Specifications for Facilities for the Handicapped.

In the mid-1970s, the Illinois Department of Transportation (IDOT) published its first accessible curb ramp design standards. During the 1980s, the Environmental Barriers Act (1985) and the Illinois Accessibility Code (1988) established new standards for accessibility, including standards for accessible curb ramps. In 1988, IDOT updated its curb ramp requirements in accordance with the new standards.

Following the enactment of ADA in 1990, IDOT completed an initial transition plan for making state facilities compliant. The 1992 transition plan outlined the Departments goals for accessibility, including a curb ramp prioritization strategy.

Since the 1990s, the focus of Illinois accessibility policy has been on integrating federal standards with state standards and policies. In 2007, the General Assembly amended the Illinois Highway Code to require consideration of pedestrians and cyclists, reflecting a national movement toward complete streets. In 2014, IDOT revised its ADA transition plan to reflect the draft PROWAG standards.

Table 2-1 **Federal Policies and Standards Time Line**

Decade	Americans with Disabilities Act	Public Right-of-Way Accessibility Guidelines	Illinois Statutes and Policies
1960s	**1968:** Architectural Barriers Act (ABA)		**1965:** Facilities for the Handicapped Act
1970s	**1973**: Section 504 of the Rehabilitation Act banned discrimination on the basis of disability by recipients of federal funds **1977:** Section 504 regulations were issued, paving the way for ADA		**Mid-1970s:** Illinois Department of Transportation (IDOT) issued standards for the design of curb ramps for people with disabilities
1980s	**1986:** The National Council on Disability recommended enactment of ADA in its Toward Independence report **1988:** Civil Rights Restoration Act		**1985:** Environmental Barriers Act **1988:** Illinois Accessibility Code (IAC) **1988:** IDOT revised standards for the design of curb ramps
1990s	**1990:** Americans with Disabilities Act (ADA) **1991:** Access Board published the original ADA Accessibility Guidelines (ADAAG) **1999:** Access Board published updated ADAAG for public comment	**1992:** Access Board proposed guidelines for government facilities, including rules for public right-of-way **1998:** Access Board issued final rules for government facilities but deferred action on public right-of-way rules **1999:** Access Board convened the Public Rights-of-Way Access Advisory Committee (PROWAAC)	**1992:** IDOT completed its initial ADA transition plan **1994:** IDOT published design standards for accessible curb ramps and issued PM 94-12 containing accessibility requirements for state highways
2000s	**2004:** Access Board published final ADAAG **2006:** Department of Transportation adopted final ADAAG	**2001:** PROWAAC reported its findings to the Access Board **2002:** Access Board published draft Public Right-of-Way Accessibility Guidelines (PROWAG) **2005:** Access Board published revised draft PROWAG	**2006:** Chicago became the first municipality in Illinois to adopt a complete streets policy **2007:** The Illinois Highway Code was amended to include complete streets provisions
2010s	**2010:** Department of Justice adopted final ADAAG	**2011:** Access Board published proposed PROWAG **2012:** Public comment period for proposed PROWAG ended	**2014:** IDOT released its revised draft transition plan

Data Sources: Illinois Department of Transportation, 2014 Americans with Disabilities Act Transition Plan, June 2014, p. 5; U.S. Access Board, Background on the Public Rights-of-Way Rulemaking, http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/background; U.S. Access Board, Background, https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background; Mayerson, A. (1992) The History of the Americans with Disabilities Act: A Movement Perspective, Disability Rights Education & Defense Fund, http://dredf.org/news/publications/the-history-of-the-ada/; Frieden, L. (July 2005) MCD and the Americans with Disabilities Act: 15 Years of Progress, National Council on Disability, http://www.ncd.gov/publications/2005/06262005.

Local Programs and Policies

Against the backdrop of federal and state accessibility legislation, local agencies in the Champaign Urbana Urbanized Area have instituted their own programs and policies over the last three decades (see *Table 2-3*).

City of Champaign

Beginning in the mid-1980s, the City of Champaign instituted a series of sidewalk repair and rehabilitation programs to improve the physical condition of sidewalks. The City also adopted standards governing the construction of sidewalks and curb ramps in 1987 and 1988, respectively.

In 1992, the City published an initial Americans with Disabilities Act Compliance Plan to satisfy the ADA transition plan requirement. Additionally, the City made site-specific rehabilitation on sidewalk segments with the implementation of the 1994 Beardsley Park Sidewalk Repairs program and the 1994 Neighborhood Infrastructure Repair Program.

In 2008, the City of Champaign adopted a complete streets policy requiring roadway projects to consider all modes of transportation. In 2013, it began updating its ADA transition plan, a process that is ongoing.

City of Urbana

In 1985, the City of Urbana began installing curb ramps to make the pedestrian network more accessible to wheelchair users and other individuals with disabilities. In 1991, City staff conducted a survey of curb ramps and found that 62.5 percent of locations requiring a ramp had one, though the standards used to determine where ramps were necessary were more lenient than PROWAG standards.

The City of Urbana published its initial ADA Compliance Plan in 1993. The plan established priorities for installation of curb ramps and set target dates for constructing the ramps. The City's 2012 ADA transition plan updated and expanded the earlier plan, outlining specific criteria used to prioritize potential accessibility projects and describing data collection procedures.

Urbana's historic brick sidewalks have proven difficult and expensive to maintain. A 1997 survey of property owners with brick sidewalks found a wide variety of opinions, though few respondents were willing to bear the full cost of brick maintenance through taxes or assessments. In 2002, the City established a replacement policy requiring contractors to repair damage to brick sidewalks and providing limited resources for residential brick sidewalk repairs.

Village of Savoy

The Village of Savoy is working with the Champaign Urbana Urbanized Area Transportation Study (CUUATS) to develop a complete streets policy in conjunction with its forthcoming *Savoy Bike + Pedestrian Plan*.

CUUATS and CATS

The Campus Area Transportation Study Policy Committee, representing the University of Illinois, the City of Champaign, the City of Urbana and the Champaign-Urbana Mass Transit District, adopted a complete streets policy in 2012 During the same year, the Policy Committee of the Champaign Urbana Urbanized Area Transportation Study (CUUATS) adopted a complete streets policy for the metropolitan planning organization (MPO). These policies were designed to better integrate pedestrian planning and pedestrian network benchmarks in the transportation planning process.

Table 2-2 **Local Programs and Policies Time Line**

Decade	Champaign	Urbana	Savoy	CUUATS/CATS
1980s	**1985:** Sidewalk Repair Program **1985:** Sidewalk Rehabilitation Program **1987:** Sidewalk Access Ramp Policy **1987:** Sidewalk Access Ramp Construction Code **1988:** New Sidewalk Construction Standards	**1984:** Census Tract 55 Sidewalk Project **1985:** First curb ramps installed **1988:** Subdivision Code, including updates to sidewalk requirements		
1990s	**1992:** Americans with Disabilities Act Compliance Plan **1994:** Neighborhood Infrastructure Repair Program **1994:** Beardsley Park Sidewalk Repairs **1995:** Justice Department Council Policy Revision **1995:** Americans with Disabilities Act Ramp Program Adjustments	**1991:** Survey of curb ramps conducted by Public Works **1993:** Americans with Disabilities Act Compliance Plan **1995:** Streetscaping and Crosswalk Repair Project **1997:** Brick Sidewalks in Urbana Survey Report **1997:** Southwest Urbana Sidewalk Repair Project		
2000s	**2008:** Complete Streets Policy	**2002:** Brick Sidewalk Replacement Policy **2003** and **2005:** Brick Sidewalk Repair Projects **2007:** Northwest Urbana Sidewalk replacement Project **2009:** Brick Sidewalk Reconstruction Project		
2010s	**2013:** ADA Transition Plan Update	**2011:** Complete Streets Policy **2012:** ADA Transition Plan	**Forthcoming:** Complete Streets Policy	**2012:** CATS Complete Streets Policy **2012:** CUUATS Complete Streets Policy

Local Regulations

Municipalities in the Champaign Urbana Urbanized Area have a variety of policies related to sidewalks. To summarize the state of pedestrian network policies in the urbanized area, the municipal codes and related standards were reviewed, with an eye toward four focus areas (see *Table 2-3*):

- Requirements for new development
- Design standards
- Maintenance and replacement
- Snow removal

The Village of Bondville was not included in the review because its municipal code was not available in electronic format.

Requirements for New Development

Most municipalities in the urbanized area require sidewalks on both sides of the street in residential subdivisions. Policies for industrial and commercial development are more varied. Of the municipalities examined, only the Village of Tolono has no specific requirement for sidewalk construction.

Design Standards

All of the municipalities require new sidewalk widths of at least four feet, and some require wider sidewalks, particularly in areas where pedestrian traffic is high, such as commercial districts. In addition, the University of Illinois requires a minimum six-foot sidewalk width on University properties. PROWAG standards require a minimum continuous width of four feet with five-foot-wide passing spaces at least every 200 feet (R302.3 and R302.4).

Limits on the grade of the sidewalk range from five to ten percent, with only the Village of Savoy not specifying a maximum running slope. PROWAG standards specify that the grade of sidewalks within the street right-of-way must match the grade of the street, and it limits the running slope of pedestrian paths to five percent in other locations (R302.5).

The Cities of Champaign and Urbana require maximum sidewalk cross slopes of four percent and 1/4 inch per foot (2.08 percent), respectively. PROWAG standards require a maximum cross slope of 2 percent for all pedestrian access routes (R302.6). In practice, however, both municipalities require developers to construct sidewalks with a maximum cross slope of 2.0 percent, as required by PROWAG.

The municipal codes for the Cities of Champaign and Urbana require that sidewalks are constructed to current ADA/PROWAG standards. The Village of Savoy requires ADA-compliant curb ramps but does not reference PROWAG standards for sidewalks.

Ownership, Maintenance, and Replacement

Sidewalks within the street right-of-way are usually owned by the municipality, while carriage walks and walkways to houses are owned by the property owner. Sidewalks within public parks are owned and maintained by the owner of the park property, usually the park district or village. Sidewalks on University of Illinois property are owned and maintained by the University, or by specific auxiliary units such as athletics or housing.

Only the City of Champaign provides a mechanism requiring property owners to repair or replace sidewalks that are in poor condition as part of the permitting process for buildings on the property. Other municipalities provide specifications for replacement sidewalks (City of Urbana) and for maintaining pedestrian paths free of obstructions (Village of Savoy).

Snow Removal

The Cities of Champaign and Urbana have similar policies requiring removal of snow and ice from sidewalks by property owners in certain districts. The City of Urbana requires removal with 24 hours of the announcement of a qualifying snow event, while the City of Champaign allows property owners 48 hours before City crews remove the snow at the owner's expense.

According to an advisory letter published by the U.S. Department of Justice, municipalities generally are not required to enact ordinances requiring snow removal by private property owners under Title II of ADA. However, businesses and other places of public accommodation may be required to keep adjacent walkways free of snow and ice under Title III of the Act. In both Title II and Title III, temporary blockage of pedestrian access routes due to snow is allowed unless the issue lasts beyond "a reasonable period of time."[1]

1 For a detailed discussion of snow removal requirements under ADA, see the letter from Assistant Attorney General Deval L. Patrick to Senator Mitch McConnell dated April 16, 1996: http://www.justice.gov/sites/default/files/crt/legacy/2010/12/15/cltr191.txt.

Table 2-3 **Municipal Sidewalk Network Regulations**

Type of Regulation	Champaign	Urbana	Savoy	Tolono
Sidewalk requirements for new development	Sidewalks are required on both sides of the street in a subdivision (§ 31-620). Additionally, sidewalks must be installed along any new development other than a one- or two-unit residential building (§ 30-454). The Director of Public Works may waive the sidewalk requirement under certain circumstances (§ 30-456).	Sidewalks are required on both sides of the street for residential and commercial development and on one side for industrial development (§ 21-37). An administrative review committee may defer the sidewalk requirement in cases where sidewalks are not immediately necessary (§ 21-17).	Sidewalks are required on both sides of public streets within a subdivision. The Village Board may waive the sidewalk requirement except for subdivisions containing only multi-family or apartment units (§ 16.20.130).	
Sidewalk design standards	New sidewalks must be at least five feet wide, or at least six feet wide in high-traffic areas. They should have a maximum running slope of 8 percent and a cross slope between 2 and 4 percent. They must comply with current ADA standards (MP § 11.02).	New sidewalks must be at least five feet wide in commercial areas and at least four feet wide in other developments. They must have a maximum running slope of 5 percent and a cross slope of 1/4 inch per foot (2.08 percent) (§ 21-58). Sidewalks must comply with PROWAG standards (RP).	Sidewalks must be four feet wide. ADA-compliant curb ramps with a passable width of four feet are required where sidewalks meet public streets (§ 16.20.130).	New public sidewalks must be four feet wide and have a maximum running slope of 10 percent (§ 12.04.010).
Sidewalk maintenance and replacement	Prior to issuance of an occupancy permit, existing sidewalks on the property must be in good condition (§ 30-452). Addition of new driveways requires the replacement of sidewalks that are out of compliance with the Manual of Practice (§ 30-453).	Except under certain conditions, current brick sidewalks must be replaced with brick (§ 20-504). Replacement sidewalks of any material must be the same width as the original sidewalk, or 5 feet wide for replacements over 100 feet in length and those that include sidewalk ramps (RP).	Trees and other plantings must be trimmed so that they do not overhang the sidewalks (§ 12.20.040).	
Snow removal	Owners of property in the University District and Downtown District, as well as owners of building with more than four housing units, are responsible for removing snow and ice from sidewalks. When the Director of Public Works makes a determination that at least two inches of snow has fallen, these owners have 48 hours to perform the snow removal, or the City will perform it at their expense (§ 30-812).	Owners of property in the Downtown District, University District, and South Philo Road District are responsible for removing snow and ice from sidewalks. When the Director of Public Works makes a determination that at least two inches of snow has fallen, these owners have 24 hours to perform the snow removal (§ 11-65).	Village crews do not clear sidewalks (Snow Removal Info and Tips, Village of Savoy website).	

MP = Manual of Practice. RP = Right-of-Way Permit Standards. Except where otherwise noted, references are to the relevant municipal code.

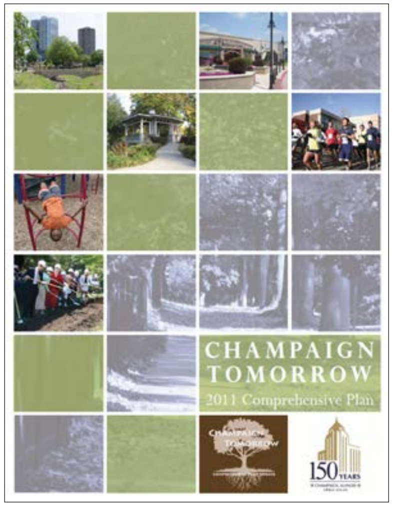
Local Plans

Several of the jurisdictions in the Champaign Urbana Urbanized Area have adopted plans that, directly or indirectly, touch on issues of pedestrian network construction and maintenance. While these plans are not legally binding, they provide a context for integrating pedestrian network improvements with ongoing planning efforts.

In this section, relevant plans are reviewed, and their recommendations with regard to the sidewalk network and pedestrian facilities are summarized. The plans reviewed are:

- Champaign Tomorrow Comprehensive Plan (2011)
- Walk Champaign Pedestrian Plan (2014)
- Walking for Life: Addressing Health in Champaign's Pedestrian Plan (2014)
- City of Urbana 2005 Comprehensive Plan
- Village of Savoy 2009 Comprehensive Plan Update
- Savoy Bike + Pedestrian Plan (In Development)
- University District Traffic Circulation Study (2013)
- University of Illinois University District: Crosswalk Markings and Signage 2011
- Active Choices: Champaign County Greenways & Trails Plan (2014)
- Long Range Transportation Plan: Sustainable Choices 2040 (2014)

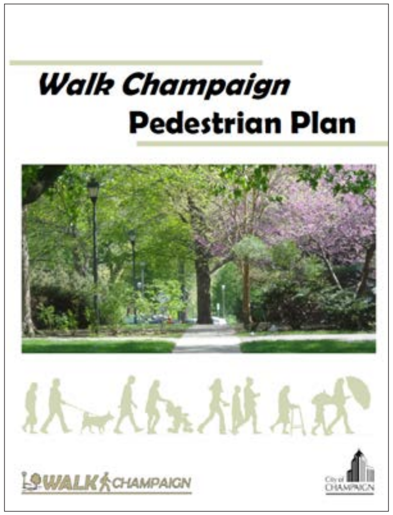
Champaign Tomorrow Comprehensive Plan (2011)



The *Champaign Tomorrow Comprehensive Plan* is a broad overview of methods to create complete streets, complete neighborhoods and complete public infrastructure in Champaign. It includes future land use maps and a growth area analysis to help the City plan for future growth. The plan focuses on constructing a walkable built environment, from residential neighborhoods to high density commercial areas and public spaces. It offers recommendations for pedestrian network improvements and sidewalk maintenance, including:

- **Recommendation:** "Residents live within a mile of neighborhood commercial uses where they can satisfy most everyday needs" (p. 32).
- **Recommendation:** "Residential development is within a five to ten minute walk of a park and is safely accessible" (p. 32).
- **Recommendation:** "Define neighborhood boundaries for the purpose of tracking densities, walking distance to activity centers, parks and other amenities" (p. 33).
- **Recommendation:** "Create a 'complete neighborhood' checklist that can be used by staff and decision makers when considering new development proposals. This list would ensure that all new development is within 5 to 10 minutes walking distance of parks and neighborhood commercial centers…" (p. 33).
- **Performance Measure:** "Sidewalks are built on both sides of streets in new development" (p. 44).

Walk Champaign Pedestrian Plan (2014)



Walk Champaign evaluates the current state of the pedestrian network in Champaign and proposes strategies to improve walkability. The plan identifies sidewalk gaps and large, auto-oriented intersections as the primary challenges facing pedestrians in the City. It proposes a three-tier system for prioritizing sidewalk gaps and recommends a variety of crossing and intersection modifications to improve safety. Specific recommendations from the plan include:

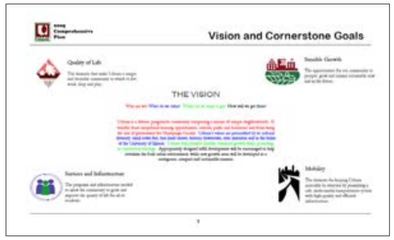
- **Recommendation:** In prioritizing sidewalk gaps, the plan "recommends that any effort to address gaps—whether through the Sidewalk Gap Program or an individual capital improvements process—focus on Tier 1 gaps before moving onto Tier 2 gaps, and Tier 2 gaps before connecting Tier 3 gaps" (p. 8).
- **Recommendation:** The plan "recommends fully filling in one side of a two-sided sidewalk gap before beginning work on the other side unless unusual circumstances exist which make a two-sided approach more feasible" (p. 8).
- **Recommendation:** The plan recommends that the Engineering Division revise its formula for determining protected crossing treatments by lowering pedestrian volume thresholds and adjusting scoring ranges (p. 16).
- **Recommendation:** The plan recommends that the City "pursue lower-tier crossings entirely under its own jurisdiction before attempting to address higher-tier IDOT crossings" (p. 16).
- **Recommendation:** The plan proposes several possible treatments at signalized intersections, including "narrower crossing distances, tighter curb radii, retiming of signals, and improved crosswalk infrastructure" (p. 26).
- **Recommendation:** The plan identifies 16 intersections that lack lighting and "recommends that the Neighborhood Street Light Program consider [these] intersections when funding becomes available" (p. 34).
- **Recommendation:** The plan proposes several specific streetscape improvements and recommends pedestrian accommodations for overpasses, underpasses, interchanges, and viaducts (pp. 36-46).

Walking for Life: Addressing Health in Champaign's Pedestrian Plan (2014)

Walking for Life provides recommendations for Champaign to focus on specific problem areas in the pedestrian network. With an emphasis on public health, this appendix to the *Walk Champaign Pedestrian Plan* reviews factors that influence walkability and health and recommends strategies to promote public health though pedestrian activity. The study proposes several site-specific improvements as well as 11 city-wide recommendations, including:

- **Recommendation:** "Revise Champaign's existing snow removal ordinance" (R1, p. 6).
- **Recommendation:** "Prioritize improvements for Champaign's high-reliance neighborhoods." High-reliance neighborhoods are those whose population demographics suggest a high level of reliance on the sidewalk network for transportation (R2, p. 7).
- **Recommendation:** "Support CU Safe Routes to School in Unit 4 Schools" (R6, p. 9).
- **Recommendation:** "Prioritize sidewalk gap infill in high-demand areas" such as Prospect Avenue, Springfield Avenue, and Neil Street (R7, p. 9).
- **Recommendation:** "Retrofit [collector and minor arterial streets in accordance with] Champaign's complete streets resolution" (R9, p. 10).
- **Recommendation:** "Mandate direct (to-the-door) connections to destinations" by requiring developers to connect new pedestrian facilities to the existing sidewalk network (R11, p. 11).

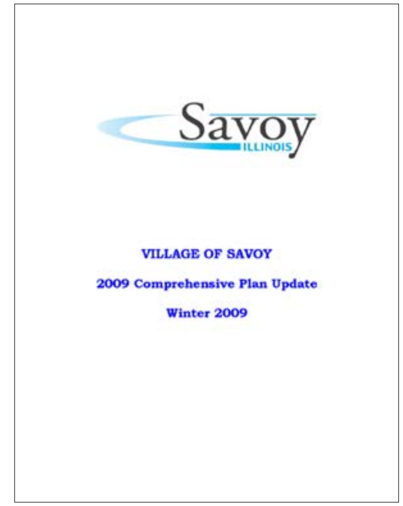
City of Urbana 2005 Comprehensive Plan



The *2005 Comprehensive Plan for Urbana* highlights the City's overarching vision for maintaining its unique historic neighborhoods and small town feel. This guiding document focuses on opportunities to improve streetscapes, revitalize neighborhoods, and make communities more walkable. Proposed improvements to pedestrian safety, accessible public rights-of-ways, and intersection infrastructure are also included. Mobility is a focal point of the plan, and maintaining efficient and accessible public facilities is a priority. Specific objectives set forth in the plan include:

- **Objective:** "Encourage adequate pathways to connect residential areas to nearby commercial and office areas" (Objective 11.2, p. 36).
- **Objective:** "Improve intersection markings and signage, especially in the University District and downtown areas" (Objective 44.3, p. 52).
- **Objective:** "Ensure that street lighting is established in tandem with new development in order to enhance safety" (Objective 44.4, p. 52).
- **Objective:** "Promote new technologies and designs in construction and improvement of crosswalks, including accessible ramps and signaling for the visually impaired" (Objective 44.6, p. 52).

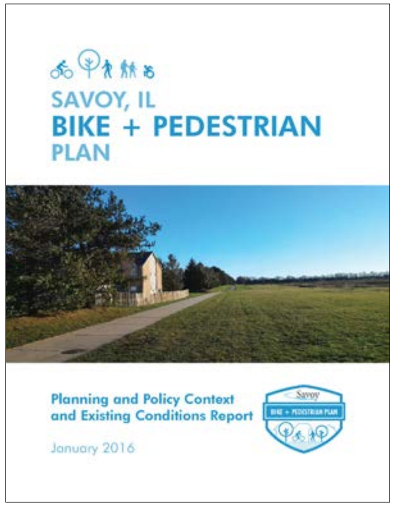
Village of Savoy 2009 Comprehensive Plan Update



The *Village of Savoy 2009 Comprehensive Plan Update* provides an account of transportation, land use, and developmental changes since the last comprehensive plan update in 2002. It is designed to assist Village officials in making important growth and development management decisions. The plan proposes strategies for maintaining Savoy's small town atmosphere, preparing for development over the next five years, and improving City infrastructure in specific locations. Recommendations found in the plan include:

- **Recommendation:** "Continue the requirement that developers install sidewalks in new developments" (p. 6).
- **Recommendation:** "Continue efforts to develop the greenway concept along U.S. 45 from Curtis Road southward" (p. 6).

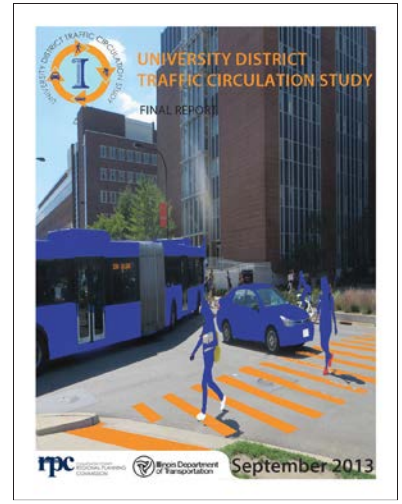
Savoy Bike + Pedestrian Plan (In Development)



Working with staff at the Champaign County Regional Planning Commission (CCRPC), the Village of Savoy is currently developing the *Savoy Bike + Pedestrian Plan*. In January 2016, CCRPC staff released an existing conditions report detailing the current state of the roadway, bicycle, sidewalk, and transit networks in the Village and surrounding areas. Key findings related to pedestrians in the report include:

- **Finding:** Residents of Savoy are highly automobile-dependent, with approximately 85 percent of workers commuting via car, truck, or van. Less than 1 percent of employed residents walk to work (p. 19).
- **Finding:** "Most major roadways in the study area have a low frequency of driveways, making them potential candidates for a sidepath. Dunlap Avenue (U.S. 45) is a leading candidate, both due to its location and the concentration of destinations along its length in the study area" (p. 35).
- **Finding:** Between 2009 and 2013, four bicycle-vehicle crashes and one pedestrian-vehicle crash took place on Windsor Road at its intersections with U.S. 45 and Prospect Avenue (p. 39).

University District Traffic Circulation Study (2013)

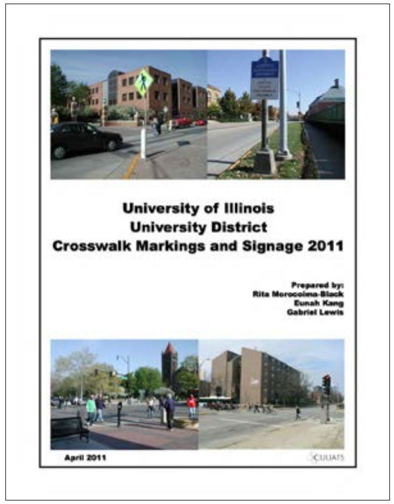


The *University District Traffic Circulation Study* was prepared in response to the rapid growth of the University of Illinois. The purpose of the study was to enhance the transportation network as the University's reach and influence grows. The study analyzed vehicular flow, traffic crashes, pavement condition, speed issues, traffic congestion. In addition, the report evaluated the status, as of 2011, of recommendations from previous plans and studies, including:

- **Not Implemented:** "Provide mid-block crosswalks at locations that pedestrians have gradually transformed into de facto crosswalks" (p. 17, from *Crosswalk Signing and Marking Effects on Conflicts and Pedestrian Safety on the UIUC Campus*, 2007).
- **Not Implemented*:** "Install pedestrian activated signals at busy mid-block crossings to allow pedestrians to cross when vehicles are stopped" (p. 17, from *Crosswalk Signing and Marking Effects on Conflicts and Pedestrian Safety on the UIUC Campus*, 2007).
- **Implemented:** "Make crosswalks more visible to both pedestrians and motorists" (p. 19, from *Analysis of Pedestrians and Drivers Opinions on Crosswalk Safety on the UIUC Campus*, 2007).
- **Ongoing:** "Mid-block crosswalks should be located where walkways cross streets and pedestrians regularly use walkways" (p. 19, from *Analysis of Pedestrians and Drivers Opinions on Crosswalk Safety on the UIUC Campus*, 2007).
- **Ongoing:** "Upgrade traffic signals on campus to enhance pedestrian safety, including the use of pedestrian countdown signal heads" (p. 21, from *Multi-Modal Transportation Study*, 2007).

* Since 2011, pedestrian activated signals have been installed at the Grainger Library.

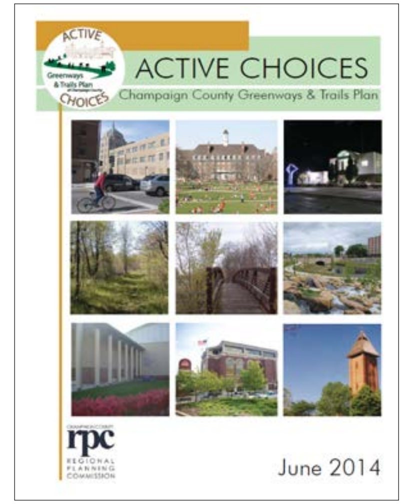
University of Illinois University District: Crosswalk Markings and Signage 2011



University of Illinois University District: Crosswalk Markings and Signage 2011 gives general guidelines for crosswalk signage and markings for the University District. It provides general and intersection-specific recommendations for Campus Area Transportation Study (CATS) zones 1, 2, and 3. General recommendations for the zones include:

- **Zone 1:** "Use high visibility continental crosswalk markings for all controlled and uncontrolled marked crossings" on major corridors. Crosswalks should be 9 feet wide on the north and south legs of the intersection and 6 feet wide on the east and west legs. Crossings outside major corridors should use standard markings with a width of ten feet (p. 1).
- **Zones 2 and 3:** Crosswalks should follow the CUUATS guidelines except for crossings with high pedestrian volumes, which should be marked with a high visibility crosswalk with a minimum width of 9 feet. Stop bars and Stop Here For Pedestrian Signs should be located 20 to 50 feet ahead of unsignalized mid-block crosswalks, except in selected cases where other treatments are warranted (pp. 2-3).

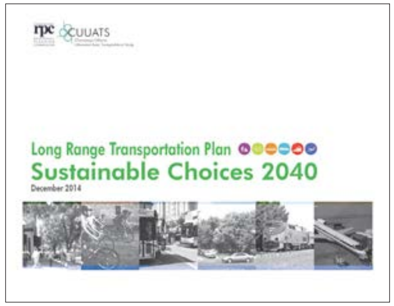
Active Choices: Greenways & Trails Plan (2014)



Prepared by the Champaign County Regional Planning Commission on behalf of a coalition Greeways and Trails member agencies, *Active Choices* updates the *2004 Champaign County Greenways and Trails Plan*. The plan reviews local planning documents, evaluates existing conditions, and provides design guidelines for trails, bicycle lanes, and other similar facilities. The plan also proposes goals, objectives, strategies, and performance measures for enhancing pedestrian facilities in the area, including:

- **Objective:** "Increase the mileage of bicycle and pedestrian facilities in Champaign County by 70 miles by 2020" (p. 123).
  - **Strategy:** "Identify 'missing links' in the overall system."
- **Objective:** "Complete at least 10 missing links in the trail and bikeway system by 2020" (p. 124).
  - **Strategy:** "Identify gaps between trails that can be connected with the implementation of trails, bike lanes or bike routes."
  - **Strategy:** "Identify 'dead end' shared-use paths, bikeways and bike lanes."
- **Objective:** "Increase the mileage of bicycle and pedestrian facilities in five low-income areas by 2020" (p. 124).
  - **Strategy:** "Identify neighborhoods that are underserved by pedestrian and bicycle paths."
- **Objective:** "Increase pedestrian safety by minimizing cut-through motorized vehicular traffic on 5 residential streets by 2020" (p. 126).
  - **Strategy:** "Require street layouts and traffic controls that discourage speeding and implement traffic calming improvements"
- **Objective:** "Increase pedestrian safety by improving markings and signage at least 5 intersections by 2020" (p. 127).
  - **Strategy:** "Encourage adoption of Pedestrian Safety Action Plans by the University of Illinois, City of Urbana, and City of Champaign."

Long Range Transportation Plan: Sustainable Choices 2040 (2014)



Sustainable Choices 2040 is the federally-mandated long range transportation plan for the Champaign Urbana Urbanized Area. As the metropolitaan planning organization (MPO) for the region, the Champaign Urbana Urbanized Area Transportation Study is required to prepare this document every five years.

The plan projects changes in the urbanized area's transportation system over the next 25 years. With a regional scope, it includes an analysis of the pedestrian, bicycle, bus, automobile, rail, and air modes of transportation in the metropolitan planning area. Overall, the plan aims to provide recommendations and strategies to help stakeholders make investments to improve core accessibility, arterial mobility, and regional connectivity. Specific objectives and strategies include:

- **Objective:** "Reduce the total number of crashes involving pedestrians in Champaign-Urbana by 15% by 2020" (p. 120).
  - **Strategy:** "Continue to enforce codes requiring new development to provide sidewalks along roadway frontages and safe crossings at intersections" (p. 121).
- **Objective:** "Upgrade 2015 existing sidewalk network within the Champaign-Urbana urbanized area by 10% to be ADA-compliant by 2020" (p. 124).
  - **Strategy:** "Install ADA-compliant sidewalks and ramps on all new roadway projects" (p.125).
- **Objective:** "Develop pedestrian plans for all jurisdictions within the urbanized area by 2020" (p. 126).
  - **Strategy:** "Consult with existing pedestrian plans and local agencies to coordinate all plans and infrastructure priorities" (p. 127).
- **Objective:** "Develop snow removal ordinances, programs, and policies for all jurisdictions to provide year-round access to sidewalks, bike paths, and transit stops by 2020" (p. 126).
  - **Strategy:** "Define high traffic and priority areas for snow removal" (p.127).
- **Objective:** "Increase accessibility to transit services by providing missing sidewalks connecting to at least 20 bus stops by 2020" (p. 128).
  - **Strategy:** "Apply for funding to build sidewalks connecting to bus stops" (p. 129).
- **Objective:** "Provide multimodal access to at least 3 new open spaces or recreational spaces by 2020" (p. 128).
  - **Strategy:** "Complete sidewalk inventory and assessment of Urbanized Area" (p. 129).

Example Sidewalk Assessments

The self-assessment requirement of the ADA transition plan has proven to be one of the Act's most challenging provisions for units of local government. In order to assess the state of pedestrian network features, governments need a large quantity of field data corresponding to current accessibility standards, which have changed throughout their development. In addition, ADA provides little guidance on how accessibility data should be collected or assessed, leaving municipalities to develop their own procedures.

In this section, ADA inventory and assessment procedures from Bellevue, Washington and Lees Summit, Missouri are reviewed (see *Table 2-4*). These procedures served as examples in the development of the inventory and assessment for the Champaign Urbana Urbanized Area. Common features between these example sidewalk inventories included collection of sidewalk surfaces, distress conditions, and slopes. In addition, each assessment created a prioritization system to identify areas in need of sidewalk repair, reconstruction, or installation.

City of Bellevue, Washington

In its 2009 *ADA Self-Evaluation Report*, the City of Bellevue used an activity score and an impedance score to prioritize pedestrian network features. The activity score represented the amount of pedestrian activity in the area and included factors such as the concentration of individuals with disabilities and seniors; street traffic volume; housing density; and proximity to locations such as public facilities, schools, parks, retail, and employment centers.

The impedance score represented the amount of resistance a pedestrian network feature posed to individuals with disabilities. Factors considered in the impedance score included obstructions, vertical faults, slopes, dimensions, and the presence of accessibility features such as detectable warning surfaces. To collect data on sidewalks, City of Bellevue technicians used an Ultra-Light Inertial Profiler (ULIP) mounted on a Segway scooter. Technicians also rode a bicycle and used a portable GPS unit to conduct the curb ramp inventory.

City of Lee's Summit, Missouri

In 2009, the City of Lee's Summit hired Burns & McDonnell Engineering to assess the City's sidewalk network and to prepare its *Public Sidewalk Inventory Analysis Report*. Using a table computer and a GPS unit, the data collection staff conducted field audits of all existing sidewalk segments, recording defects such as vertical faults, horizontal gaps, and surface condition issues. Curb ramps and other sidewalk endpoints were given a cursory visual assessment but were not measured.

Defect scores derived from the inventory were normalized using the length of the sidewalk segment, and sidewalk replacement costs were estimated. In addition, sidewalk segments were prioritized based on their proximity to schools and parks.

Using street centerlines collected as part of the inventory, a gap analysis was used to identify streets that lacked a sidewalk on one or both sides. A minimum gap length of two feet was used in the analysis. New sidewalks identified in the analysis were prioritized based on factors such as population density, housing density, subdivision age, and whether the street lacked sidewalks on one or both sides.

Table 2-4 **Comparison of Example Sidewalk Inventories**

Factor	Bellevue, WA	Lee's Summit, MO
Existing sidewalks examined	321 miles	353 miles
Total project budget	$285,000	$188,983
Features collected	Sidewalks and curb ramps	Sidewalks (visual assessment of curb ramps)
Data collection tools	Ultra-Light Inertial Profiler (sidewalks) and manual measurement tools (curb ramps)	Manual measurement tools
Assessment tools	Activity score and impedance score	Defect score and priority areas

3 Data Collection

The study area for the sidewalk inventory was the Champaign-Urbana Urbanized Area, a geography defined by the U.S. Census Bureau (see *Figure 3-1*). The urbanized area includes the University of Illinois campus and five municipalities:

- City of Champaign
- City of Urbana
- Village of Bondville
- Village of Savoy
- Village of Tolono

Within the urbanized area, data collection was focused on the priority collection area. This area was defined as pedestrian paths adjacent to the public street network, as well as those in the University of Illinois campus area. The priority collection area included approximately 690 miles of sidewalks.

Within the priority collection area, the inventory recorded four types of features in the pedestrian network:

- **Sidewalks** – Linear paths, usually adjacent to public streets
- **Curb Ramps** – Transitions between sidewalks and the street
- **Crosswalks** – Marked crossings at intersections or mid-block crossings
- **Pedestrian Signals** – "Walk" signals indicating safe crossing phases

For each type of feature, a variety of measurements were taken (see *Table 3-1*). The sections that follow describe the fields for each feature type.

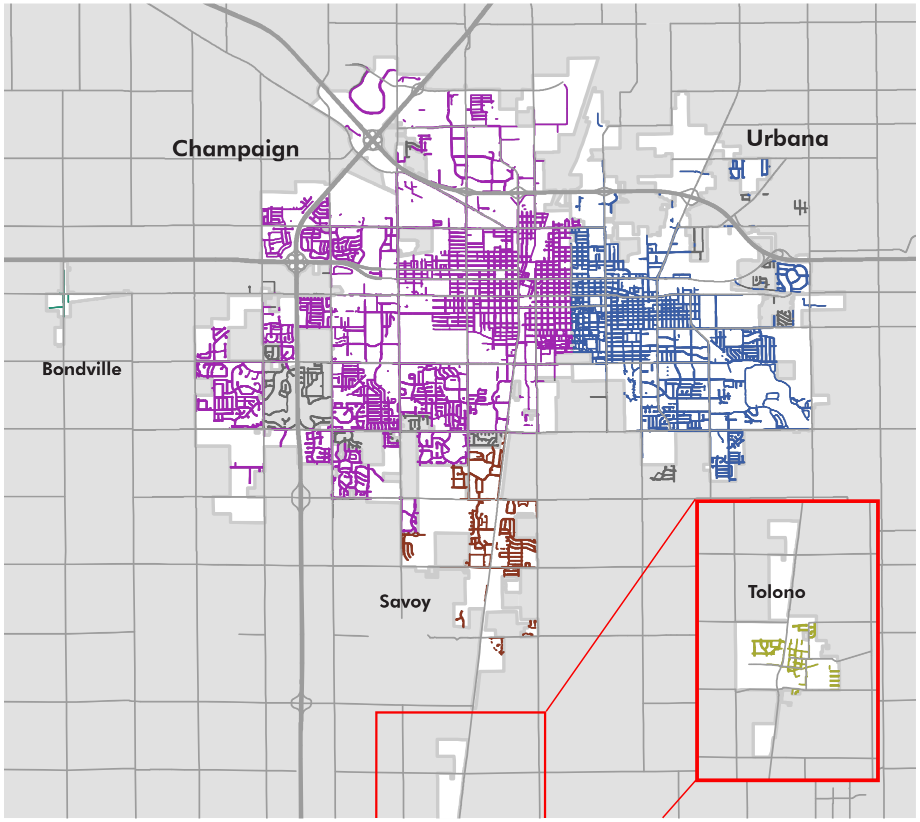


Figure 3-1 **Project Study Area**

Table 3-1 **Inventory Fields by Feature Type**

Variable	Units	Sidewalks	Curb Ramps: Ramp	Curb Ramps: DWS	Curb Ramps: Gutter	Curb Ramps: Landing	Curb Ramps: Flare	Curb Ramps: Approach	Crosswalks	Pedestrian Signals	Assessment Index
Type	—	○	●	●	○	○	○	○	●	○	Inventory only
Material	—	●	●	○	○	○	○	○	●	○	Inventory only
Length	Inches	○	●	●	○	●	○	○	○	○	Compliance
Width	Inches	●	●	●	○	●	○	●	●	○	Compliance
Running slope	Percent	◉[1]	●	○	●[2]	●	●[3]	●	○	○	Compliance
Cross slope	Percent	●	●	○	●	●		●	●	○	Compliance
Obstructions	—	●	●						○	○	Compliance
Largest vertical fault	—	●	●						○	○	Compliance
Number of vertical faults	Count	●	●						○	○	Condition
Number of cracked panels	Count	●	●						○	○	Condition
Surface condition	—	●	●						○	○	Condition
Comment	—	◉	◉						◉	◉	Inventory only
Photo	—	◉	●						◉	◉	Inventory only
Additional variables *See the following sections for details.*			- Edge treatment							- Pedestrian signal present - Pedestrian button location - Button size - High contrast - Vibrotactile signal or button - Button height - All weather surface adjacent to button - Pushbuttons at least 10 feet apart - Pushbuttons within 10 feet of curb - Number of pushbuttons at this location - Locator tone to find pushbutton - Passive pedestrian detector present	Compliance

Collected for: ● All features ◉ Some features ○ No features

[1] Grade was collected for sidewalks only when it exceeded the grade of the street.
[2] The running slope for gutters is referred to as the counter slope.
[3] Flare slope was measured parallel to the curb.

Sidewalks

Data on the locations of sidewalks were provided by the local agencies, and these datasets were merged and standardized to create a sidewalk segment GIS layer for the urbanized area. Throughout the data collection process, new sidewalk segments were added based on aerial imagery and field data.

Though sidewalks are linear, all data for the inventory, including sidewalk data, were collected as points. Field staff recorded points for sidewalks at several types of locations in the priority collection area (see *Figure 3-2*):

- **Block Summaries** – At the end of each block of sidewalk, field staff recorded a point summarizing the condition and compliance of the block. Block summary points recorded data for all sidewalk fields.
- **Cross Slopes at Driveways** – At points where driveways crossed the sidewalk, field staff recorded the cross slope of the sidewalk at the middle of the driveway. Cross slopes were collected at these locations because driveway crossings often have higher cross slopes than other parts of the sidewalk.
- **Major Obstructions and Condition Issues** – All condition issues found in sidewalks were recorded in the block summaries, but major obstructions and condition issues were also recorded using a dedicated point. These points captured the precise location of the issue or obstruction and allowed field staff to attach a photograph of the problem.

The sidewalks summary points recorded the material, width, cross slope, obstructions, vertical fault size, and several measures of condition for each block of sidewalk (see "Common Fields" on page 26 for a detailed description of these fields).

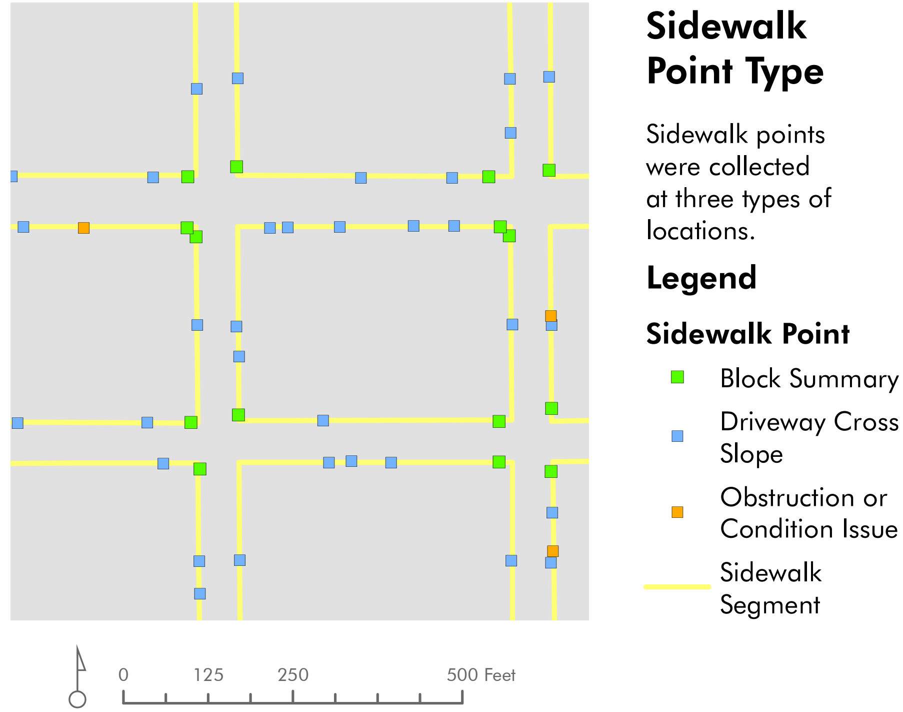


Figure 3-2 **Sidewalk Point Type**

Curb Ramps

Field staff recorded curb ramp points for every curb ramp and blended transition in the priority collection area. They also recorded points at sidewalk endpoints that did not include a ramp or blended transition.

Each curb ramp was classified according to its type (see *Figure 3-5*). The type depends on the orientation of ramp (i.e., the sloped part of the surface) in relation to the street that the pedestrian is crossing:

- **Perpendicular Ramp** – The ramp is perpendicular to the crossed street.
- **Parallel Ramp** – The ramp is parallel to the crossed street.
- **Combination Ramp** – The ramp has two sections, one of which is parallel to the crossed street, and one of which is perpendicular to it.
- **Diagonal Ramp** – The ramp serves pedestrians crossing two intersecting streets and lies at a 45 degree angle to both streets.
- **Built-Up Ramp** – The ramp is constructed on the street side of the curb and is built up to the level of the sidewalk.
- **Blended Transition** – The entire corner is sloped toward the intersection.

For multi-part ramps, such as combination ramps, field staff collected each part as a separate curb ramp record.

Field staff collected data about several parts of each curb ramp or blended transition (see *Figure 3-3*). These parts included:

- **Ramp** – The sloped surface creating a transition between the level of the sidewalk and the level of the street.
- **Detectable Warning Surface** – The tactile surface indicating the end of the ramp and the beginning of the street.
- **Gutter** – The channel between the ramp and the street used for drainage.
- **Landing** – The flat area at the top or bottom of the ramp used by pedestrians to change direction.
- **Curb Flares** – For ramps that lie within sidewalks or other pedestrian paths, a sloped surface creating a transition between the sidewalk and the ramp.
- **Left and Right Approaches** – The segments of sidewalk leading to the ramp. For ramps connected to only one sidewalk segment, only one approach was recorded.

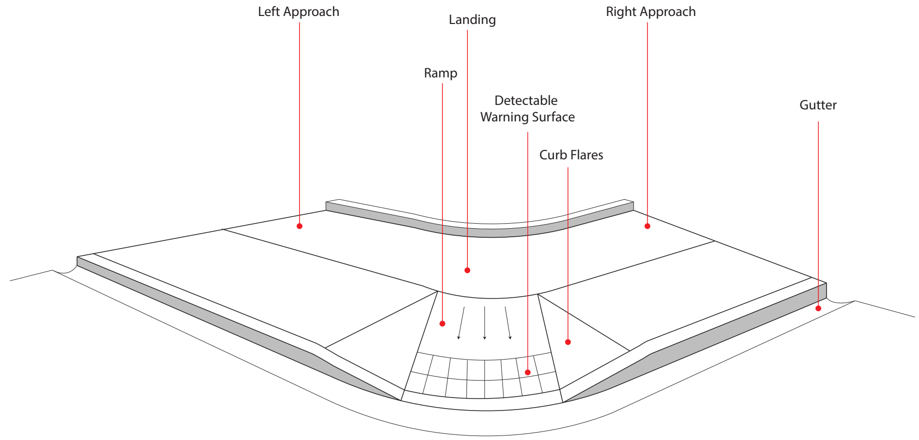


Figure 3-3 **Parts of a Curb Ramp**

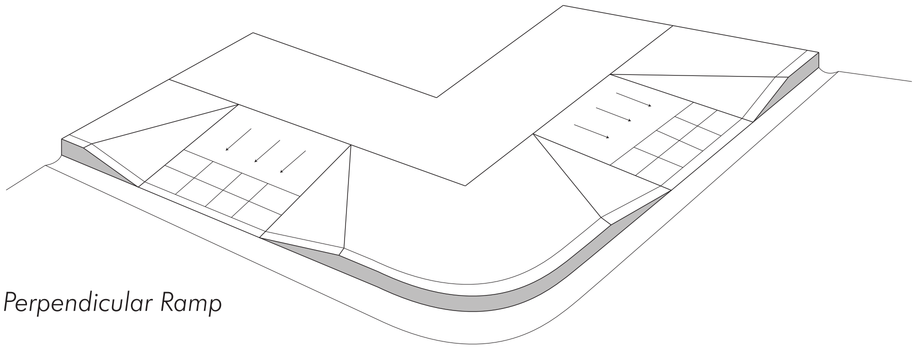
For ramps and blended transitions with detectable warning surfaces, the type of surface was recorded using the following categories (see *Figure 3-4*):

- **Truncated Domes** – A tactile surface consisting of raised domes with flat tops. Truncated dome detectable warning surfaces were further classified by color: red, yellow or other.
- **Pavement Grooves** – A surface consisting of parallel grooves cut or molded into the surface of the ramp.
- **Other** – Any other type of tactile surface.

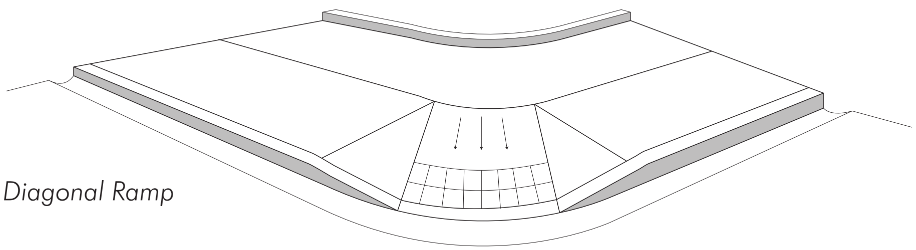
Truncated domes

Pavement grooves

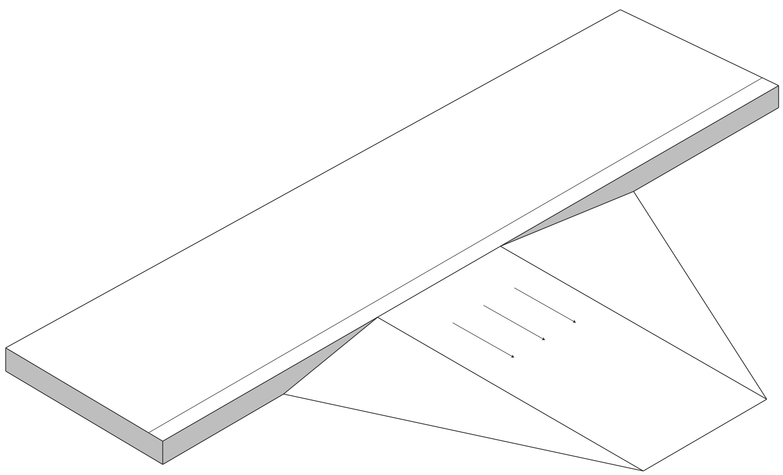
Figure 3-4 **Curb Ramp Detectable Warning Surface Types**



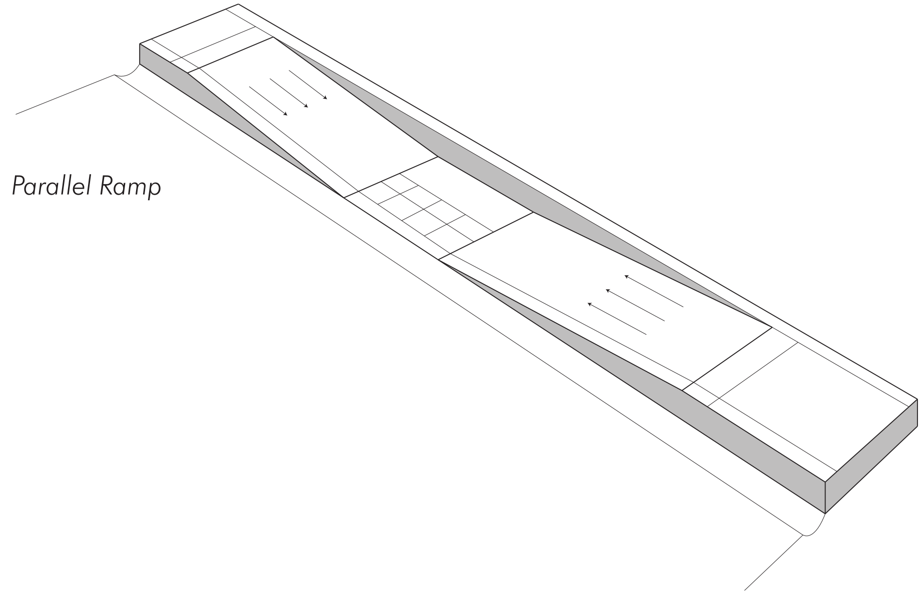
Perpendicular Ramp



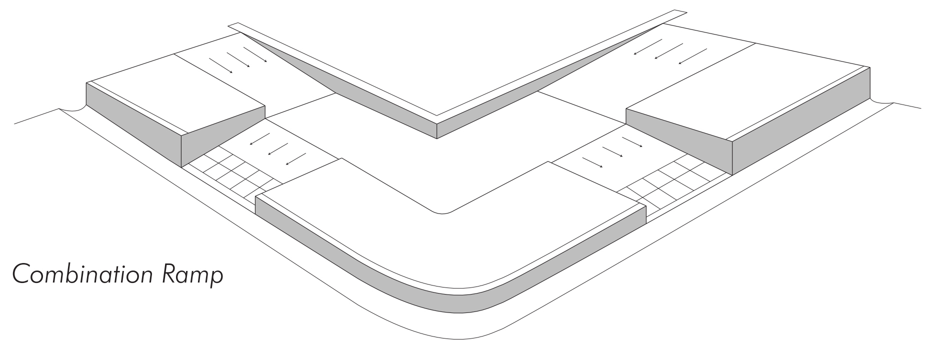
Diagonal Ramp



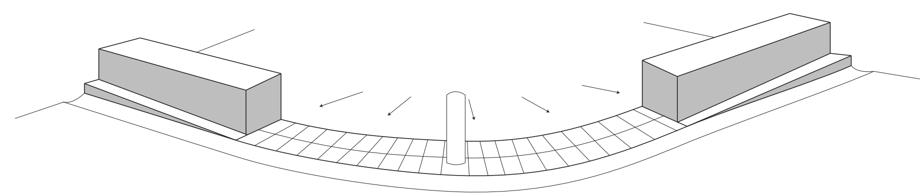
Built-Up Ramp



Parallel Ramp



Combination Ramp



Blended Transition

Figure 3-5 **Curb Ramp Types**

For each curb ramp, field staff recorded the edge treatment (see *Figure 3-6*):

- **Returned Curbs** – The sides of the ramp end in distinct curbs similar to the curb at the street.
- **Flared Sides** – The sides of the ramp end in sloped panels that create a gradual transition between the ramp and the adjacent walkable surface.
- **Flat Edges** – The sides of the ramp are flat, similar to a sidewalk.

For ramps with returned curbs, the curbs were not included in linear measurements (e.g., ramp width). For ramps with flared sides, the slope of the curb flare was measured parallel to the curb.

Returned Curbs

Flared Sides

Flat Edges

Figure 3-6 **Curb Ramp Edge Treatment Types**

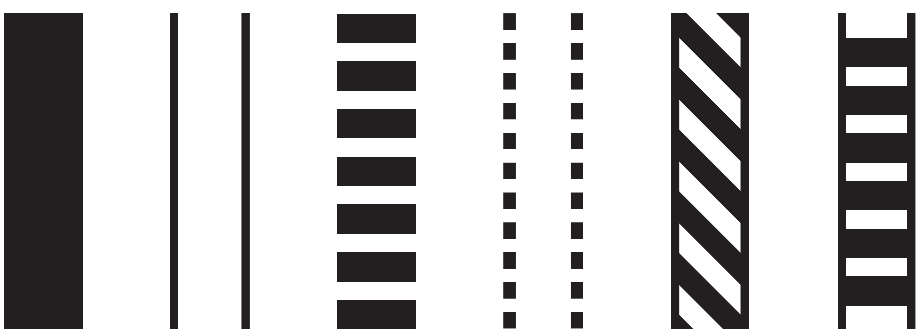
Crosswalks

Field staff recorded crosswalk points at every marked crosswalk in the priority collection area. Marking types were classified based on the system used by the Federal Highway Administration (see *Figure 3-7*):

- **Solid** – A crosswalk marked by paint along the entire crossing surface.
- **Standard** – A crosswalk marked by solid lines at its outer edges.
- **Continental** – A crosswalk marked by wide stripes perpendicular to the direction of travel.
- **Dashed** – A crosswalk marked by dashed lines at its outer edges.
- **Zebra** – A crosswalk marked by wide diagonal stripes in its interior and solid lines along its outer edges.
- **Ladder** – A crosswalk marked by wide stripes perpendicular to the direction of travel in its interior and solid lines along its outer edges.

In addition, field staff recorded several non-standard crosswalk marking types (see *Figure 3-8*):

- **Box for Exclusive Period** – A painted marking indicating that, during the appropriate signal phase, pedestrians can cross the intersection in any direction.
- **Other** – A crosswalk marked by a different type of painted marking.
- **No Painted Markings** – A crossing without painted markings and indicated by the presence of a street sign.



Solid Standard Continental Dashed Zebra Ladder

Figure 3-7 **Crosswalk Painted Marking Types Diagram (FHWA)**

Solid

Standard

Continental

Zebra

Ladder

Box for Exclusive Period

Figure 3-8 **Selected Crosswalk Painted Marking Types**

Pedestrian Signals

Field staff recorded pedestrian signal points for every pedestrian signal in the priority collection area. Points were recorded at locations with pushbuttons; those with visual or audible signals (see *Figure 3-9*); and those with both a button and a signal. At each of these locations, field staff noted the presence or absence of particular accessibility features (see *Figure 3-10*):

- **Pedestrian Signal** – A visual, tactile or audible signal indicating to pedestrians when they may safely cross the street.
- **High Contrast** – The color of the pushbutton, if present, contrasts with the color of the surrounding surface.
- **Tactile Arrow** – The signal or button includes a raised arrow indicating the direction of crossing to pedestrians who are blind or have low vision.
- **Vibrotactile Signal or Button** – The signal or button vibrates to indicate that it has been activated.
- **All Weather Surface Adjacent to Button** – The surface immediately adjacent to the button remains safe during inclement weather, including rain or snow.
- **Pushbuttons at Least 10 Feet Apart** – In locations with multiple buttons, the pushbuttons are mounted at least 10 feet from each other.
- **Pushbutton within 10 Feet of the Curb** – The pushbutton is near enough to the curb to indicate which crossing signal it activates.
- **Locator Tone** – The pushbutton emits an audible tone that allows pedestrians who are blind or have low vision to find it.
- **Passive Pedestrian Detector** – The signal is activated by a sensor that detects the presence of pedestrians without requiring them to push a button.

Visual Pedestrian Signal


Audible Pedestrian Signal

Figure 3-9 **Pedestrian Signal Types**

High Contrast


Tactile Arrow


Vibrotactile Button


All Weather Surface Adjacent to Button


Pushbuttons at Least 10 Feet Apart


Pushbuttons within 10 Feet of the Curb

Figure 3-10 **Selected Pedestrian Signal Accessibility Features**

Small

Medium

Accessible

Figure 3-11 **Pedestrian Signal Pushbutton Sizes**

At locations with pushbuttons, field staff recorded the height of the button compared to the adjacent surface and the size of the button using the following categories (see *Figure 3-11*):

- **Small** – 0.4 inches in diameter or less
- **Medium** – 0.5 to 1.9 inches in diameter
- **Accessible** – 2 inches in diameter or more

Pedestrian Signal Pole

Traffic Signal Pole

Stub Pole

Figure 3-12 **Pedestrian Signal Pushbutton Locations**

Field staff also recorded the position of the button (see *Figure 3-12*):

- **Pedestrian Signal Pole** – The button is located on the same pole that supports the pedestrian signal.
- **Traffic Signal Pole** – The button is located on the same pole that supports the traffic signal.
- **Stub Pole** – The button is located on a dedicated pole.
- **Other** – The button is mounted on a building wall or other surface.

Common Fields

Geometry

Field staff recorded several variables related to the geometry of pedestrian network features (see *Figure 3-13*). The details of how these measurements were applied to particular features appears in the variable table (see *Table 3-1*).

- **Length** – The measurement of the feature in the direction of pedestrian movement.
- **Width** – The measurement of the feature in the direction perpendicular to pedestrian movement.
- **Running Slope** – The slope of the feature in the direction of pedestrian movement.
- **Cross Slope** – The slope of the feature in the direction perpendicular to pedestrian movement.

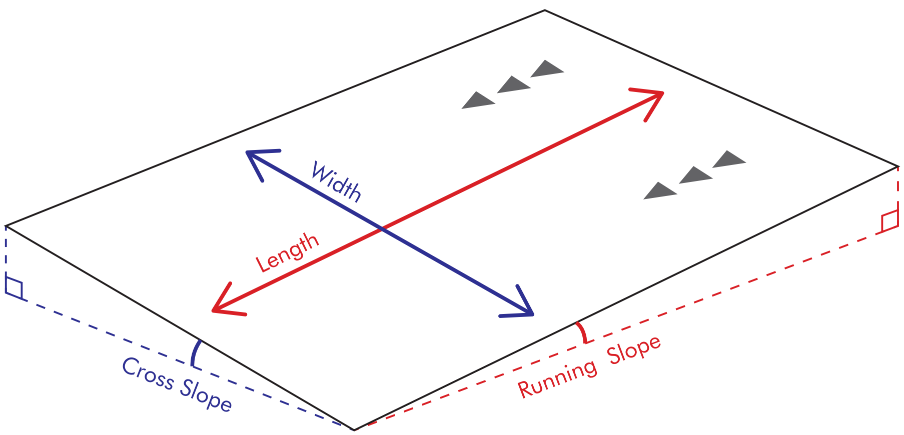


Figure 3-13 **Geometry Measurements**

Material

Using the following categories, field staff recorded the material used to construct surfaces in the pedestrian network (see *Figure 3-14*):

- Concrete
- Asphalt
- Aggregate
- Brick
- Other

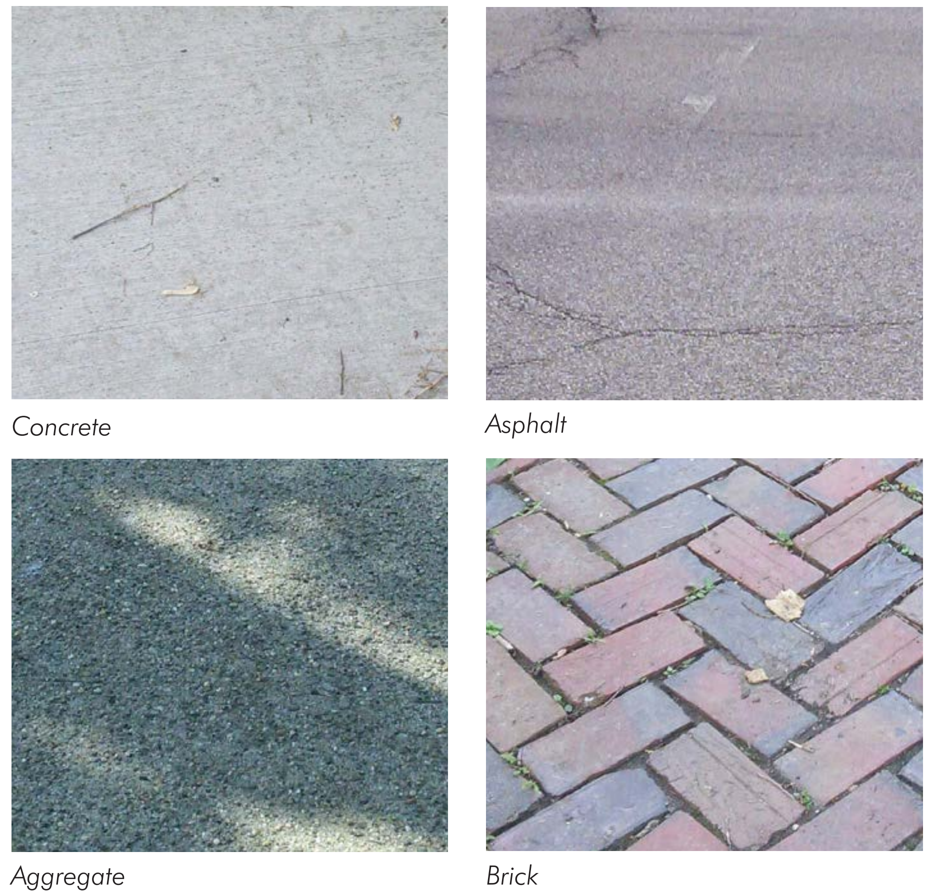


Figure 3-14 **Selected Material Types**

Condition

Field staff also recorded variables related to the condition of features in the pedestrian network (see *Figure 3-15*):

- **Vertical Faults** – Vertical faults are points where the surface of the sidewalk is uneven, usually due to heaving or settling of panels. Field staff recorded the total number of vertical faults present in the feature as well as the size of the largest vertical fault using the following categories:
  - No vertical faults
  - Less than ¼ inch, or beveled
  - ¼ inch to ½ inch, not beveled
  - More than ½ inch
- **Cracked Panels** – Field staff recorded the number of panels containing cracks.
- **Surface Condition** – Field staff recorded the most serious condition issue, if any, present in the feature. Possible surface condition issues, from least to most serious, included:
  - **Cracking** – The panels are cracked but generally intact.
  - **Dirt** – Water has deposited a layer of dirt, reducing traction.
  - **Grass** – Grass or other vegetation is growing through cracks.
  - **Spalling** – The smooth top layer of the surface has chipped away.

Vertical Fault

Cracked Panel

Surface Condition: Cracking

Surface Condition: Dirt

Surface Condition: Grass

Surface Condition: Spalling

Figure 3-15 **Condition Issues**

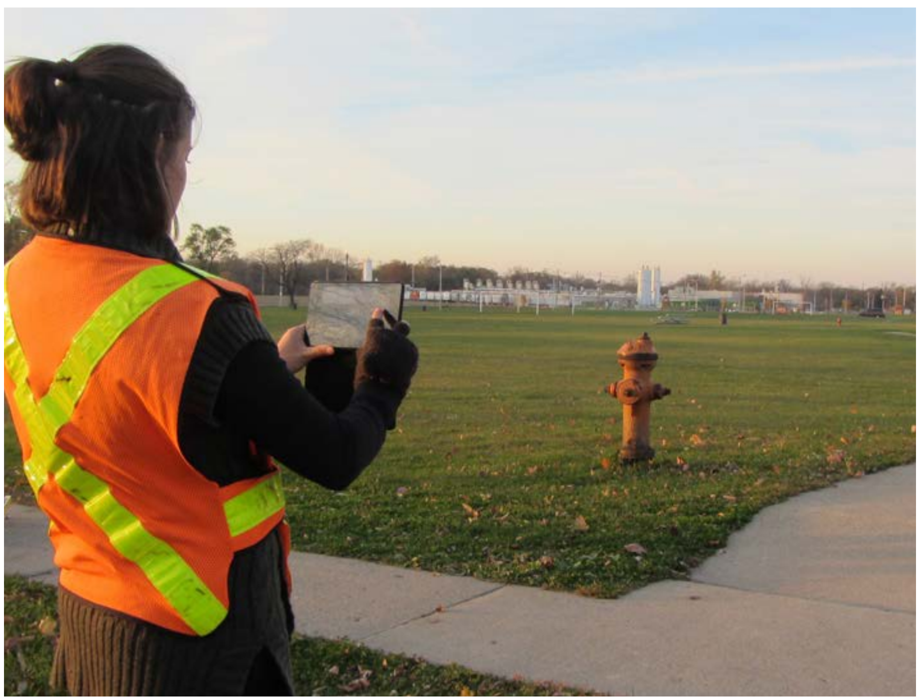
Obstructions

Obstructions are any foreign objects that intrude on the pedestrian path, reducing its passable width below the allowed minimum. Field staff recorded the presence of the following categories of obstructions (see *Figure 3-16*):

- Pole or signpost
- Hydrant
- Bollard
- Grate
- Tree roots
- Tree trunk or other vegetation
- Other

Photos

Field staff collected photos of all curb ramps. For other feature types, photos were only taken in order to better explain an atypical situation or value (e.g., an attribute value of "other").



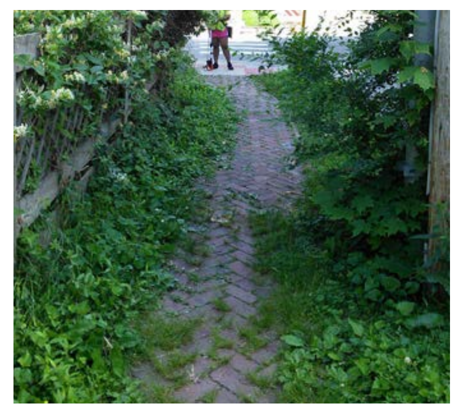
Pole

Hydrant

Bollard

Grate

Tree Roots



Vegetation

Figure 3-16 **Obstruction Types**

Tools and Methods

Field staff used four primary tools to measure and record data about the pedestrian network (see *Figure 3-17*):

- **Measuring Wheel** – Keson measuring wheels were used to measure linear distances, including feature lengths and widths. Linear measurements were recorded in feet and inches and were converted to inches during data analysis.
- **Smart Slope Meter** – M-D Building Products Smart Tools were used to take slope readings, including cross slopes and running slopes.
- **Tablet Computers** – Google Nexus 7 tablets loaded with the ESRI ArcGIS Collector application were used to record data collected as part of the inventory. The tablet's internal GPS unit and camera were used to capture geolocations and photos of features.
- **WiFi Hotspots** – Verizon MiFi mobile hotspots were used to transmit data from the tablets to an ArcSDE server for storage and analysis.

The priority collection area was divided into smaller work areas, and field staff were assigned to collect data in these areas. Field staff worked in teams of two, with one staff member using the measuring tools and one entering data in the tablet computer. Because the measurements were collected using coarse-precision instruments such as measuring wheels, they are suitable for initial ADA assessment but not for engineering purposes.

Data and photos collected in the inventory were saved to an ArcGIS SDE enterprise geodatabase stored in Microsoft SQL Server. Because the data collection tools were internet-connected, features were saved to the geodatabase in real time, allowing project managers and other field staff to see the "live" data and monitor progress throughout the data collection process.

Measuring Wheel

Smart Slope Meter

Tablet Computer

WiFi Hotspot

Figure 3-17 **Data Collection Tools**

Quality Assurance

Because of the scale of the data collection, the relatively large number of the field staff, and the level of error inherent in field measurement and touchscreen data entry, quality assurance was a significant challenge. In order to catch and correct errors quickly, both automated and manual checks were used in the quality assurance process. Throughout the process, each feature was assigned a quality assurance status:

- **Not Started** – Data for the feature have been collected but not checked.
- **Needs Field Review** – Field staff need to revisit the feature to take missing measurements or correct errors.
- **Needs Staff Review** – Project managers need to review the feature to address questions or issues raised by field staff.
- **Complete** – The data for the feature have been checked, and no problems have been found.
- **Deferred** – Data for the feature cannot be collected because of construction or other obstacles.

For all feature types, the initial check was performed using a quality assurance script (see *Figure 3-18*). The script was run at the end of each data collection shift and checked for:

- Missing values
- Excessively high or low values
- Slopes with invalid decimal places
- Linear measurements with invalid inches
- Inconsistency among dependent fields (e.g., curb ramp edge treatment and flare slope)

For curb ramps, office staff also performed manual checks using an ArcGIS Online quality assurance map (see *Figure 3-19*). Referring to the photo of the ramp, staff checked fields such as ramp type, edge treatment, detectable warning type, landing measurements, and approach measurements.

When issues were detected through automatic or manual checks, the status of the features was changed to Needs Field Review, and the issues were noted in a quality assurance comment field. Field staff were directed to revisit the features and address the noted issues.

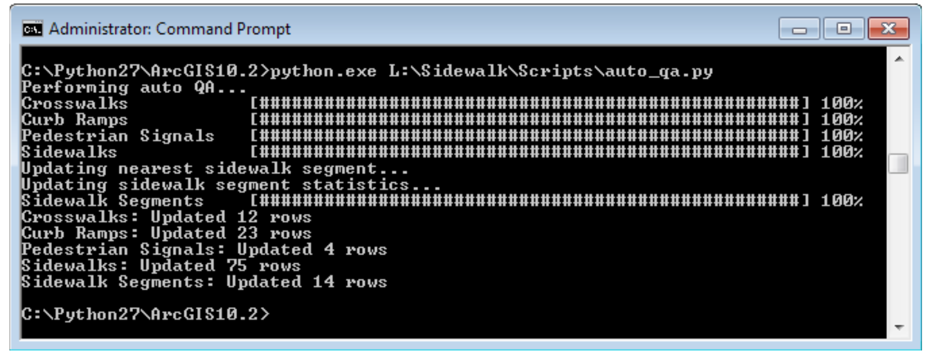


Figure 3-18 **Quality Assurance Script Output**

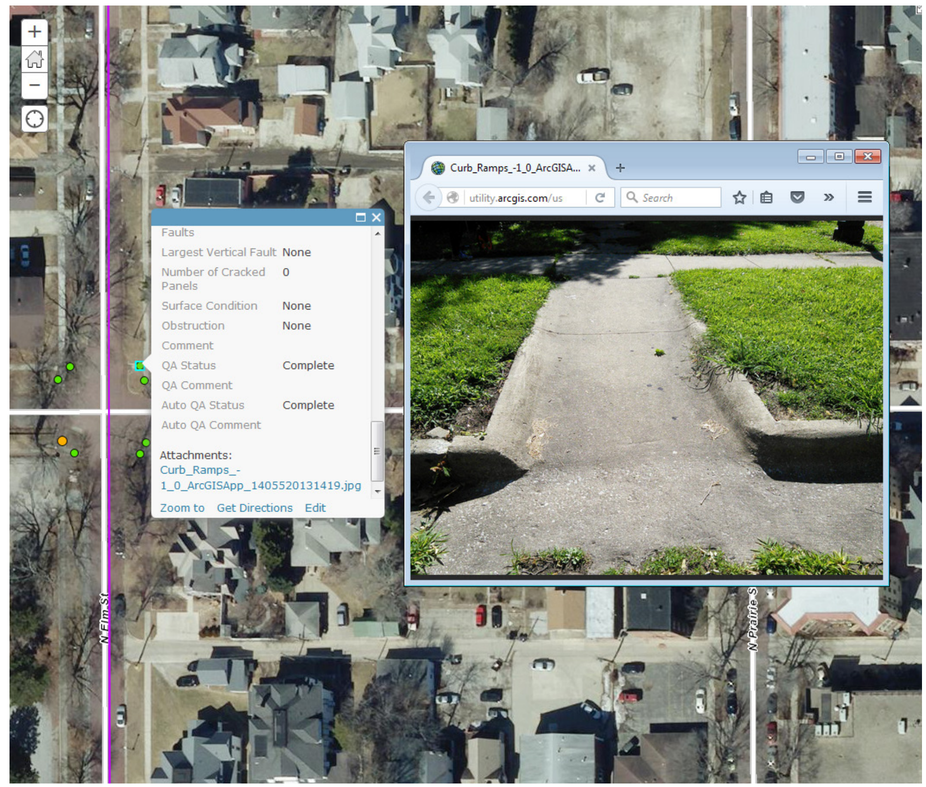


Figure 3-19 **Curb Ramp Quality Assurance Map**

4 Compliance

One of the primary goals of creating a sidewalk network database and collecting data about pedestrian network features was to allow for an initial assessment of Americans with Disabilities Act (ADA) compliance. This assessment of compliance is the first step in the self-assessment process required by the Act as part of each agency's ADA transition plan.

In order to assess preliminary compliance with ADA, a compliance index was developed. The compliance index converts measurements taken as part of the inventory to compliance scores corresponding to PROWAG standards. For each criterion, a score of 100 corresponds to full compliance with the relevant PROWAG standard. Lower scores indicate measurements outside of the compliant range, with the lowest scores indicating the greatest deviation from the standard. The scales were developed based on a review of sidewalk assessments performed in other regions as well as the distribution of observed values for each type of measurement.

For each feature type, an overall compliance score was developed to summarize the level of compliance with current accessibility standards. Scores for individual criteria were aggregated for each feature according to predefined weights. The weights reflect the relative importance to overall accessibility of each individual criterion. The compliance scores offer a valuable benchmark of ADA compliance, but because not all relevant PROWAG standards were included in the inventory, they are not a definitive measure of compliance or noncompliance.

The design of the compliance index, with its concept of varying levels of compliance, may at first seem at odds with the structure of PROWAG standards. While PROWAG operates under an assumption of strict compliance or noncompliance, such a binary assessment provides minimal guidance in prioritizing features for improvement, as required in the ADA transition plan. Knowing the degree to which a feature meets or fails to meet relevant standards offers a much richer set of information to local agency staff and officials, allowing them to prioritize the "worst offenders" and defer work on features that fall only slightly outside the PROWAG specifications.

For each feature type, the results of the compliance index are presented, first for each component criterion and finally for the combined compliance score. Scores are summarized in tabular format for the entire urbanized area and spatially on a map. The map consisting of half-mile wide hexagons and displays the average compliance score for each zone. Zones containing fewer than five features are excluded from the map in order to avoid placing undue weight on the scores for any one feature.

In general, compliance scores tended to be highest at the periphery of the urbanized area, where the pedestrian network was constructed after the development of modern accessibility standards, and in the core of the community, where pedestrian network upgrades have been focused. The ring of neighborhoods surrounding the core of the community, many of which contain pedestrian network features that predate ADA, had the lowest levels of compliance on average.

Though the compliance scores are not directly comparable among feature types, sidewalks and pedestrian signals exhibited the lowest levels of compliance, followed by curb ramps. Crosswalks had the highest average compliance scores of any feature type, though the high scores were due in part to the limited number of criteria considered.

Sidewalks

Sidewalks form the backbone of the pedestrian network, and their level of ADA compliance impacts not only individuals with disabilities, but all pedestrians. The priority collection area for the Champaign Urbana Urbanized Area includes approximately 690 miles of sidewalks and off-street pedestrian paths.

Because sidewalks are linear but sidewalk data were collected as point locations, the resulting points were assigned to sidewalk block segments in order to perform the analysis. In this process, sidewalk points were assigned to the nearest sidewalk block, up to a distance of 25 feet. The values and measurements from the point locations were then summarized by segment, and the segment values were scored using the compliance index.

The compliance index for sidewalks considers four criteria representing PROWAG accessibility standards:

- Cross slope
- Vertical fault size
- Obstructions
- Sidewalk width

For each block, the most extreme value observed for each criterion was evaluated for compliance with PROWAG standards. Compliance scores ranged from less than 20 for sidewalks with multiple accessibility issues to 100 for sidewalks that met PROWAG standards for the four criteria examined (see *Figure 4-1*).

Of the four criteria, vertical fault size was most consistently problematic, with just 11 percent of sidewalks by length meeting the PROWAG standard. Cross slope compliance varied significantly across the urbanized area and was highest in the core of the urbanized area and at the periphery, a pattern also exhibited in the combined compliance score. Scores for sidewalk width and obstructions were high overall, with isolated pockets of noncompliance.

Key findings from the analysis include:

- Vertical fault size is a persistent problem, though more than one third of total sidewalk length could be brought into compliance with beveling alone.
- More than 65 percent of the sidewalks in the urbanized area have a maximum cross slope between 2.1 and 6.0 percent.
- Tree trunks and other vegetation are the most common type of obstruction, affecting seven percent of sidewalks by length.

In this block of sidewalk, vegetation overgrowth acts as an obstruction and reduces the passable width to 39 inches. The largest vertical fault on the block is over ½ inch, and the maximum cross slope is 10 percent, resulting in a combined compliance score of 15.

This block of sidewalk is 60 inches wide and has no vertical faults or obstructions. With a maximum cross slope of 2.3 percent, it scores 95 on the combined compliance index.

Figure 4-1 **Sidewalk Compliance Score Examples**

Cross Slope

Cross slope is the slope of the sidewalk perpendicular to the direction of travel. In order to be ADA compliant, sidewalk cross slopes must be 2.0 percent or less (PROW-AG R302.6). Greater cross slopes can make wheelchairs, walkers and other mobility devices unstable. Field staff recorded the sidewalk cross slope every time a driveway crossed the sidewalk as well as a representative summary cross slope for each block. The score for cross slope is based on the maximum value for the block (see *Table 4-1*).

Table 4-1 **Sidewalk Cross Slope Scores**

Maximum Cross Slope	Score	Miles of Sidewalk	Percent of Total Length
2.0 % or less	100	122.1	17.7 %
2.1 % to 4.0 %	80	277.9	40.3 %
4.1 % to 6.0 %	60	174.1	25.2 %
6.1 % to 8.0 %	40	70.9	10.3 %
8.1 % to 10.0 %	20	25.9	3.7 %
10.1 % or more	0	19.0	2.8 %

Of the total sidewalk length in the urbanized area, only about 18 percent met the standard for maximum cross slope. More than 75 percent of sidewalks by length had a maximum cross slope between 2.1 and 8.0 percent. Very high maximum cross slopes greater than 8.0 percent were relatively rare and comprised about 6 percent of the total sidewalk length in the urbanized area.

Maximum sidewalk cross slopes were highest in older residential neighborhoods with frequent driveway crossings (see *Figure 4-2*). Downtowns, commercial areas, and newer residential neighborhoods had lower maximum cross slopes. The University of Illinois campus area had lower maximum sidewalk cross slopes than most other parts of the urbanized area, though on average, many parts of the of the campus still exceeded the 2.0 percent PROWAG threshold.

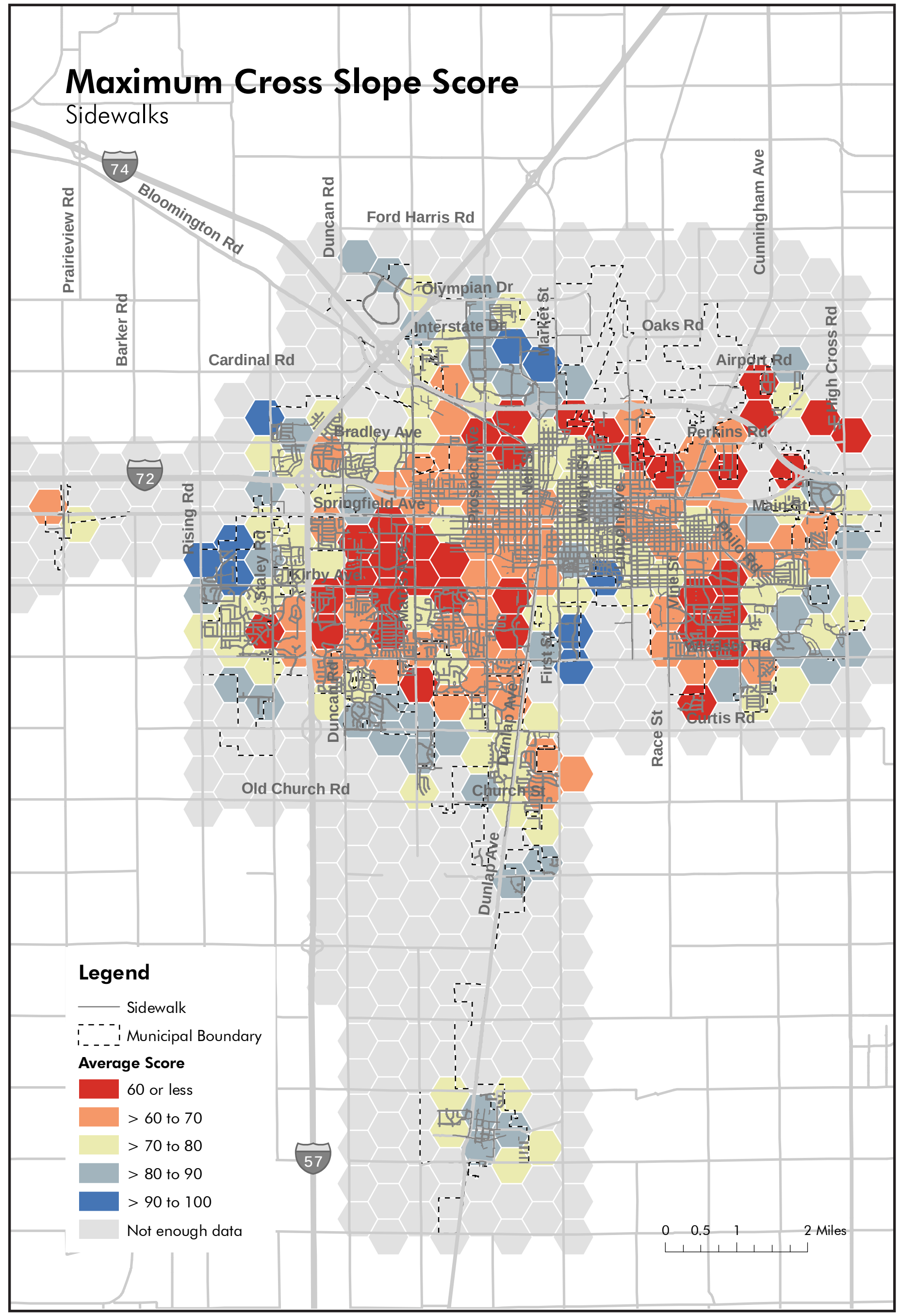


Figure 4-2 **Sidewalk Cross Slope Scores**

Vertical Faults

Vertical faults are points where the surface of the sidewalk is uneven, usually due to heaving or settling of panels. In order to be ADA compliant, all vertical faults must be less than ½ inch. In addition, all faults between ¼ inch and ½ inch must be beveled, or ground down to remove the fault (PROWAG R302.7.2). Larger vertical faults can create a tripping hazard and can impede mobility devices such as wheelchairs. Field staff recorded the size of the largest vertical fault in each block as well as the total number of vertical faults (included in the condition index). The compliance score for vertical faults is based on the maximum vertical fault size observed in each block of sidewalk (see *Table 4-2*).

Table 4-2 **Sidewalk Vertical Fault Size Scores**

Largest Vertical Fault	Score	Miles of Sidewalk	Percent of Total Length
Less than ¼ inch, or beveled	100	78.9	11.4 %
¼ inch to ½ inch, not beveled	50	264.5	38.3 %
More than ½ inch	0	346.4	50.2 %

Because of the very strict standard set by PROWAG, sidewalk vertical fault size was consistently problematic in virtually all parts of the urbanized area (see *Figure 4-3*). The low scores represent the challenge of locating and addressing new faults, which are continually created by freeze-thaw cycles, tree roots, settling of soil, and other environmental factors.

Less than 12 percent of sidewalks by length met the PROWAG standard for the largest vertical fault. However, about 38 percent of sidewalk had vertical faults between ¼ inch and ½ inch, which could be addressed using beveling. The remaining half of sidewalks by length had larger faults that would require more extensive repairs, such as concrete leveling or replacement of panels.

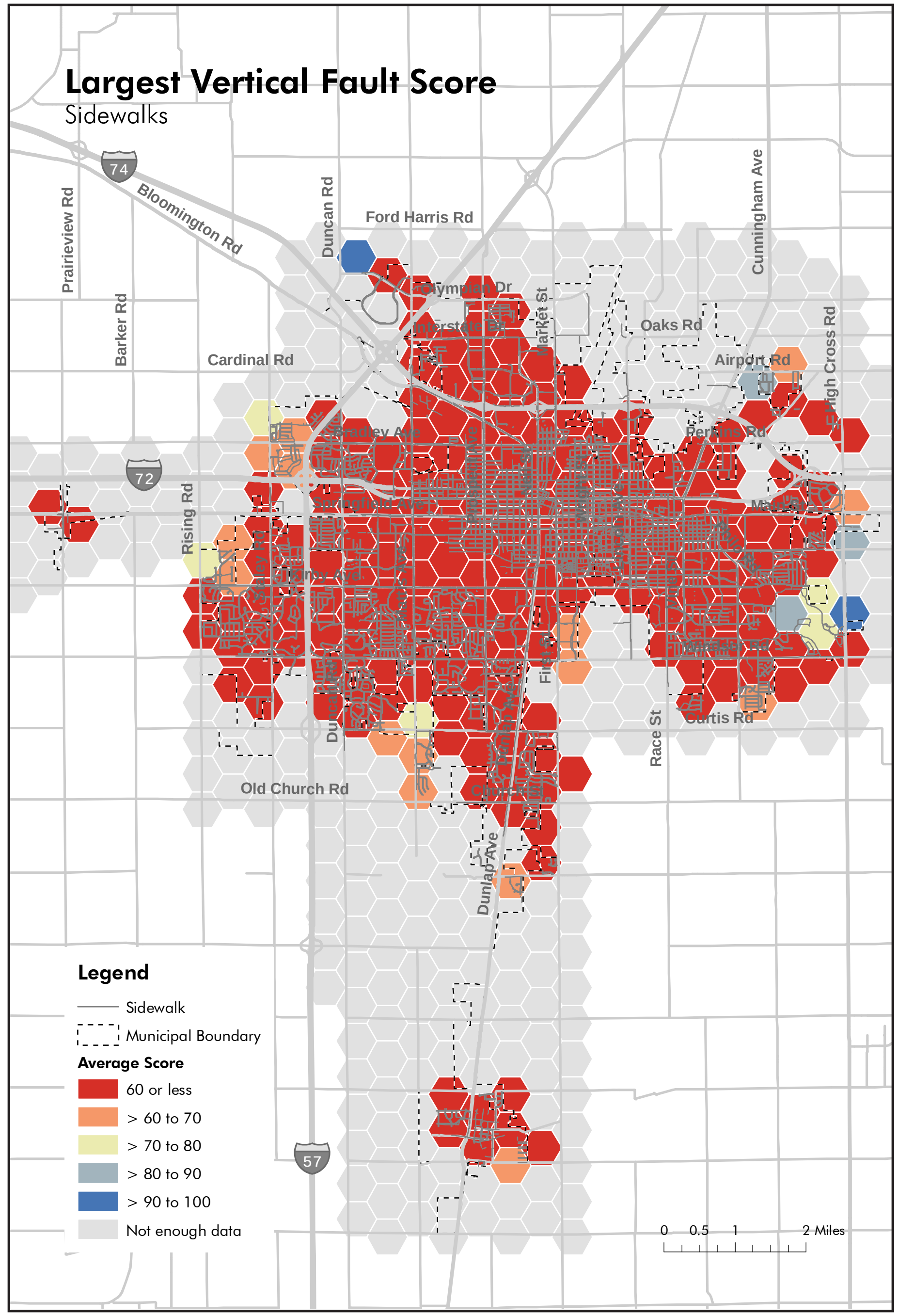


Figure 4-3 **Sidewalk Vertical Fault Size Scores**

Obstructions

Obstructions are objects that impede travel on the sidewalk. In order to be ADA compliant, sidewalks must have a four-foot wide clear path free from obstructions (PROWAG R210). Sidewalks where the clear width is less than four feet may be impassible for some users. Field staff recorded the type of obstruction present, if any, for each block of sidewalk. They also recorded specific point geolocations of major obstructions. The compliance score for sidewalk obstructions is based on the number of types of obstructions present in each block (see *Table 4-3*).

Table 4-3 **Sidewalk Obstruction Scores**

Number of Obstruction Types	Value	Miles of Sidewalk	Percent of Total Length
No obstructions present	100	561.8	81.4 %
One type present	50	120.4	17.5 %
Two or more types present	0	7.6	1.1 %

Table 4-4 **Most Common Sidewalk Obstruction Types**

Obstruction Type	Blocks of Sidewalk*	Percent of Blocks
Tree trunk or other vegetation	565	7.3%
Other	462	6.0%
Tree roots	137	1.8%
Grate	102	1.3%

* Some blocks had more than one type of obstruction and are counted in multiple categories.

Less than 20 percent of sidewalks by length had an obstruction, and only about one percent had more than one type of obstruction. Tree trunk or other vegetation was the most common type of obstruction, followed by other obstructions, such as gravel, street furniture, or planters. Areas with high concentrations of sidewalk obstructions included the Duncan Road corridor and Dobbins Downs area in Champaign; and the Cunningham Avenue corridor, East Washington Street corridor, and Meadowbrook Park area in Urbana (see *Figure 4-4*).

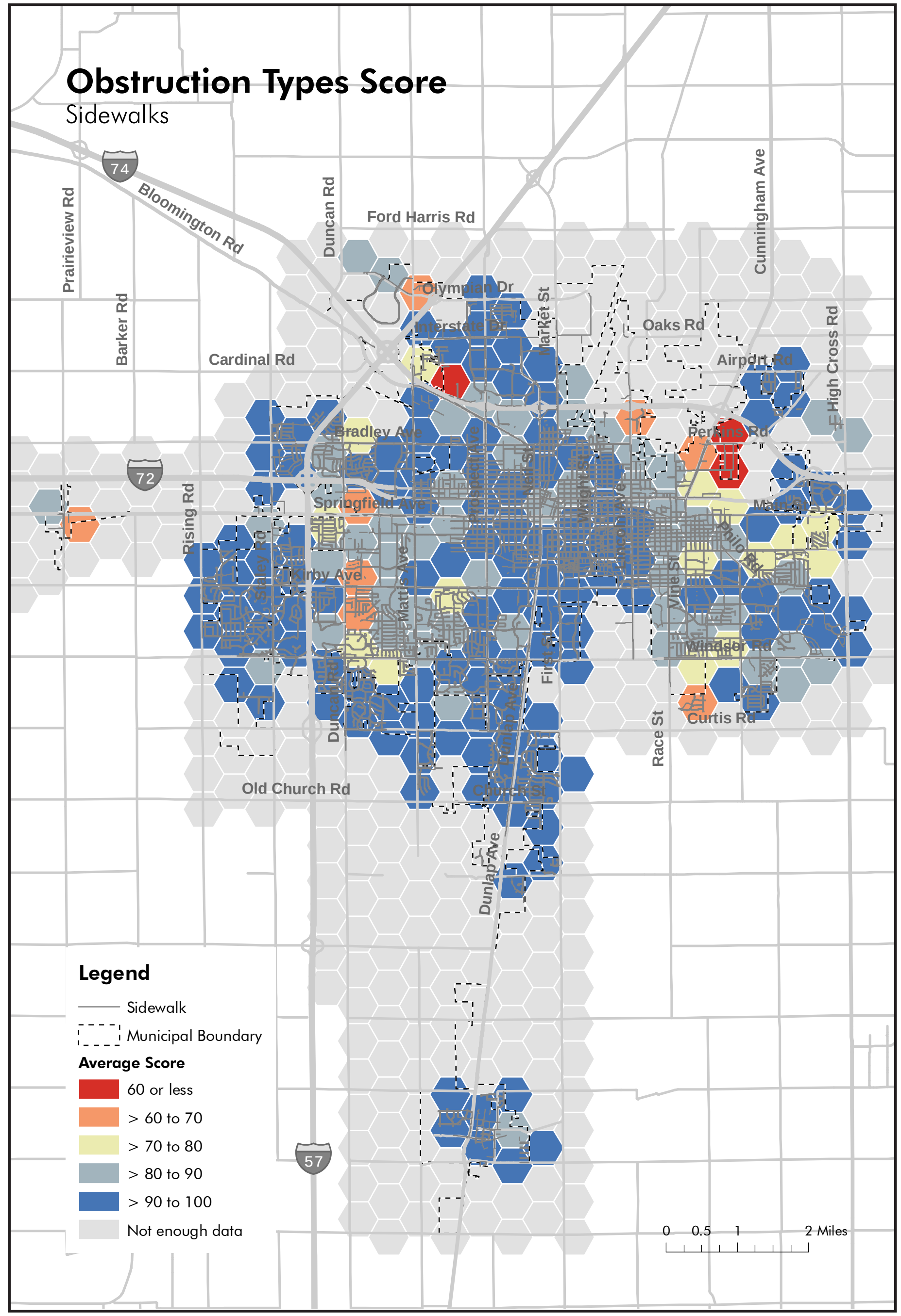


Figure 4-4 **Sidewalk Obstruction Scores**

Sidewalk Width

In order to be ADA compliant, sidewalks must have a continuous width of at least four feet (PROWAG R302.3). The PROWAG advisory group recommends a total sidewalk width of at least five feet in order to accommodate street furniture and other obstructions. Sidewalks that are narrower than four feet may be impassible to some users. Field staff recorded the narrowest passable width of the sidewalk for each block. The compliance score for each block feature is based on this minimum width measurements (see *Table 4-5*).

Table 4-5 **Sidewalk Width Scores**

Minimum Sidewalk Width	Score	Miles of Sidewalk	Percent of Total Length
48 inches or more	100	533.5	77.3 %
45 to 47 inches	80	68.8	10.0 %
42 to 44 inches	60	61.8	9.0 %
39 to 41 inches	40	17.4	2.5 %
36 to 38 inches	20	6.4	0.9 %
35 inches or less	0	1.9	0.3 %

More than three quarters of sidewalks by length met the PROWAG standard for continuous width. However, since PROWAG requires periodic passing spaces on sidewalks less than five feet, some of these sidewalks may require additional passing spaces. Very narrow sidewalks, less than three feet, were relatively rare, representing about 0.3 percent of total sidewalk length.

Areas where sidewalk width was most problematic included central Champaign between I-57 and Mattis Avenue; north Champaign between Mattis and Prospect Avenues; and scattered areas in Urbana and Savoy (see *Figure 4-5*). Sidewalk width was higher in the central part of the urbanized area and in newer developments along the fringe.

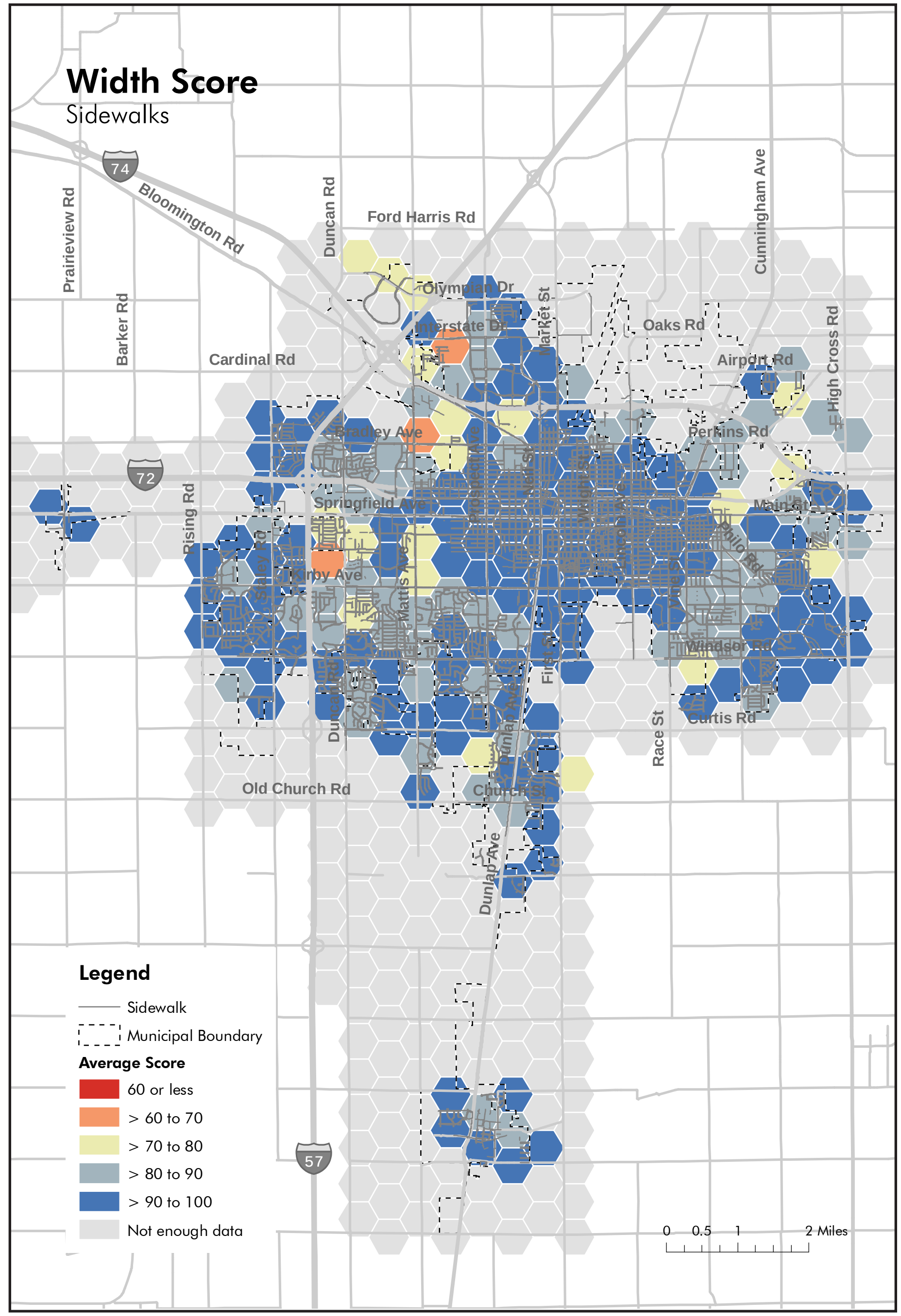


Figure 4-5 **Sidewalk Width Scores**

Combined Sidewalk Compliance

The combined compliance score for sidewalks was calculated by equally weighting each of the four compliance criteria (see *Table 4-6*). Equal weights were used because any of these factors can severely reduce the mobility and safety of individuals with disabilities.

Table 4-6 **Sidewalk Compliance Weights**

Variable	Weight
Maximum cross slope	25 %
Largest vertical fault	25 %
Number of obstruction types	25 %
Sidewalk width	25 %

Table 4-7 **Sidewalk Compliance Scores**

Compliance Score	Miles of Sidewalk	Percent of Total Length
> 90 to 100	57.2	8.3 %
> 80 to 90	146.9	21.3 %
> 70 to 80	114.6	16.6 %
> 60 to 70	183.0	26.5 %
60 or less	188.2	27.3 %

Preliminary ADA compliance was relatively low overall, with only about 8 percent of sidewalks by length scoring above 90 on the compliance index (see *Table 4-7*). More than half of the total sidewalk length in the urbanized area scored below 70 on the index. Compliance was highest at the fringe of the urbanized area, followed by the core of the community (see *Figure 4-6*). The ring of residential neighborhoods constructed in the mid to late twentieth century had the lowest levels of compliance, a pattern visible in Champaign-Urbana-Savoy and in Tolono.

Though the low scores underscore the large amount of work necessary to bring sidewalks into compliance with PROWAG standards, they also reflect assumptions inherent in the data collection methodology. Since field staff recorded only the most severe defect for each block (e.g., the largest vertical fault and the minimum passable width), the results tend to exaggerate the magnitude of sidewalk non-compliance. This effect is most pronounced for long blocks, which are statistically more likely to contain severe defects than short blocks.

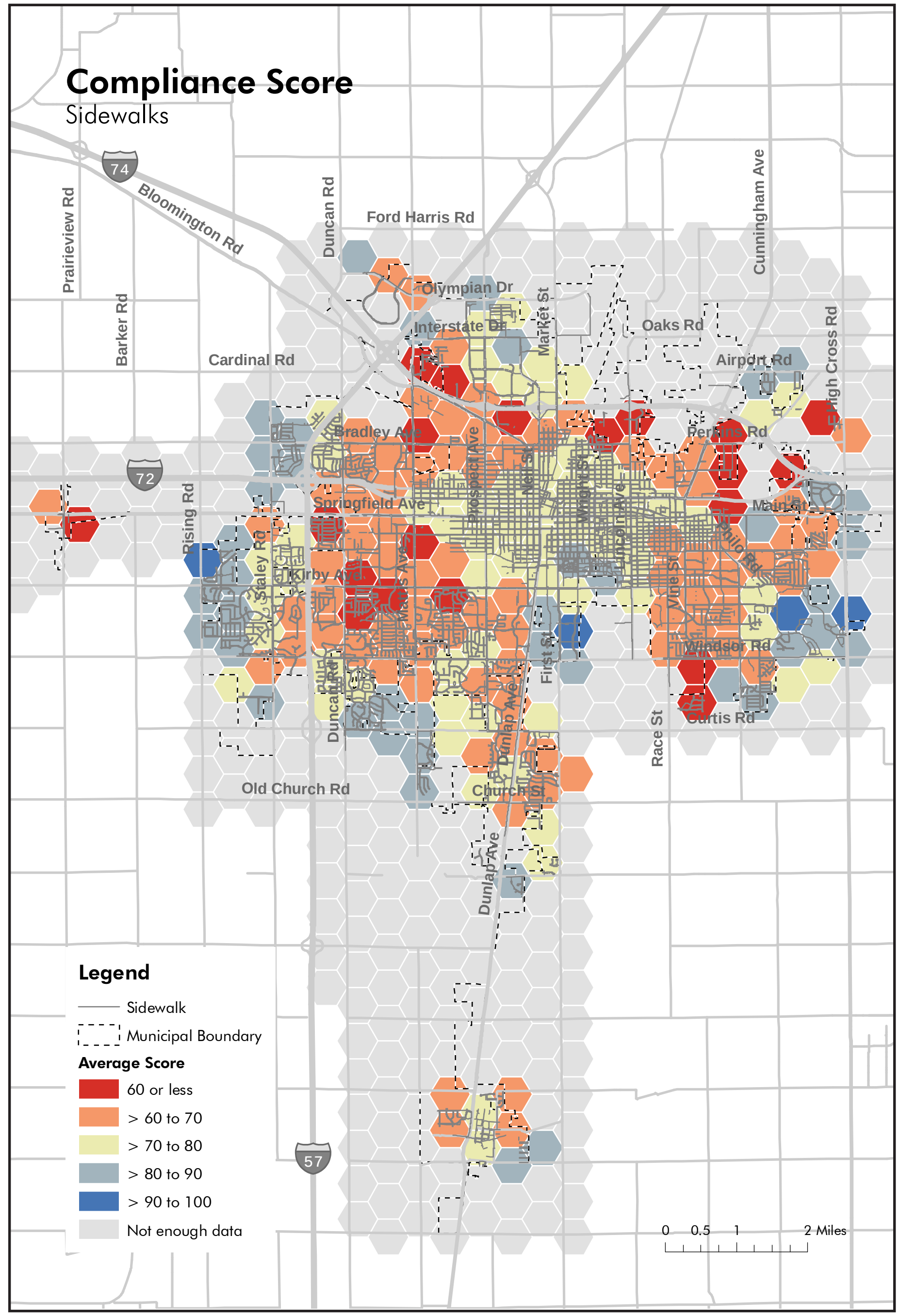


Figure 4-6 **Sidewalk Compliance Scores**

Curb Ramps

Curb ramps create a safe transition between the sidewalk and the street. ADA-compliant sidewalks are particularly important for pedestrians who use mobility devices, and compliant detectable warning surfaces provide vital safety cues for blind and low-vision users.

Field staff collected data for 12,717 curb ramps and blended transitions and recorded the locations of 2,069 non-ramp sidewalk endpoints. In the analysis that follows, the term "curb ramp" is used to refer to both ramps and blended transitions; non-ramp endpoints were not analyzed for compliance. In accordance with PROWAG, features with running slopes greater than 5.0 percent were analyzed as curb ramps, and features with running slopes less than or equal to 5.0 percent were analyzed as blended transitions, regardless of the apparent ramp type.

The curb ramp compliance index considers 13 criteria based on PROWAG standards, including slopes, dimensions, and detectable warning surface properties. The criteria cover six areas of analysis:

- Ramp geometry
- Detectable warning surface
- Gutter
- Landing
- Approaches and flares
- Hazards

Overall compliance scores for curb ramps ranged from the low 30s for ramps with no accessibility features and non-compliant geometry to 100 for ramps that met all relevant PROWAG standards (see *Figure 4-7*). As with sidewalks, compliance was highest at the edge of the urbanized are and in its core. Other key findings from the compliance analysis include:

- Detectable warning surface was the lowest-scoring area of analysis, and less than 40 percent of ramps had the required truncated domes.
- Ramp cross slopes and running slopes were both problematic, but noncompliance occurred in different parts of the urbanized area for each.
- Landing slopes were frequently out of the compliant range, while landing dimensions were compliant in most ramps that required landings.
- Vertical faults were less prevalent than in sidewalks, with about two thirds of ramps meeting the PROWAG standard.

With multiple accessibility issues, this ramp scores 31 on the combined compliance index. The ramp lacks a detectable warning surface, the left approach is obstructed by a water valve, and many of the cross slopes are 10 percent or above.

With a width of 60 inches, a minimum landing dimension of 48 inches, truncated domes that fill the width of the ramp, and all slopes within the compliant ranges, this ramp scores 100 on the combined compliance index.

Figure 4-7 **Curb Ramp Compliance Score Examples**

Ramp Geometry: Width

In order to be ADA compliant, curb ramps must be at least four feet wide, excluding returned curbs (PROWAG R304.5.1). For curb ramps within medians or pedestrians islands, the minimum required width is five feet (PROWAG R302.3.1). Field staff measured the width of curb ramps at the top of the ramp and measured blended transitions adjacent to the street. The compliance score is based on the width measurement (see *Table 4-8*).

Table 4-8 **Curb Ramp Width Scores**

Ramp Width	Pedestrian Island Ramp Width	Score	Curb Ramps	Percent of Curb Ramps
48 inches or more	60 inches or more	100	10,666	83.9 %
45 to 47 inches	57 to 59 inches	80	946	7.4 %
42 to 44 inches	54 to 56 inches	60	750	5.9 %
39 to 41 inches	51 to 53 inches	40	195	1.5 %
36 to 38 inches	48 to 50 inches	20	113	0.9 %
35 inches or less	47 inches or less	0	47	0.4 %

Nearly 84 percent of curb ramps measured met the PROWAG standard for width. Less than 3 percent of all ramps were less than 42 inches wide. Areas with higher levels of noncompliant ramp width included central Champaign between I-57 and Mattis Avenue, north Champaign near the I-57/Olympian Drive interchange, and north Urbana near the I-74/Cunningham Avenue interchange (*Figure 4-8*).

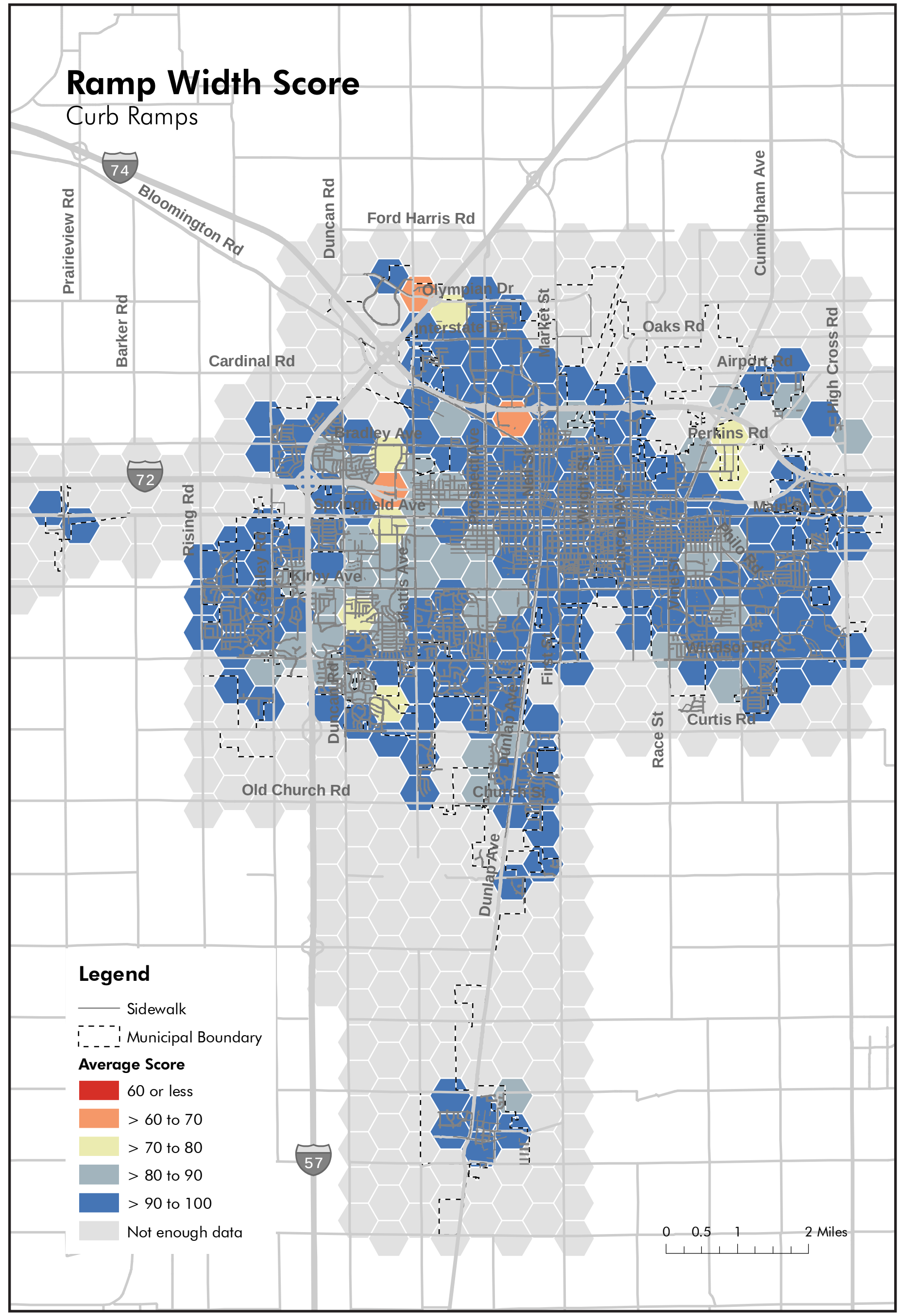


Figure 4-8 **Curb Ramp Width Scores**

Ramp Geometry: Cross Slope

Cross slope is the slope of the ramp perpendicular to the direction of travel. In order to be ADA compliant, curb ramp cross slopes must be 2.0 percent or less (PROWAG R304.5.3). Greater cross slopes can make wheelchairs, walkers and other mobility devices unstable. Field staff recorded the cross slope for each ramp, and the cross slope measurement was used to calculate the compliance score (see *Table 4-9*).

Table 4-9 **Curb Ramp Cross Slope Scores**

Cross Slope	Score	Curb Ramps	Percent of Curb Ramps
2.0 % or less	100	7,132	56.1 %
2.1 % to 4.0 %	80	3,600	28.3 %
4.1 % to 6.0 %	60	1,326	10.4 %
6.1 % to 8.0 %	40	438	3.4 %
8.1 % to 10.0 %	20	151	1.2 %
10.1 % or more	0	70	0.6 %

Approximately 56 percent of curb ramps met the PROWAG standard for cross slope. Cross slopes greater than 6.0 percent were relatively rare, representing approximately 5 percent of ramps in the urbanized area. Of these, 70 ramps had cross slopes in excess of 10 percent.

High average ramp cross slopes occurred in scattered pockets across the urbanized area, particularly in north and central Champaign and in south Urbana (see *Figure 4-9*). The highest average ramp cross slopes occurred near the intersection of Perkins Road and High Cross Road, an area with relatively few curb ramps.

The scattered pattern of problematic ramp cross slopes suggests that these cross slopes were the result of specific construction practices and standards used in particular developments rather than the time at which the ramp was built. However, the most recently developed areas also tended to have higher levels of compliance. On average, the University of Illinois campus area, west Champaign, and south Savoy had relatively low ramp cross slopes, reflecting the higher proportion of recently constructed curb ramps in these areas.

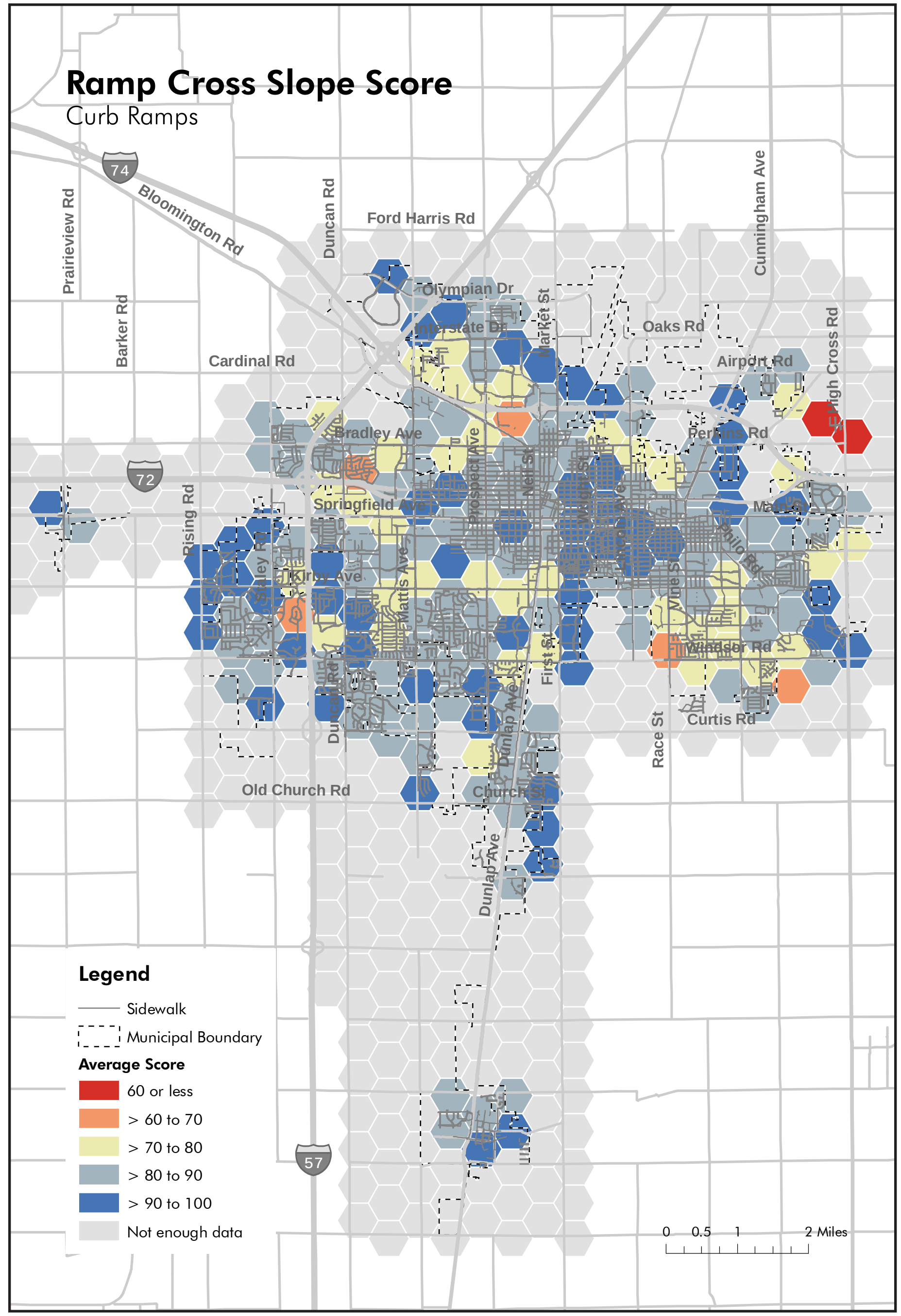


Figure 4-9 **Curb Ramp Cross Slope Scores**

Ramp Geometry: Running Slope

Running slope is the slope of the curb ramp in the direction of travel. To be ADA compliant, curb ramps must have a running slope of 5.0 percent to 8.3 percent, but they are not required to exceed 15 feet in length in order to meet the maximum slope requirement (PROWAG R304.2.2 and R304.3.2). Blended transitions must have a maximum running slope of 5.0 percent (PROWAG R304.4.1). The running slope measurement for each ramp or blended transition was used to calculate its running slope compliance score (see *Table 4-10*).

Table 4-10 **Curb Ramp Running Slope Scores**

Ramp Running Slope	Score	Curb Ramps	Percent of Curb Ramps
8.3 % or less	100	8,936	70.3 %
8.4 % to 9.3 %	67	932	7.3 %
9.4 % to 10.3 %	33	593	4.7 %
10.4 % or more	0	1,254	9.9 %
Ramp length > 15 feet	100	1,002	7.9 %

Approximately 70 percent of curb ramps in the urbanized area had running slopes within the range allowed by PROWAG, and nearly 8 percent were exempt from the running slope requirement because their length exceeded 15 feet. However, almost 10 percent of ramps had running slopes greater than 10.3 percent, or two percent above the allowed threshold.

Unlike ramp cross slope, high ramp running slopes were most common in the central part of the urbanized area, particularly in some of the oldest residential neighborhoods in Champaign and Urbana (see *Figure 4-10*). This spatial pattern likely reflects changing understandings of what constitutes a safe ramp slope for all users and the corresponding evolution of standards.

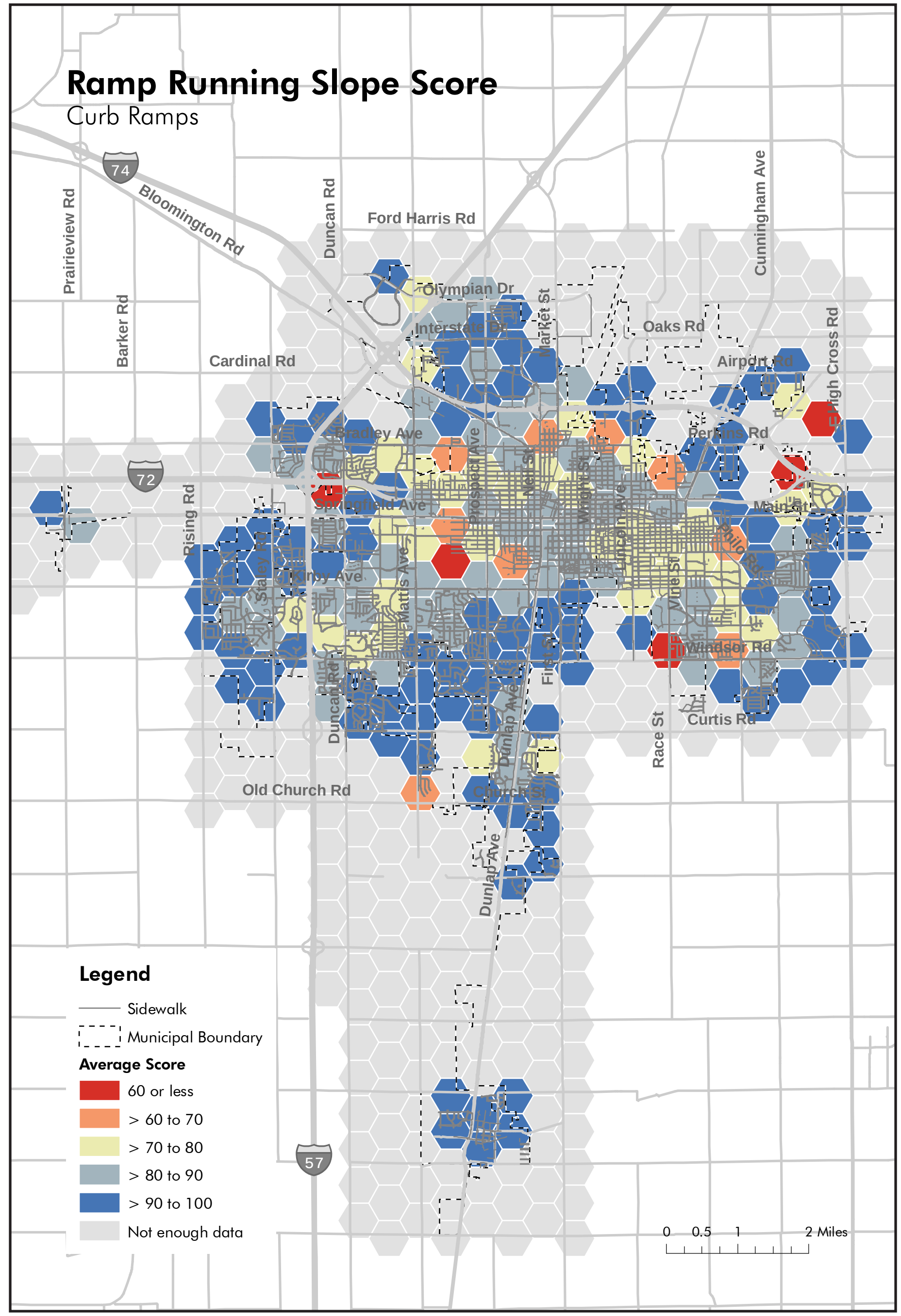
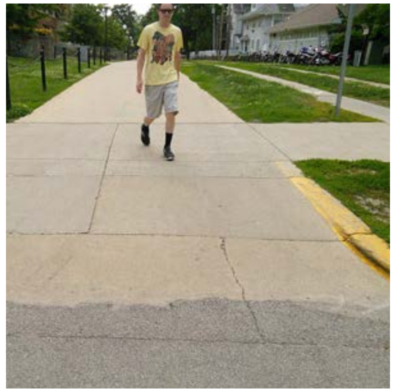


Figure 4-10 **Curb Ramp Running Slope Scores**

Detectable Warning Surface: Surface Type



Detectable warning surfaces provide a tactile indication that a curb ramp is ending and the street is beginning. In order to be ADA compliant, ramps must include a detectable warning surface composed of truncated domes (PROWAG R305). Field staff recorded the type of detectable warning surface, if any, and this value was used to calculate the score for detectable warning surface type (see *Table 4-11*). Upper combination ramps and other ramps not adjacent to the street were given a score of 100 since they do not require detectable warnings.

Table 4-11 **Curb Ramp Detectable Warning Surface Type Scores**

Surface Type	Score	Curb Ramps	Percent of Curb Ramps
Truncated domes	100	4,692	39.2 %
Pavement grooves	50	4,597	38.4 %
Other	50	13	0.1 %
None	0	2,655	22.2 %
Ramp not adjacent to the street*	100	760	—

* Ramps that are not adjacent to the street, such as upper combination ramps, do not require detectable warning surfaces. They are excluded from the percentage calculations.

Of curb ramps requiring a detectable warning surface, about 22 percent had no detectable warnings at all. Of the remaining 88 percent, about half had truncated domes, and half had pavement grooves.

Truncated domes were most prevalent in the newest developments around the fringe of the urbanized area, reflecting the evolution in accessibility standards (see *Figure 4-11*). The University of Illinois campus area had more ramps with truncated domes than most other parts of Champaign and Urbana, but even there coverage remained incomplete.

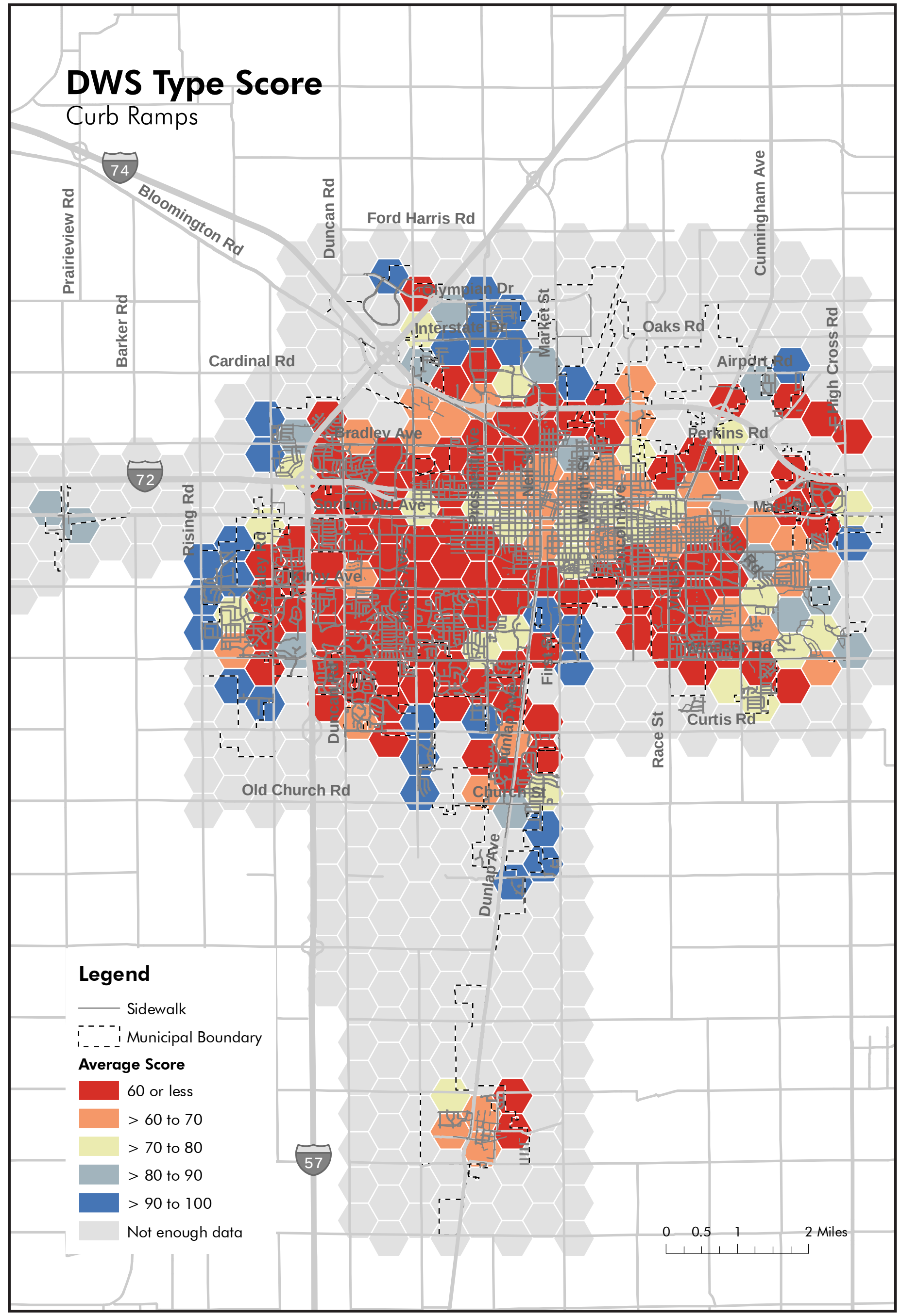


Figure 4-11 **Curb Ramp Detectable Warning Surface Type Scores**

Detectable Warning Surface:
Width

In order to be ADA compliant, the width of the detectable warning surface must be the same as the width of the ramp (PROWAG R305.1.4). However, PROWAG provides for a two-inch border around the detectable warning surface needed to secure some truncated dome panels to the ramp surface (Advisory R305.2). Detectable warning surfaces that are too narrow may be missed by pedestrians traveling along the edge of the ramp. Field staff measured the width of the detectable warning surface. Using the width of the ramp, the percent coverage of the detectable warning surface was calculated and was used to determine the detectable warning surface width compliance score (see *Table 4-12*).

Table 4-12 **Curb Ramp Detectable Warning Surface Width Scores**

Percent of Ramp or Landing Width*	Score	Curb Ramps	Percent of Curb Ramps
100 %	100	4,261	35.6 %
90 % to 99 %	80	2,306	19.3 %
80 % to 89 %	60	1,741	14.6 %
70 % to 79 %	40	464	3.9 %
69 % or less	20	530	4.4 %
None	0	2,655	22.2 %
Ramp not adjacent to the street	100	760	—

* The landing width was used for parallel ramps. Four inches was subtracted from the ramp or landing width to account for the two-inch border allowed to secure truncated domes to the concrete surface.

Nearly 36 percent of curb ramps requiring detectable warnings had surfaces that met the PROWAG width requirement. Of ramps with truncated domes, about 53 percent met the width standard. Most ramps with narrower detectable warning surfaces had surfaces that were at least 80 percent of the required width.

The spatial pattern of detectable warning surface width compliance was similar to that of surface type, suggesting that the age of the ramp was a significant factor in determining compliance (see *Figure 4-12*). The areas with the highest levels of compliance were more recent developments on the periphery of the urbanized area, particularly on the south side of Champaign, Urbana, and Savoy.

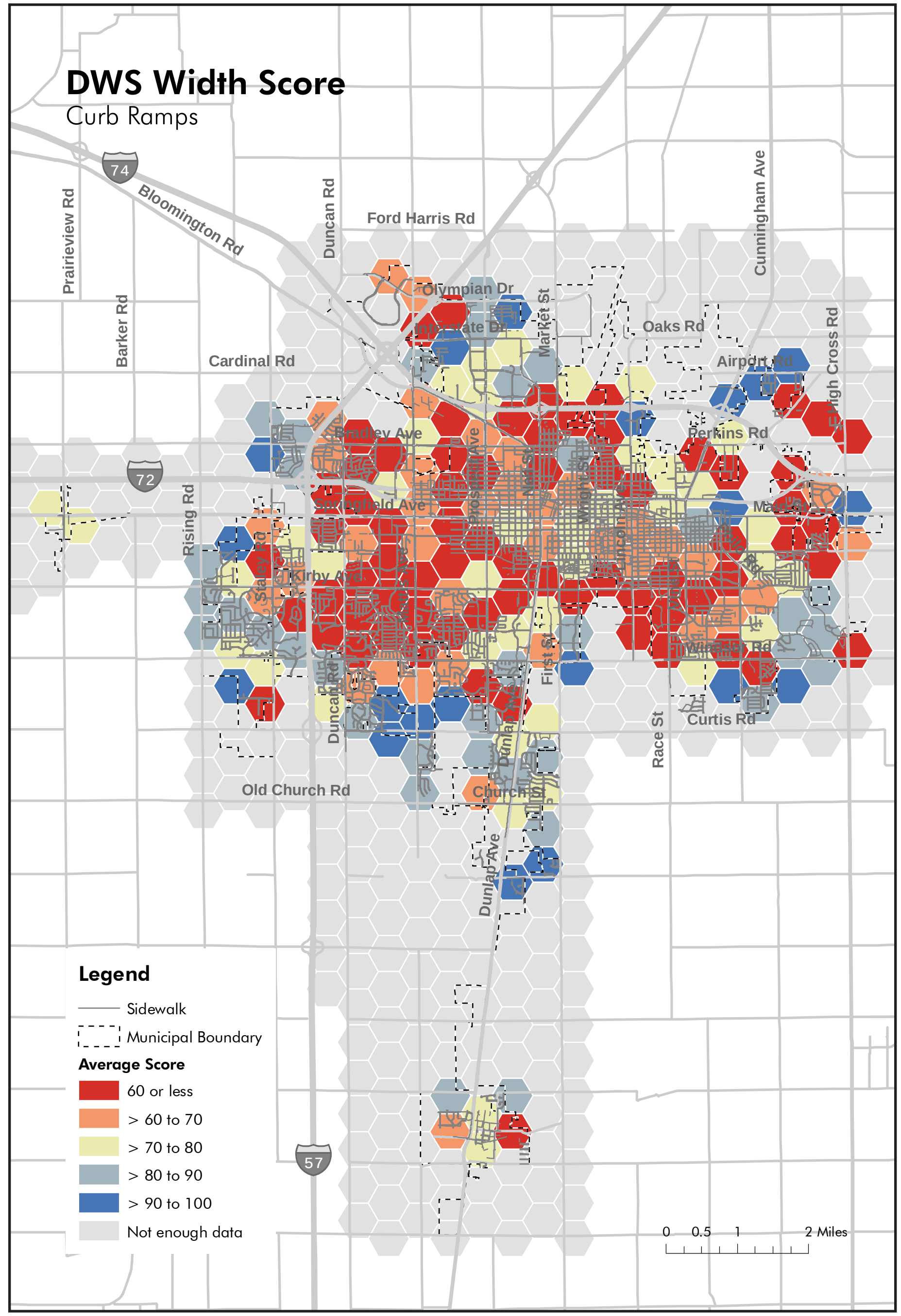


Figure 4-12 **Curb Ramp Detectable Warning Surface Width Scores**

Gutter: Cross Slope

Gutters lie between the end of a curb ramp and the street, creating a channel for water drainage. Though some slope is required for effective drainage, excessive slope perpendicular to the direction of pedestrian travel can be hazardous to pedestrians, particularly those using mobility devices. In order to be ADA compliant, gutters within pedestrian access routes must have a cross slope of 2.0 percent or less (PROWAG R304.5.3). Field staff measured the cross slope of the gutter, and the measurement was used to calculate the gutter cross slope compliance score (see *Table 4-13*).

Table 4-13 **Curb Ramp Gutter Cross Slope Scores**

Cross Slope	Score	Curb Ramps	Percent of Curb Ramps
2.0 % or less	100	8,424	70.5 %
2.1 % to 4.0 %	80	2,665	22.3 %
4.1 % to 6.0 %	60	671	5.6 %
6.1 % to 8.0 %	40	145	1.2 %
8.1 % to 10.0 %	20	34	0.3 %
10.1 % or more	0	18	0.2 %
Ramp not adjacent to the street*	100	760	—

* Ramps that are not adjacent to the street, such as upper combination ramps, do not have gutters. They are excluded from the percentage calculations.

More than 70 percent of curb ramps adjacent to the street had gutter slopes within the range allowed by PROWAG. Most of the noncompliant gutter cross slopes were 4 percent or less, suggesting that gutter cross slope presents fewer severe accessibility challenges than cross slopes in other parts of the sidewalk network.

Areas with lower levels of gutter cross slope compliance included areas north and south of I-74 in Champaign and Urbana; southwest Champaign west of I-57; Urbana south of Florida Avenue; and the U.S. 45/Dunlap Avenue corridor south of Kirby Avenue (see *Figure 4-13*).

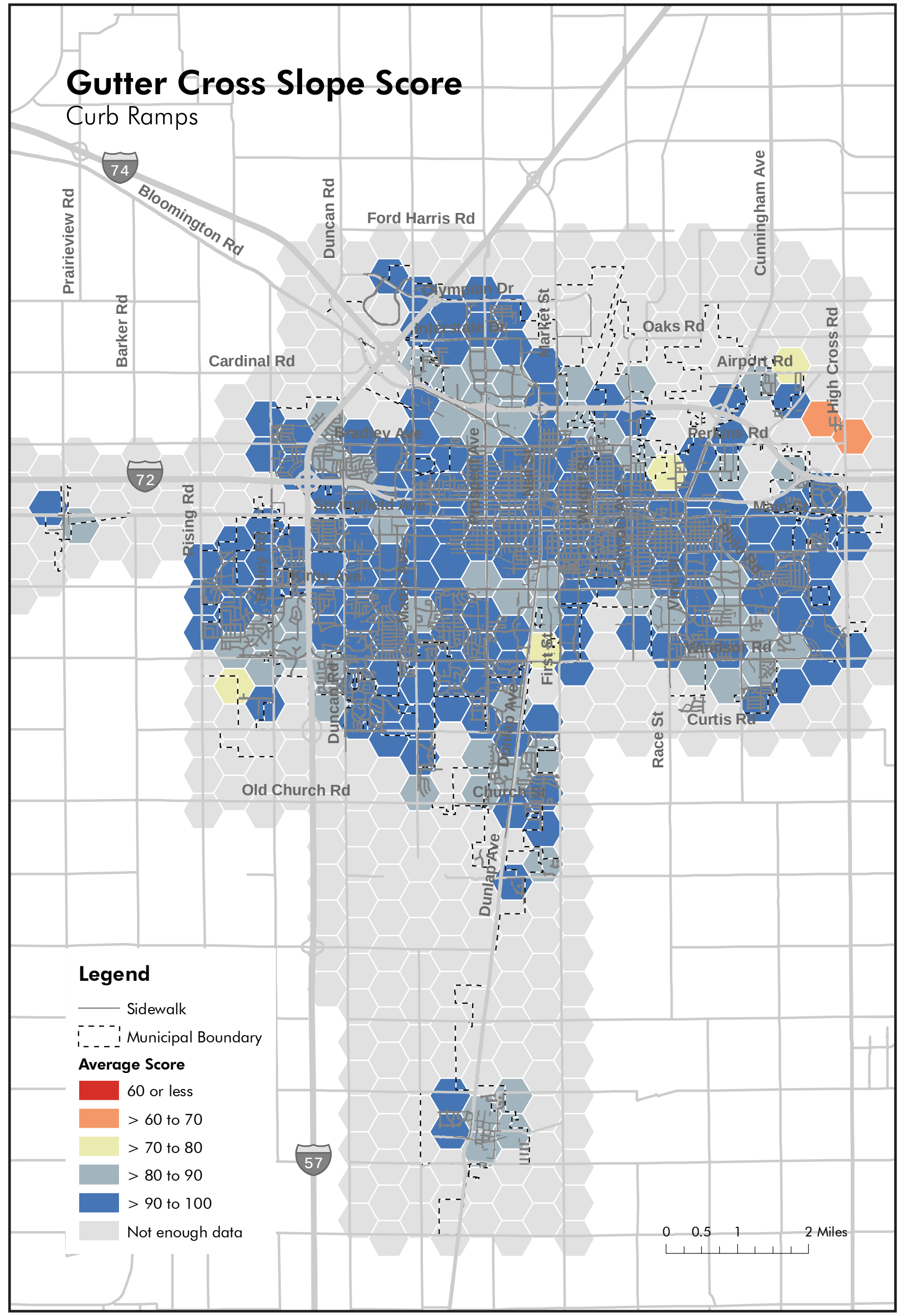


Figure 4-13 **Curb Ramp Gutter Cross Slope Scores**

Gutter: Counter Slope

Counter slope is the slope on the street side of the gutter in the direction of pedestrian travel. In order to be ADA compliant, gutters adjacent to curb ramps must have a counter slope of 5.0 percent or less (PROWAG R304.5.4). Higher counter slopes indicate an excessive change in angle between the curb ramp and the street, creating a tipping hazard for wheelchairs and other mobility devices. Field staff recorded the slope from the base of the gutter to the street, and the counter slope measurement was used to calculate the gutter counter slope score (see *Table 4-14*).

Table 4-14 **Curb Ramp Gutter Counter Slope Scores**

Counter Slope	Score	Curb Ramps	Percent of Curb Ramps
5.0 % or less	100	9,502	79.5 %
5.1 % to 7.0 %	80	1,391	11.6 %
7.1 % to 9.0 %	60	606	5.1 %
9.1 % to 11.0 %	40	253	2.1 %
11.1 % to 13.0 %	20	120	1.0 %
13.1 % or more	0	85	0.7 %
Ramp not adjacent to the street*	100	760	—

* Ramps that are not adjacent to the street, such as upper combination ramps, do not have gutters. They are excluded from the percentage calculations.

Nearly 80 percent of curb ramps adjacent to the street had gutter counter slopes within the compliant range. Of higher gutter counter slopes, most were 9 percent or less. Only about four percent of ramps had gutter counter slopes greater than 9 percent.

Noncompliant gutter counter slopes were scattered throughout the urbanized area (see *Figure 4-14*). This spatial pattern suggested that noncompliance was primarily related to the properties of specific streets and gutters rather than systematic issues in street and gutter construction.

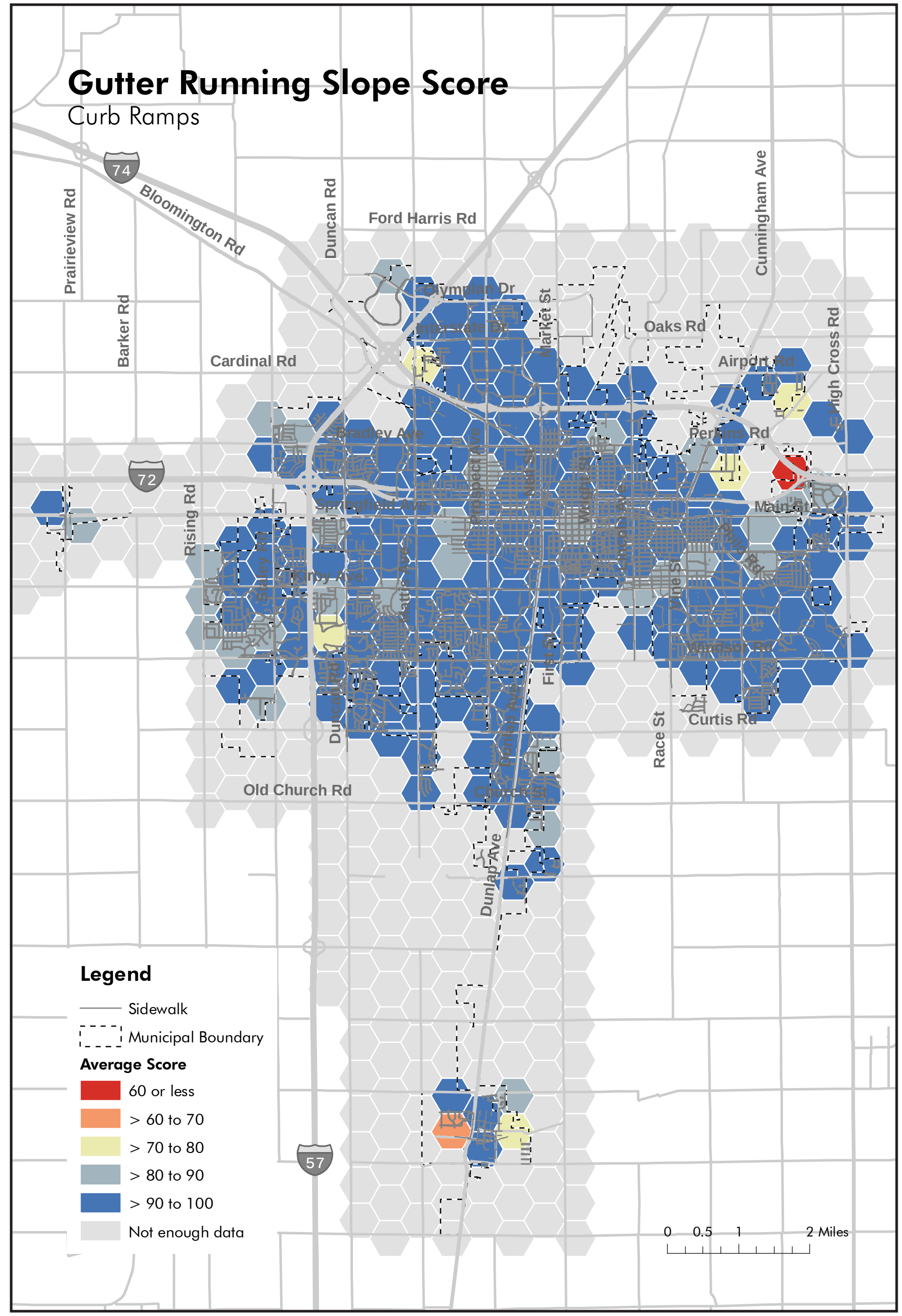


Figure 4-14 **Curb Ramp Gutter Counter Slope Scores**

Landing: Dimensions

The landing, or flat surface adjacent to the ramp, provides pedestrians with a safe space to stop or change their direction of travel. Landings that are too small may restrict the movement of pedestrians using mobility devices. Field staff recorded the length and width of the landing area for each ramp. In order to be ADA complaint, both the length and width must be at least four feet (PROWAG R304.2.1, R304.3.1 and R407.6.4). The minimum landing dimension was used to calculate the compliance score (see *Table 4-15*).

Table 4-15 **Curb Ramp Landing Dimensions Scores**

Minimum Dimension	Score	Curb Ramps	Percent of Curb Ramps
48 inches or more	100	6,640	83.1 %
42 to 47 inches	80	578	7.2 %
36 to 41 inches	60	108	1.4 %
30 to 35 inches	40	28	0.4 %
24 to 29 inches	20	5	0.1 %
Less than 24 inches	0	7	0.1 %
No landing	0	621	7.8 %
Running slope is 5.0 % or less*	100	4,730	—

* Features with a running slope of 5.0 % or less are classified as blended transitions and are not required to have landings under PROWAG. They are excluded from the percentage calculations.

Of curb ramps that required a landing, about 83 percent had a landing that met PROWAG standards for dimensions. However, nearly eight percent of ramps with running slopes greater than 5.0 percent lacked a flat landing area, requiring pedestrians to turn on the sloped ramp surface. Approximately nine percent of ramps had a landing area that was present but too small. Noncompliant landing dimensions were concentrated in the north and central portions of Champaign and Urbana (see *Figure 4-15*).

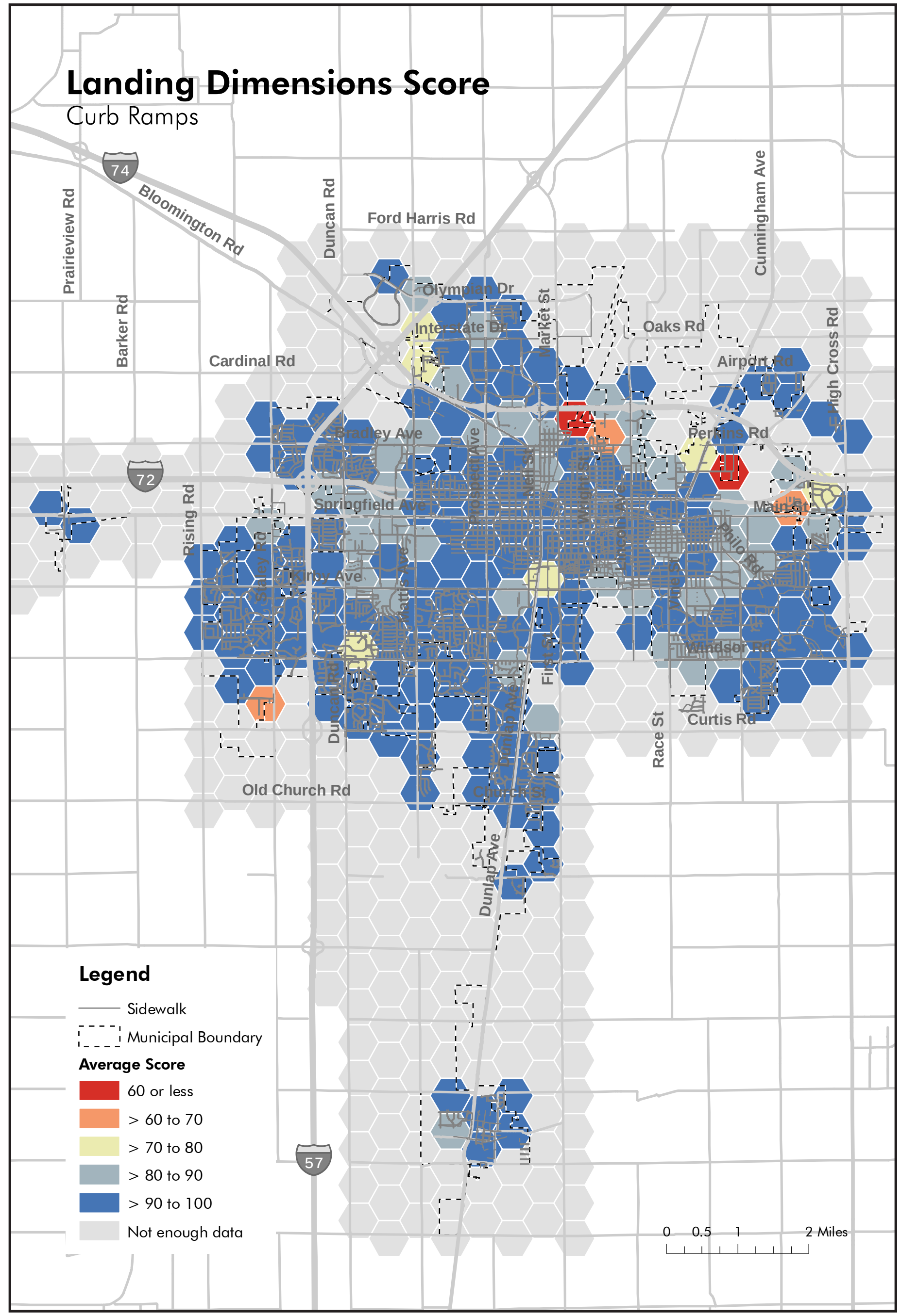


Figure 4-15 **Curb Ramp Landing Dimensions Scores**

Landing: Slope

In order to be ADA compliant, landings must have a cross slope and running slope of 2.0 percent or less (PROWAG R304.2.2, R304.3.2 and R304.5.3). Landings with steeper slopes make it difficult for users of wheelchairs and other mobility devices to stop and change direction safely. Field staff recorded the landing cross slope and running slope for each curb ramp. The maximum slope was used to calculate the landing slope compliance score (see *Table 4-16*).

Table 4-16 **Curb Ramp Landing Slope Scores**

Maximum Slope	Score	Curb Ramps	Percent of Curb Ramps
2.0 % or less	100	2,407	30.1 %
2.1 % to 4.0 %	80	2,999	37.5 %
4.1 % to 6.0 %	60	1,244	15.6 %
6.1 % to 8.0 %	40	454	5.7 %
8.1 % to 10.0 %	20	200	2.5 %
10.1 % or more	0	62	0.8 %
No landing	0	621	7.8 %
Running slope is 5.0 % or less*	100	4,730	—

* Features with a running slope of 5.0 % or less are classified as blended transitions and are not required to have landings under PROWAG. They are excluded from the percentage calculations.

Of curb ramps that required a landing, less than one third had maximum landing slopes within the range allowed by PROWAG, and nearly eight percent had no landing at all. More than half of curb ramps that required a landing had landing slopes between 2.1 and 6.0 percent. Extreme landing slopes greater than 10 percent were rare, representing less than one percent of ramps.

Landing cross slopes were most problematic in the older core of the urbanized area (see *Figure 4-16*). However, the highest concentrations of noncompliance were observed in north and south Champaign and Urbana. Southwest Champaign, southeast Urbana, Savoy, and Tolono had the highest levels of landing slope compliance.

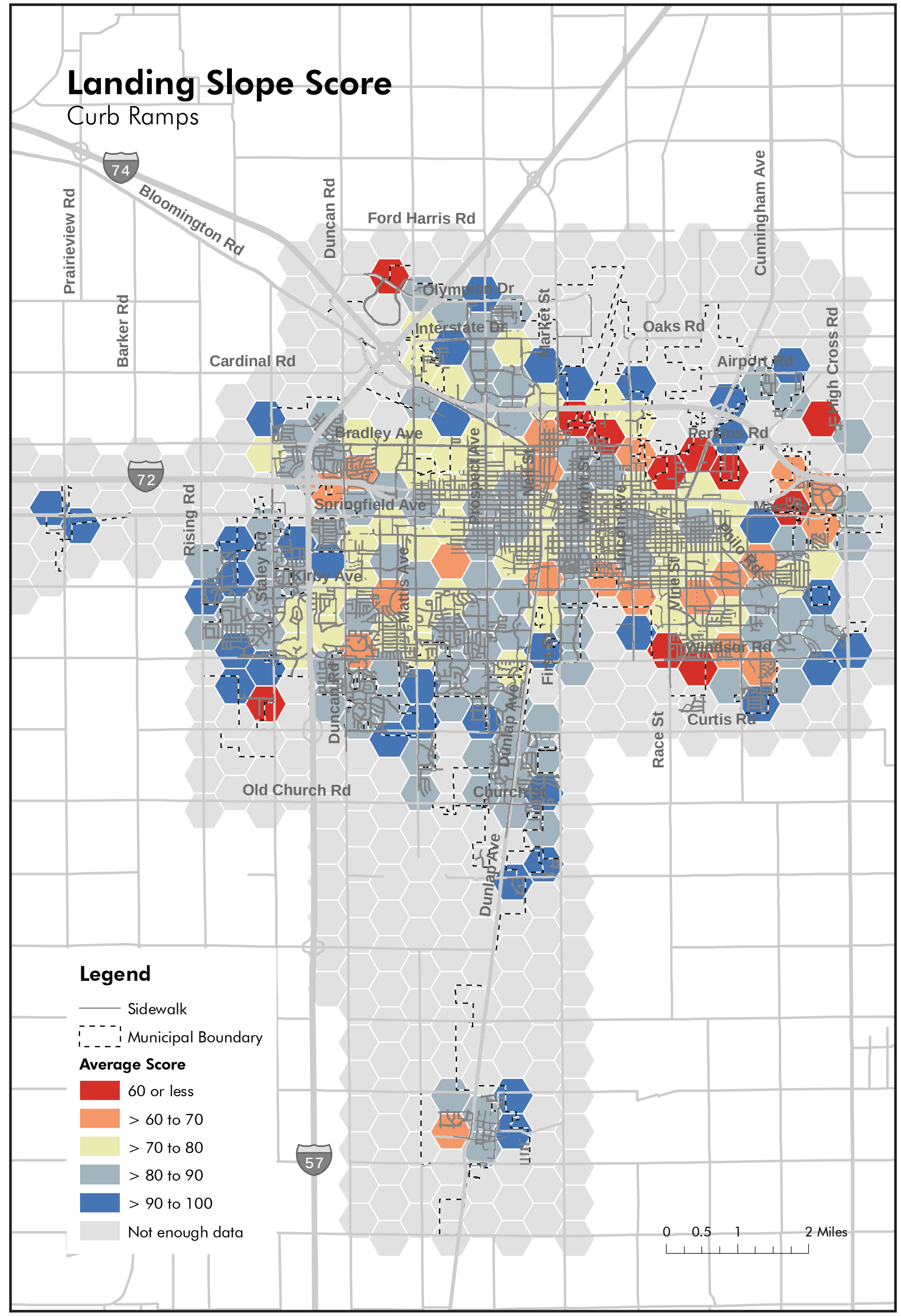


Figure 4-16 **Curb Ramp Landing Slope Scores**

Approaches and Flares:
Approach Cross Slope

Approaches are the sidewalk segments leading to a ramp. In order to be compliant, approaches must have a cross slope of 2.0 percent or less (PROWAG R304.5.3). Greater cross slopes reduce the stability of mobility devices and often indicate a poorly-designed ramp. Field staff recorded the cross slope of approaches on the first panel immediately adjacent to the ramp or landing. The maximum cross slope for the left and right approaches was used to calculate the approach cross slope compliance score (see *Table 4-17*).

Table 4-17 **Curb Ramp Approach Cross Slope Scores**

Maximum Cross Slope	Score	Curb Ramps	Percent of Curb Ramps
2.0 % or less	100	4,757	39.4 %
2.1 % to 4.0 %	80	5,163	42.8 %
4.1 % to 6.0 %	60	1,566	13.0 %
6.1 % to 8.0 %	40	461	3.8 %
8.1 % to 10.0 %	20	93	0.8 %
10.1 % or more	0	33	0.3 %
No approaches*	100	644	—

* Ramps served only by other ramps, such as lower combination ramps, were excluded from the percentage calculations.

Less than 40 percent of ramps with approaches had maximum approach cross slopes within the compliant range. About 56 percent had a maximum approach cross slope between 2.1 and 6.0 percent. Higher approach cross slopes were relatively rare and often coincided with other flaws in the ramp design, such as intersecting ramps and high ramp cross slope.

Approach cross slope was most often compliant on the periphery of the urbanized area and in the core (see *Figure 4-17*). Compliance was lowest in the ring of mid to late twentieth century residential neighborhoods surrounding the core of the community.

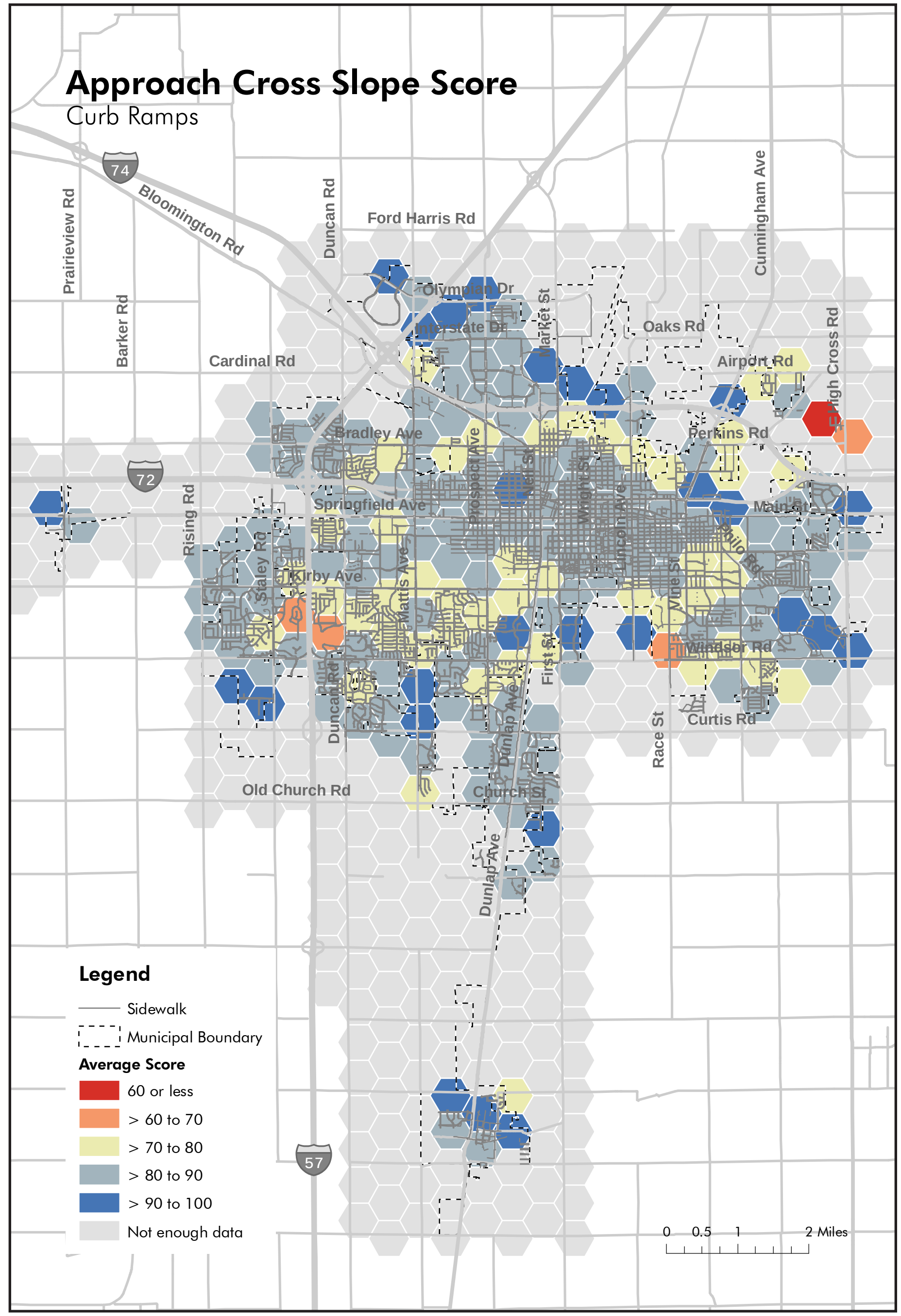


Figure 4-17 **Curb Ramp Approach Cross Slope Scores**

Approaches and Flares:
Flare Slope

Curb flares create a safe transition between the ramp and the adjacent surface when that surface is walkable. In order to be compliant, curb flares must have a slope of 10.0 percent or less (PROWAG R304.2.3). Greater flare slopes can be unsafe for pedestrians who use wheelchairs or other mobility devices. For ramps with curb flares, field staff measured the slope of the flare parallel to the curb. The slope measurement was used to calculate the flare slope compliance score (see *Table 4-18*).

Table 4-18 **Curb Ramp Flare Slope Scores**

Flare Slope	Score	Curb Ramps	Percent of Curb Ramps
10.0 % or less	100	148	40.2 %
10.1 % to 12.0 %	80	39	10.6 %
12.1 % to 14.0 %	60	41	11.1 %
14.1 % to 16.0 %	40	20	5.4 %
16.1 % to 18.0 %	20	21	5.7 %
18.1 % or more	0	99	26.9 %
No flares	100	12,349	—

Only 368 curb ramps had flared sides, and of these, about 40 percent had flare slopes within the compliant range. Almost 100 ramps, more than one quarter of the total with flares, had curb flare slopes greater than 18 percent. In many cases, these flares were not adjacent to a walkable surface and were designed to function as returned curbs. However, the steep slope and lack of a distinct, cane-detectable curb made them a potential safety hazard, particularly for blind or low-vision pedestrians.

Because of the small number of ramps with curb flares, no spatial pattern in flare slope compliance was evident (see *Figure 4-18*).

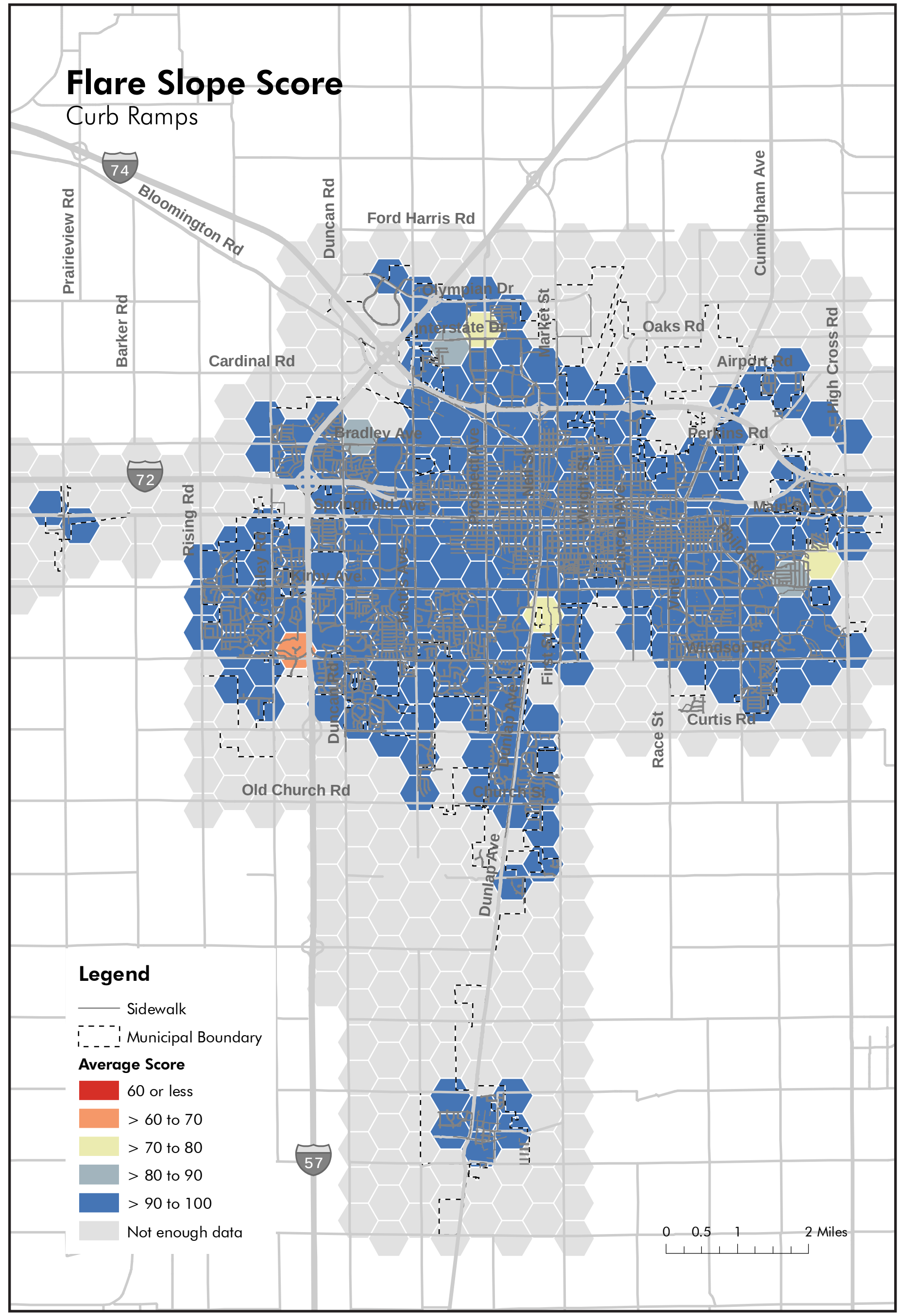


Figure 4-18 **Curb Ramp Flare Slope Scores**

Hazards: Vertical Faults

Vertical faults are points where the surface of the ramp is uneven, usually due to heaving or settling of panels. In order to be ADA compliant, all vertical faults must be less than ½ inch. In addition, all faults between ¼ inch and ½ inch must be beveled, or ground down to remove the fault (PROWAG R302.7.2). Larger vertical faults can create a tripping hazard and can impede mobility devices such as wheelchairs. Field staff recorded the size of the largest vertical fault in each ramp as well as the total number of vertical faults (included in the condition index). The largest vertical fault was used to calculate the compliance score (see *Table 4-19*).

Table 4-19 **Curb Ramp Vertical Fault Size Scores**

Largest Vertical Fault	Score	Curb Ramps	Percent of Curb Ramps
Less than ¼ inch, or beveled	100	8,509	66.9 %
¼ inch to ½ inch, not beveled	50	2,827	22.2 %
More than ½ inch	0	1,381	10.9 %

More than two thirds of curb ramps had a maximum vertical fault size that met the PROWAG standard. About 22 percent of ramps had vertical faults that could be addressed through beveling, while the remaining 11 percent required more substantial repairs to address larger vertical faults. These results suggest that vertical faults are less of a problem in curb ramps than in other parts of the sidewalk network, likely because curb ramps tend to be newer, on average, and shorter in length than sidewalks.

Vertical fault compliance scores for curb ramps were highest in the central part of the urbanized area, including the downtowns of Champaign and Urbana and the University of Illinois campus area (see *Figure 4-19*). Clusters of noncompliance were scattered throughout the outer parts of the urbanized area, most notably in the North Prospect Avenue commercial district in Champaign.

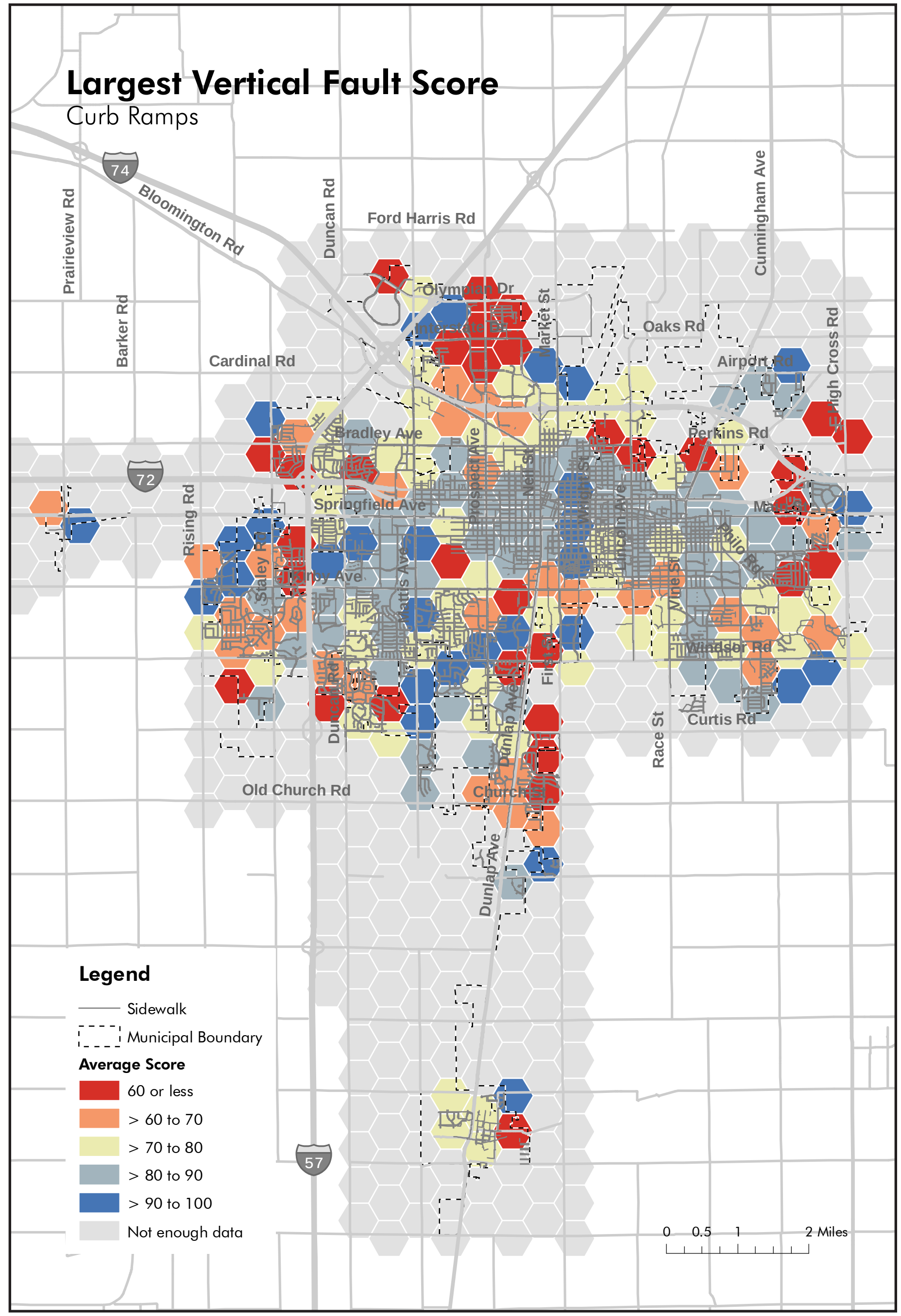


Figure 4-19 **Curb Ramp Vertical Fault Size Scores**

Hazards: Obstructions

Obstructions are objects that impede travel on the curb ramp. In order to be ADA compliant, ramps must have a four-foot wide clear path free from obstructions (PROWAG R210). Ramps where the clear width is less than four feet may be impassible for some users. Field staff recorded the type of the most serious obstruction present, if any, for each ramp. The compliance score for curb ramp obstructions was assigned based on whether obstructions were present (see *Table 4-20*).

Table 4-20 **Curb Ramp Obstruction Scores**

Presence of Obstruction	Score	Curb Ramps	Percent of Curb Ramps
No obstructions present	100	11,431	89.9 %
Obstructions present	0	1,286	10.1 %

Table 4-21 **Most Common Curb Ramp Obstruction Types**

Obstruction Type	Curb Ramps	Percent of Curb Ramps
Other	549	4.3 %
Grate	350	2.8 %
Tree trunk or other vegetation	276	2.2 %

Approximately 90 percent of curb ramps in the urbanized area were free from obstructions, while about 10 percent had at least one type of obstruction present. The most common types of obstructions were other obstructions such as insufficiently depressed curbs; grates and manhole covers; and tree trunks or other vegetation (see *Table 4-21*).

Areas with high concentrations of curb ramp obstructions were scattered throughout the urbanized area and included the northeast corner of the urbanized area along I-74, the Windsor Road corridor in Urbana, some areas along I-57 in southwest Champaign, and fringe areas of Tolono (see *Figure 4-20*).

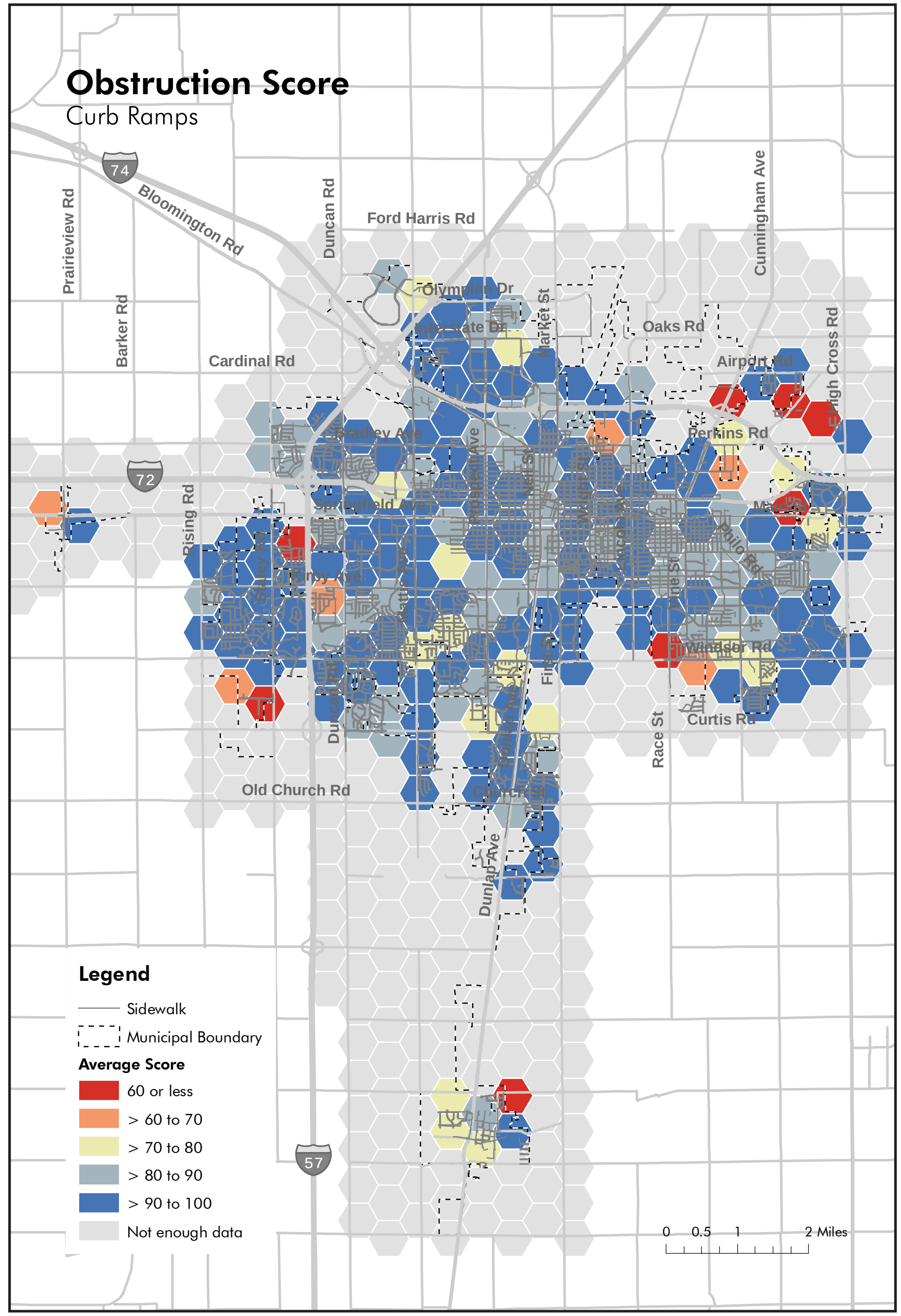


Figure 4-20 **Curb Ramp Obstruction Scores**

Combined Curb Ramp Compliance

The combined compliance score for curb ramps was calculated by weighting the scores for compliance criteria (see *Table 4-22*). Each criterion was assigned a weight of 5 or 10 percent depending on its importance to curb ramp accessibility and the range of scores observed. Factors like dimensions and slopes of the ramp and landing; detectable warning surface type; and hazards were given the highest weight because they have the greatest impact on individuals with disabilities. Other factors, such as ramp width and gutter slopes, were given lower weight because most of the curb ramps measured fell within the compliant range.

Table 4-22 **Curb Ramp Compliance Weights**

Variable	Weight
Ramp geometry	**25 %**
Ramp width	5 %
Ramp cross slope	10 %
Ramp running slope	10 %
Detectable warning surface	**15 %**
Detectable warning surface type	10 %
Detectable warning surface width	5 %
Gutter	**10 %**
Gutter cross slope	5 %
Gutter counter slope	5 %
Landing	**20 %**
Landing dimensions	10 %
Landing slope	10 %
Approaches and flares	**10 %**
Approach cross slope	5 %
Flare slope	5 %
Hazards	**20 %**
Vertical faults	10 %
Obstructions	10 %

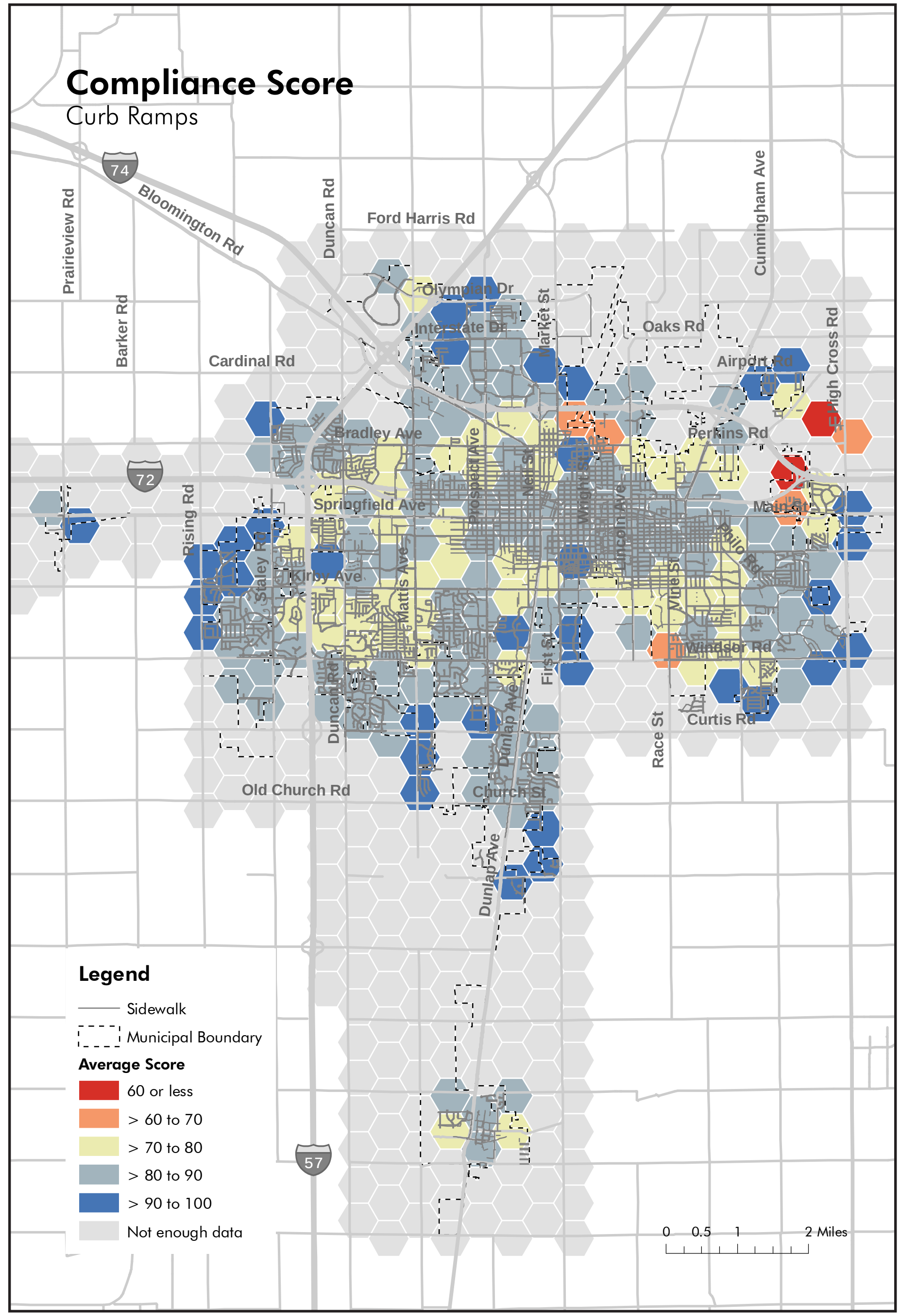


Figure 4-21 **Curb Ramp Compliance Score**

Overall, curb ramp compliance scores were higher than sidewalk compliance scores, with about 36 percent of features scoring higher than 90 on the combined compliance index (see *Table 4-23*). More than 83 percent of curb ramps scored above 70 on the compliance index. The higher scores are due in part to the lower average age of curb ramps relative to sidewalks. They also reflect consistently high scores on certain components of the index, such as gutter slopes and landing dimensions, which inflated the combined compliance score of many features.

Table 4-23 **Curb Ramp Compliance Scores**

Compliance Score	Curb Ramps	Percent of Curb Ramps
> 90 to 100	4,574	36.0 %
> 80 to 90	3,624	28.5 %
> 70 to 80	2,460	19.3 %
> 60 to 70	1,220	9.6 %
60 or less	839	6.6 %

For most components of the compliance index, approximately 50 to 60 percent of features fell within the top score category, with fewer features in each of the lower score tiers (see *Table 4-24*). Detectable warning surface scores were lower, on average, than other components due to the relatively large proportion of ramps without a detectable warning surface and the prevalence of pavement grooves.

Both the ramp geometry component and the landing component had more than 10 percent of features in the lowest score tier. In the case of ramp geometry, the low-scoring features often included ramps that did not conform to any of the standard ramp types or combined ramp types in a way that pushed the running slope or cross slope measurements well out of the compliant ranges. Landing scores were lowest where no flat landing was provided or where the landing area for one ramp also functioned as the ramp in the opposite direction.

The combined compliance scores were highest on average in newly-constructed developments at the fringe of the community (see *Figure 4-21*). These consistently high scores appeared on virtually all sides of the urbanized area, including north, west, and south Champaign; east Urbana; and Savoy. Ramps in these areas tended to be newer, on average, and conformed more closely to the current PROWAG standards, particularly with regard to the use of truncated domes.

The core of the urbanized area, including the downtowns of Champaign and Urbana; older urban neighborhoods; and the University of Illinois campus area also scored relatively high on curb ramp compliance. These areas had more pedestrian activity than other parts of the urbanized area, and as a result, a higher proportion of ramps had been updated with modern accessibility features than in other parts of the community. In the case of the older urban neighborhoods, they also had a greater share of non-ramp sidewalk endpoints, which were not included in the compliance analysis.

Curb ramp compliance was most consistently problematic in the ring of neighborhoods developed from the 1960s through the 1980s. These neighborhoods were constructed at a time when accessibility requirements were beginning to take shape, but current standards for accessible design were not yet in place. As a result, the curb ramps in these areas were built in a wide variety of configurations that are no longer considered accessible under the current PROWAG standards.

In some cases, such as ramps that are missing truncated domes, it may be possible to retrofit the noncompliant ramps to bring them into compliance with PROWAG standards. Other problems, such as incorrect geometry in the ramp and approaches, may require total reconstruction of the ramp area. In such cases, it may be necessary to replace one ramp type with a different type, such as replacement of a perpendicular ramp with combination ramps, in order to remedy overly steep ramp runs.

Table 4-24 **Curb Ramp Compliance Score Components**

Compliance Score	Ramp Geometry	Detectable Warning Surface	Gutter	Landing	Approaches and Flares	Hazards
> 90 to 100	61.7 %	31.5 %	59.4 %	52.3 %	41.8 %	62.6 %
> 80 to 90	13.8 %	9.4 %	23.8 %	22.3 %	39.8 %	—
> 70 to 80	9.5 %	2.0 %	9.6 %	10.6 %	12.4 %	19.4 %
> 60 to 70	3.0 %	14.1 %	3.9 %	4.6 %	3.8 %	—
60 or less	12.0 %	43.0 %	3.3 %	10.2 %	2.1 %	18.0 %

Percentages represent the percent of features scoring in the given range for the given component of the compliance index.

Crosswalks

Crosswalks provide a safe pedestrian crossing at street intersections and mid-block locations. ADA-compliant crosswalks work in concert with sidewalks and curb ramps to allow pedestrians of all abilities to navigate the community safely and independently.

Field staff collected data for 1,196 crosswalks in the urbanized area. The compliance index for crosswalks includes two criteria that correspond to PROWAG standards:

- Crosswalk width
- Cross slope

Based on these criteria, the overall compliance scores for crosswalks ranged from 70 for crosswalks with cross slopes outside the compliant range to 100 for crosswalks that met PROWAG standards for both criteria (see *Figure 4-22*). Most of the crosswalks examined scored 100 on the compliance index due to the limited number of criteria examined and the looser standards for crosswalk cross slope at uncontrolled intersections compared with other parts of the pedestrian network.

Crosswalks at intersections without stop or yield control are allowed to have cross slopes up to 5.0 percent under PROWAG, compared with the 2.0 percent threshold for cross slope in most pedestrian access routes. The higher cross slope ceiling is designed to prevent ramping of vehicles at locations where they are not required to stop. Since traffic signals do not require vehicles to stop during the green phase, they were considered uncontrolled intersections for the purpose of the compliance analysis, though which standard should apply to crosswalks at traffic signals is a matter of continuing debate among ADA experts.

Key finding from the crosswalk compliance analysis include:

- All of the crosswalks examined met the standard for minimum width set in PROWAG, suggesting that current crosswalk designs provide sufficient width for accessible crossing.
- Relatively few crosswalks exceeded the standard for cross slope, and most crosswalks that fell outside the compliant range were only slightly above the allowed cross slope.

With a width of 92 inches and a cross slope of 6.3 percent, this crosswalk at a stop-controlled intersection scores 70 on the combined compliance index.

This crosswalk at an uncontrolled intersection scores 100 on the compliance index due to its width of 91 inches and its cross slope of 0.7 percent.

Figure 4-22 **Crosswalk Compliance Score Examples**

Crosswalk Width

In order to be ADA complaint, crosswalks must have a minimum width of four feet, though PROWAG standards recommend a width of at least five feet (PROWAG R302.3). Crosswalks that are too narrow may not provide a safe crossing space for all pedestrians. Field staff measured the width of marked crosswalks, measuring from the inside of the painted markings in the case of standard or dashed crosswalks. The width measurement was used to calculate the crosswalk width compliance score (see *Table 4-25*).

Table 4-25 **Crosswalk Width Scores**

Crosswalk Width	Score	Crosswalks	Percent of Crosswalks
48 inches or more	100	1,189	100 %
45 to 47 inches	80	0	0 %
42 to 44 inches	60	0	0 %
39 to 41 inches	40	0	0 %
36 to 38 inches	20	0	0 %
35 inches or less	0	0	0 %
No painted markings	100	7	—

All of the crosswalks measured had a width of at least four feet. Marked crosswalks are most prevalent in core of the community, including the downtowns of Champaign and Urbana and the University of Illinois campus area (see *Figure 4-23*).

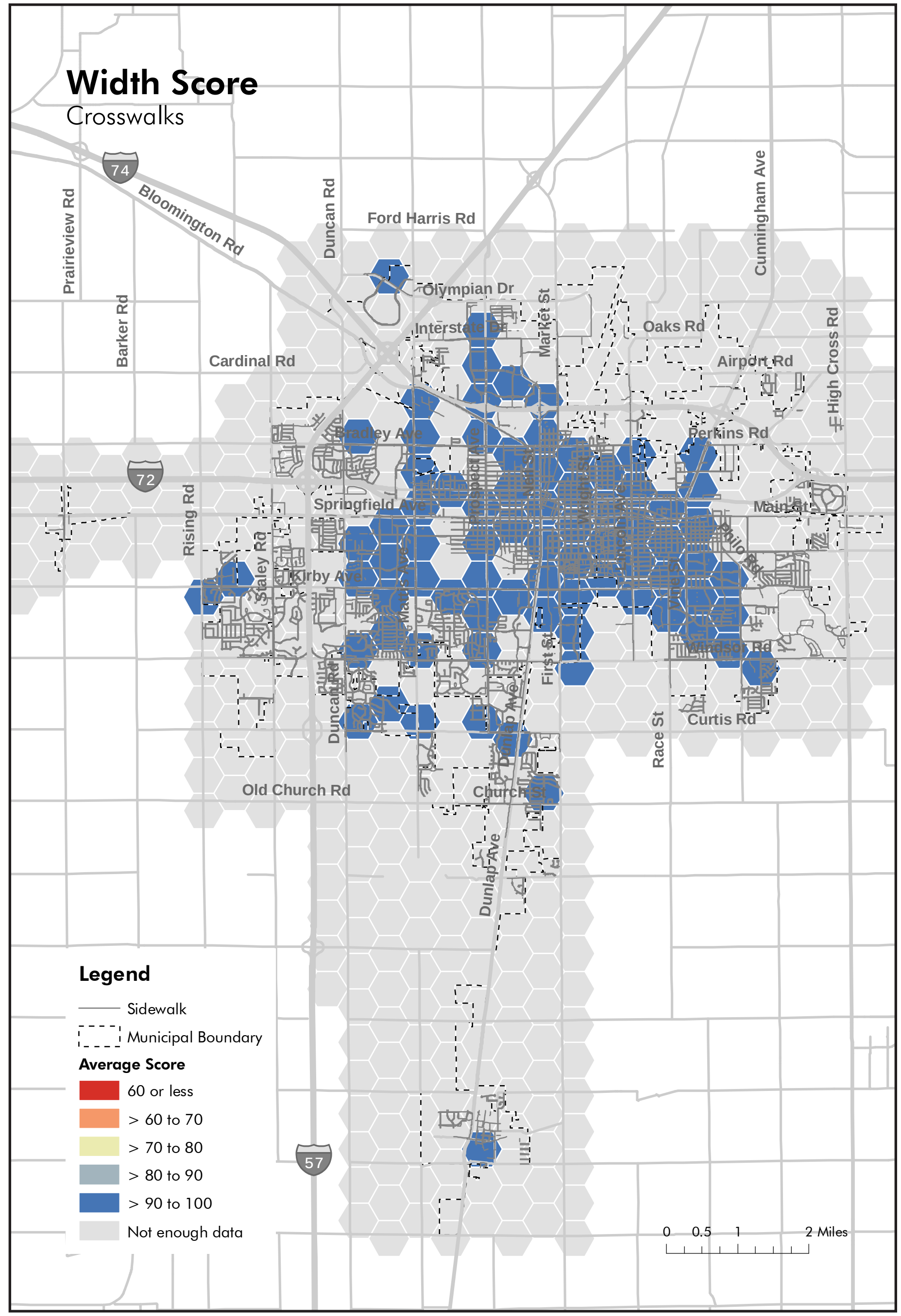


Figure 4-23 **Crosswalk Width Scores**

Cross Slope

Cross slope is the slope of the crosswalk perpendicular to the direction of travel. In order to be ADA compliant, crosswalks must have cross slopes of 2.0 percent or less (PROWAG R302.6.0). Pedestrian crossings without stop control are allowed to have cross slopes up to 5.0 percent (PROWAG R302.6.1), and midblock crossings are allowed to match the grade of the street (PROWAG R302.6.2). Greater cross slopes can make wheelchairs, walkers and other mobility devices unstable. Field staff recorded the cross slope at the midpoint of each marked crosswalk, and the cross slope measurement was used to calculate the compliance score (see *Table 4-26*).

Table 4-26 **Crosswalk Cross Slope Scores**

Stop-Controlled*	Uncontrolled	Score	Crosswalks	Percent of Crosswalks
2.0 % or less	5.0 % or less	100	1,038	94.1 %
2.1 % to 4.0 %	5.1 % to 6.0 %	80	55	5.0 %
4.1 % to 6.0 %	6.1 % to 7.0 %	60	8	0.7 %
6.1 % to 8.0 %	7.1 % to 8.0 %	40	2	0.2 %
8.1 % to 10.0 %	8.1 % to 9.0 %	20	0	0.0 %
10.1 % or more	9.1 % or more	0	0	0.0 %
Midblock crossing		100	93	—

* Intersections with a stop sign at the leg containing the crosswalk were considered stop-controlled.

Approximately 94 percent of crosswalks at intersections had a cross slope within the compliant range. Most of the remaining intersection crosswalks had cross slopes in the second score tier, while extreme cross slopes were relatively rare. Because of the high level of compliance, no spatial pattern is evident in the cross slope compliance scores (see *Figure 4-24*).

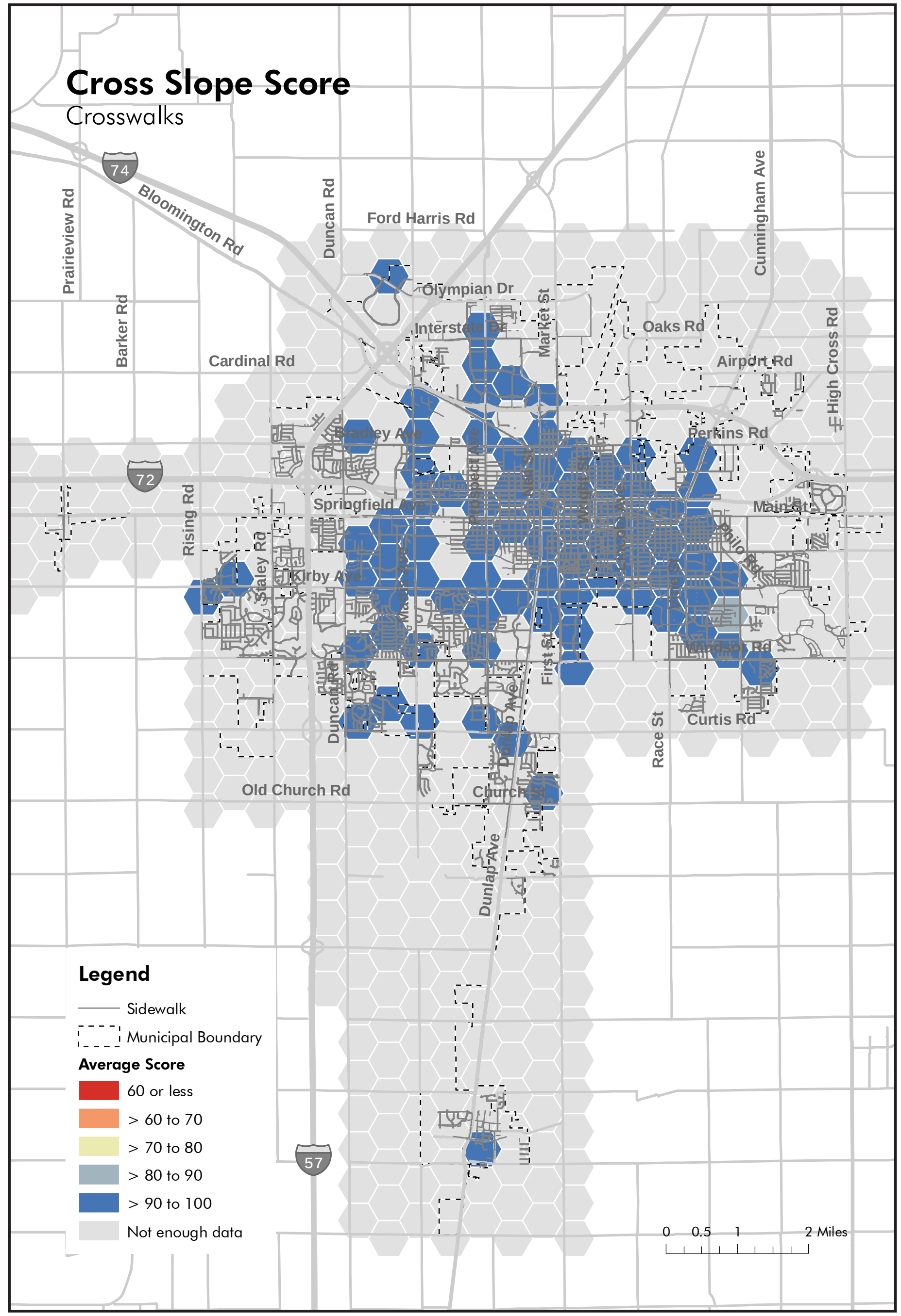


Figure 4-24 **Crosswalk Cross Slope Scores**

Combined Crosswalk Compliance

The combined compliance score for crosswalks was calculated by equally weighting each of compliance criteria (see *Table 4-27*). Equal weights were used because both width and cross slope impact the mobility and safety of individuals with disabilities.

Table 4-27 **Crosswalk Compliance Weights**

Variable	Weight
Crosswalk width	50 %
Cross slope	50 %

Table 4-28 **Crosswalks Compliance Scores**

Compliance Score	Crosswalks	Percent of Crosswalks
> 90 to 100	1,131	94.6 %
> 80 to 90	55	4.6 %
> 70 to 80	8	0.7 %
> 60 to 70	2	0.2 %
60 or less	0	0.0 %

Nearly 95 percent of crosswalks scored above 90 on the compliance index, and more than 99 percent scored above 80 (see *Table 4-28*). The high scores reflect the limited set of variables available for assessing crosswalk compliance as well as the high level of compliance on the criteria examined. Because of the high level of compliance among crosswalks, no spatial pattern was evident in the compliance results (see *Figure 4-25*).

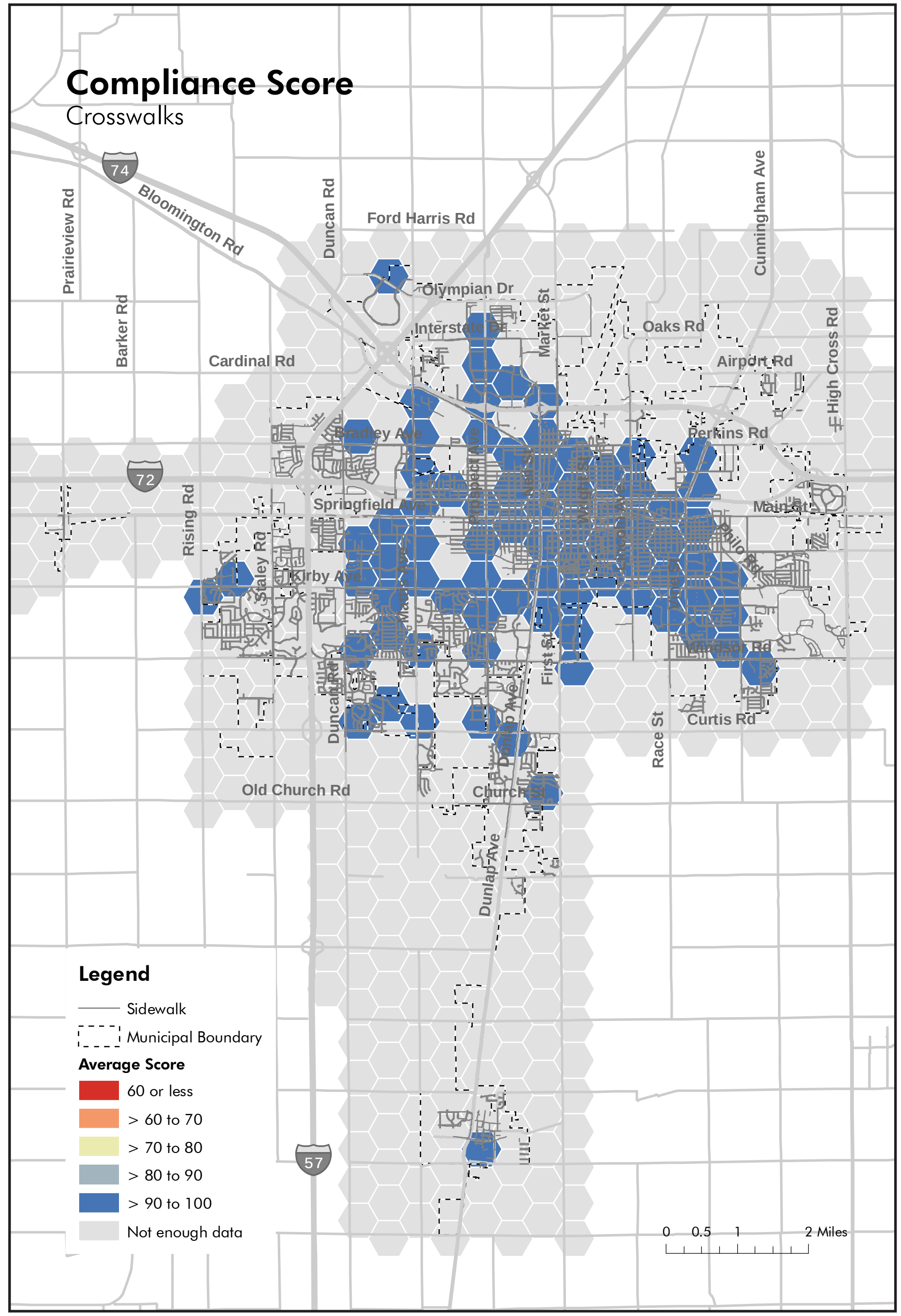


Figure 4-25 **Crosswalk Compliance Scores**

Pedestrian Signals

Pedestrian signals increase pedestrian safety by providing a visual or audible cue indicating pedestrian crossing phases. ADA-compliant pedestrian signals have additional features that make them accessible to a wider variety of pedestrians.

Field staff collected data for 601 pedestrian signals in the urbanized area. Pedestrian signals and the associated pedestrian pushbuttons were analyzed for compliance with a variety of ADA and MUTCD criteria including:

- Button size
- Button height
- Button position and appearance
- Tactile features

Overall compliance scores for pedestrian signals ranged from 0 for signals without a pushbutton and lacking tactile features to 100 for signals with accessible pushbuttons and both types of tactile accessibility features (see *Figure 4-26*). Key findings from the compliance analysis include:

- More than 70 percent of pushbuttons were of an accessible size, and about two thirds are had high contrast with the surrounding fixture.
- More than 90 percent of pushbuttons were mounted at an accessible height. Those outside the accessible range were too high rather than too low.
- More than 80 percent of pushbuttons were mounted close enough to the curb, but nearly half were located too close to another pushbutton.
- Locator tones and vibrotactile signals or buttons were the least common accessibility features for pedestrian signals in the urbanized area.

With a small pushbutton that lacks a tactile arrow, vibrotactile indicator, locator tone, and most other accessibility features, this pedestrian signal scores 40 on the combined compliance index.

Though the signal itself is similar to the previous example, this pushbutton has all of the required accessibility features and scores 100 on the compliance index.

Figure 4-26 **Pedestrian Signal Compliance Score Examples**

Button Size

Pedestrian signal pushbuttons come in several sizes. Accessible buttons are those that are 2.0 inches in diameter or larger (CUUATS Accessible Pedestrian Signal Design Standards). Buttons with diameters between 0.5 and 1.9 inches are considered somewhat accessible, while those less than 0.5 inches are the least accessible. Field staff recorded the size of the pushbutton using three size categories, and the button size was used to calculate the compliance score (see *Table 4-29*).

Table 4-29 **Pedestrian Signal Button Size Scores**

Button Diameter	Score	Pedestrian Signals	Percent of Pedestrian Signals
2 inches or greater	100	422	71.5 %
0.5 to 1.9 inches	67	111	18.8 %
0.4 inches or less	33	57	9.7 %
No pushbutton	—	11	—

Approximately 72 percent of pedestrian signals with pushbuttons were accessible based on button size. Less than 10 percent of pushbuttons were the smallest, least accessible button size. Accessible pushbuttons were least common on the north side of the urbanized area and in the Mattis Avenue corridor (see *Figure 4-27*).

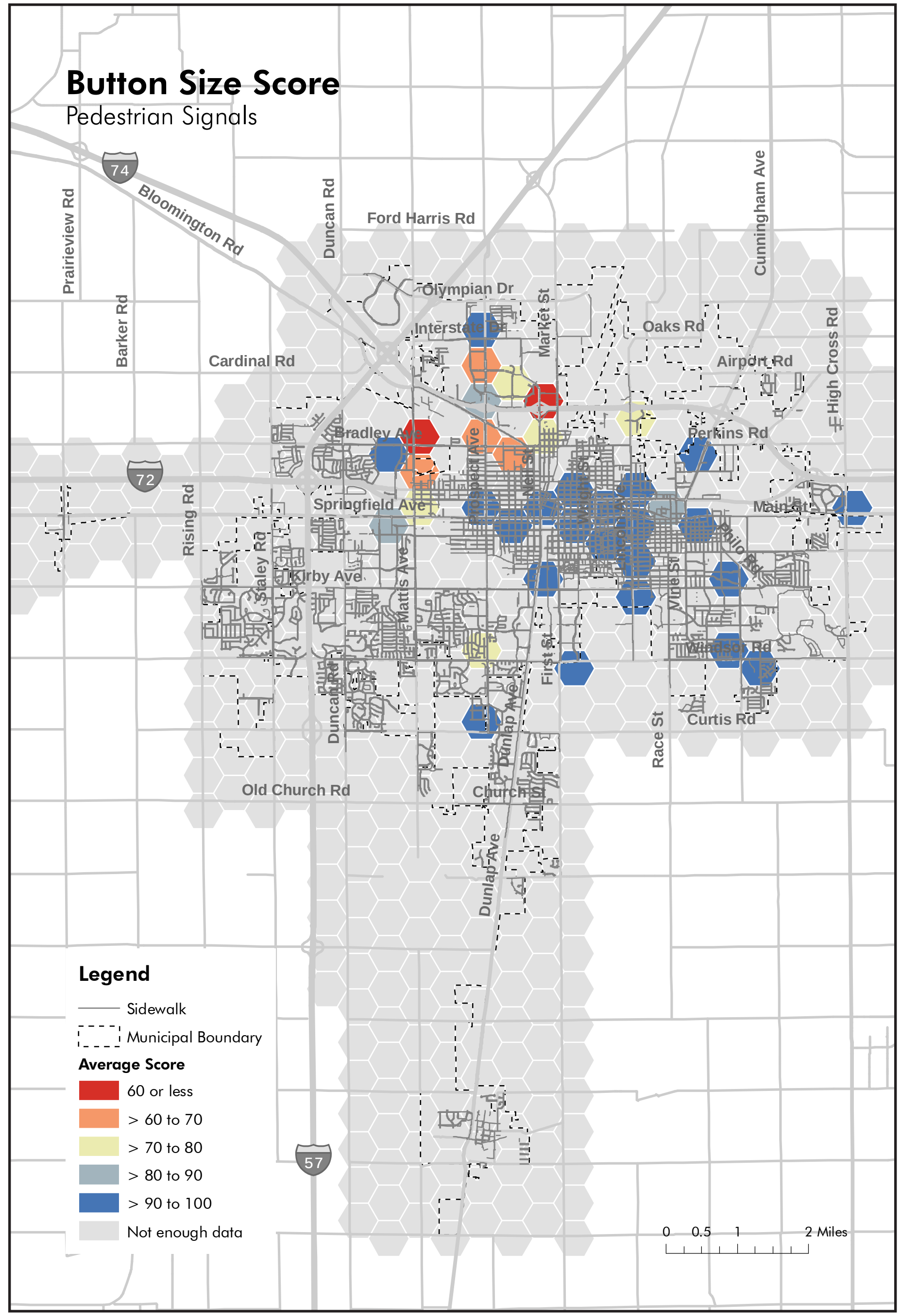


Figure 4-27 **Pedestrian Signal Button Size Scores**

Button Height

In order to be ADA compliant, pushbuttons must be mounted between 15 and 48 inches above the adjacent surface (PROWAG R406.2 and R406.3). Buttons that are positioned higher or lower may be out of reach for some users. Field staff measured the height of the pushbutton from the ground, and this measurement was used to calculate the compliance score (see *Table 4-30*).

Table 4-30 **Pedestrian Signal Button Height Scores**

Button Height	Score	Pedestrian Signals	Percent of Pedestrian Signals
4 inches or less	0	0	0 %
5 to 9 inches	20	0	0 %
10 to 14 inches	60	0	0 %
15 to 48 inches	100	552	93.6 %
49 to 53 inches	60	17	2.9 %
54 to 58 inches	20	20	3.4 %
59 inches or greater	0	1	0.2 %
No pushbutton	—	11	—

More than 93 percent of pedestrian pushbuttons were mounted at an accessible height, and no pushbuttons were located too low. Approximately 6 percent of pushbuttons were located between one and ten inches too high. Because of the high level of compliance for button height, no spatial pattern was evident (see *Figure 4-28*).

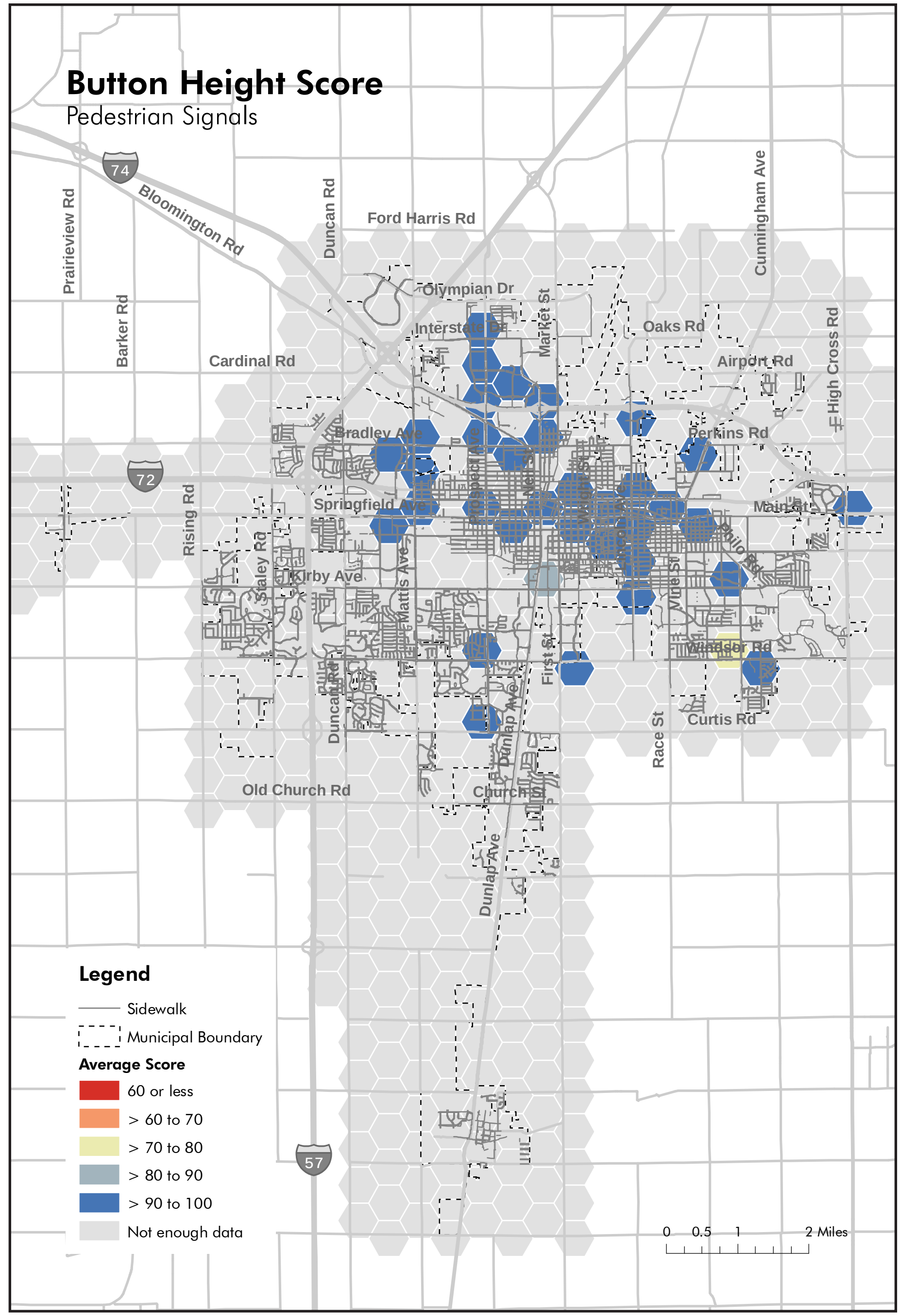


Figure 4-28 **Pedestrian Signal Button Height Score**

Button Position and Appearance

In order to be ADA compliant, pushbuttons must contrast with the surrounding surface and must emit a locator tone for vision-impaired pedestrians to find them (MUTCD 4E.12.02). In addition, MUTCD standards recommend that pushbuttons be at least 10 feet apart, within 10 feet of the curb, and adjacent to an "all-weather surface" (MUTCD 4E.08.04A, 4E.08.07 and 4E.08.06). Field staff recorded the presence or absence of these accessibility features, and each feature was assigned a point value (see *Table 4-31*). The score for each pedestrian signal was the sum of the points for the button accessibility features that were present.

Table 4-31 **Pedestrian Signal Button Position and Appearance Scores**

Button Position and Appearance	Score*	Pedestrian Signals	Percent of Pedestrian Signals**
Pushbuttons at least 10 feet apart*	15	309	52.4 %
Pushbuttons within 10 feet of curb	15	509	86.3 %
All weather surface adjacent to button	15	268	45.4 %
High contrast button	25	394	66.8 %
Locator tone to find button	30	155	26.3 %
No pushbutton	—	11	—

* The total score for each pedestrian signal is the sum of the scores for each of the features present.
** Because the categories are not mutually exclusive, the percentages do not sum to 100 percent.

Placement near the curb and high contrast were the most common accessibility features, present in approximately 86 and 67 percent of pushbuttons, respectively. Placement away from other buttons and all-weather surfaces were less common, while locator tones were the rarest accessibility feature, present in only about one quarter of pushbuttons.

Pushbutton accessibility features were most common in Urbana, in and around the University of Illinois campus, and in some parts of the North Prospect Avenue shopping district (see *Figure 4-29*).

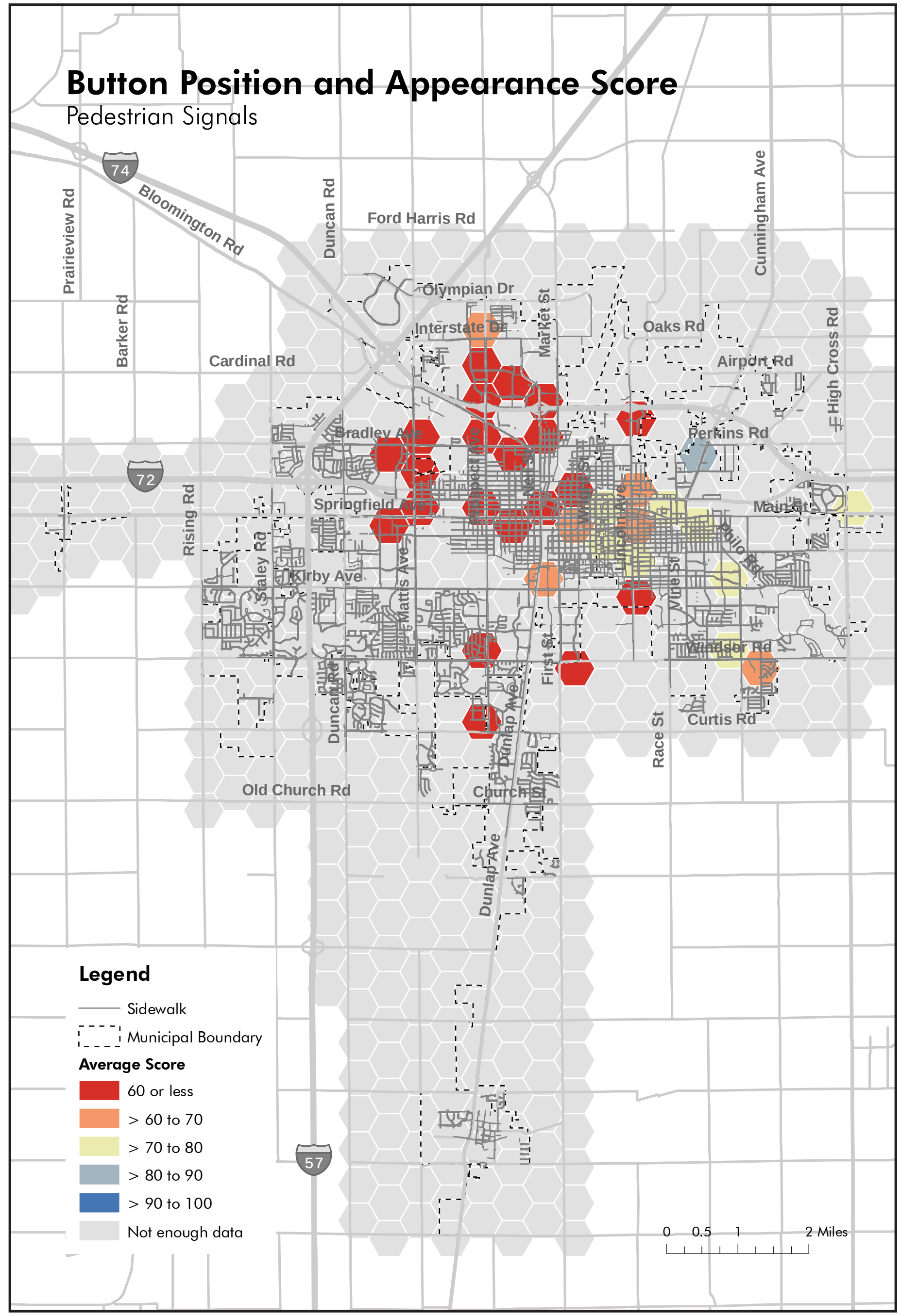


Figure 4-29 **Pedestrian Signal Button Position and Appearance Scores**

Tactile Features

In order to be ADA compliant, pedestrian signals must be accompanied by a tactile arrow indicating the direction of crossing (MUTCD 4E.12.01). In addition, signals must have a vibrotactile walk indicator (MUTCD 4E.11.02). Field staff recorded the presence or absence of tactile features, and each feature was assigned a point value (see *Table 4-32*). The compliance score for each pedestrian signal was the sum of the points for the tactile features that were present.

Table 4-32 **Pedestrian Signal Tactile Features Scores**

Tactile Features	Score*	Pedestrian Signals	Percent of Pedestrian Signals**
Tactile arrow	50	244	40.6 %
Vibrotactile signal or button	50	136	22.6 %

* The total score for each pedestrian signal is the sum of the scores for each of the features present.
** Because the categories are not mutually exclusive, the percentages do not sum to 100 percent.

Tactile features were relatively rare. Tactile arrows were present at only about 41 percent of pedestrian signals, and vibrotactile indicators were available at less than one quarter of signals. These features were most likely to be present in downtown Urbana and in the University of Illinois campus area (see *Figure 4-30*).

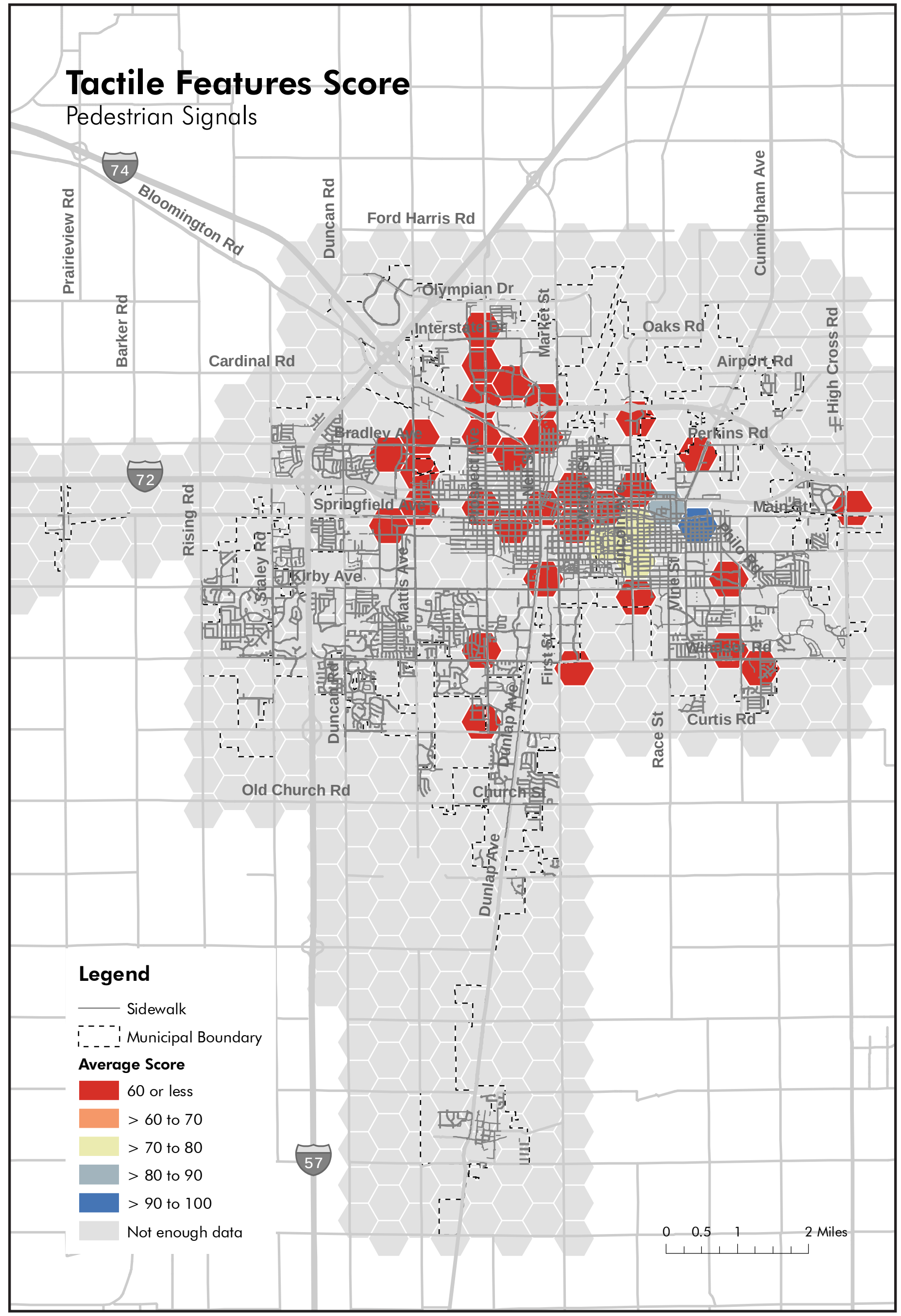


Figure 4-30 **Pedestrian Signal Tactile Features Scores**

Combined Pedestrian Signal Compliance

The combined compliance score for pedestrian signals was calculated by weighting the compliance criteria (see *Table 4-33*). Signals with pushbuttons were scored using all of the possible compliance criteria, while signals without buttons were scored based only on the tactile features criterion. For signals with pushbuttons, the weights reflect the fundamental importance of button size and height in allowing pedestrians with disabilities to activate a pushbutton, as well as the number of possible accessibility features that make buttons and signals accessible to a wide range of users.

Table 4-33 **Pedestrian Signal Compliance Weights**

Variable	Weight: With Button	Weight: Without Button
Button size	20 %	—
Button height	20 %	—
Button position and appearance	30 %	—
Tactile features	30 %	100 %

Table 4-34 **Pedestrian Signal Compliance Scores**

Compliance Score	Pedestrian Signals	Percent of Pedestrian Signals
> 90 to 100	70	11.6 %
> 80 to 90	68	11.3 %
> 70 to 80	71	11.8 %
> 60 to 70	98	16.3 %
60 or less	294	48.9 %

Overall compliance scores for pedestrian signals were low, with only about one third of all pedestrian signals scoring above 70 on the compliance index (see *Table 4-34*). Nearly half of the pedestrian signals in the inventory scored 60 or lower on the index. The low scores reflect the difficulty and expense of incorporating all of the required accessibility features, particularly when pushbuttons are present.

Pedestrian signal compliance scores were highest in the core of the community, particularly in downtown Urbana and in the University of Illinois campus area (see *Figure 4-31*). Pedestrian signals along outlying arterials, such as Mattis Avenue and Bradley Avenue, had relatively low compliance scores.

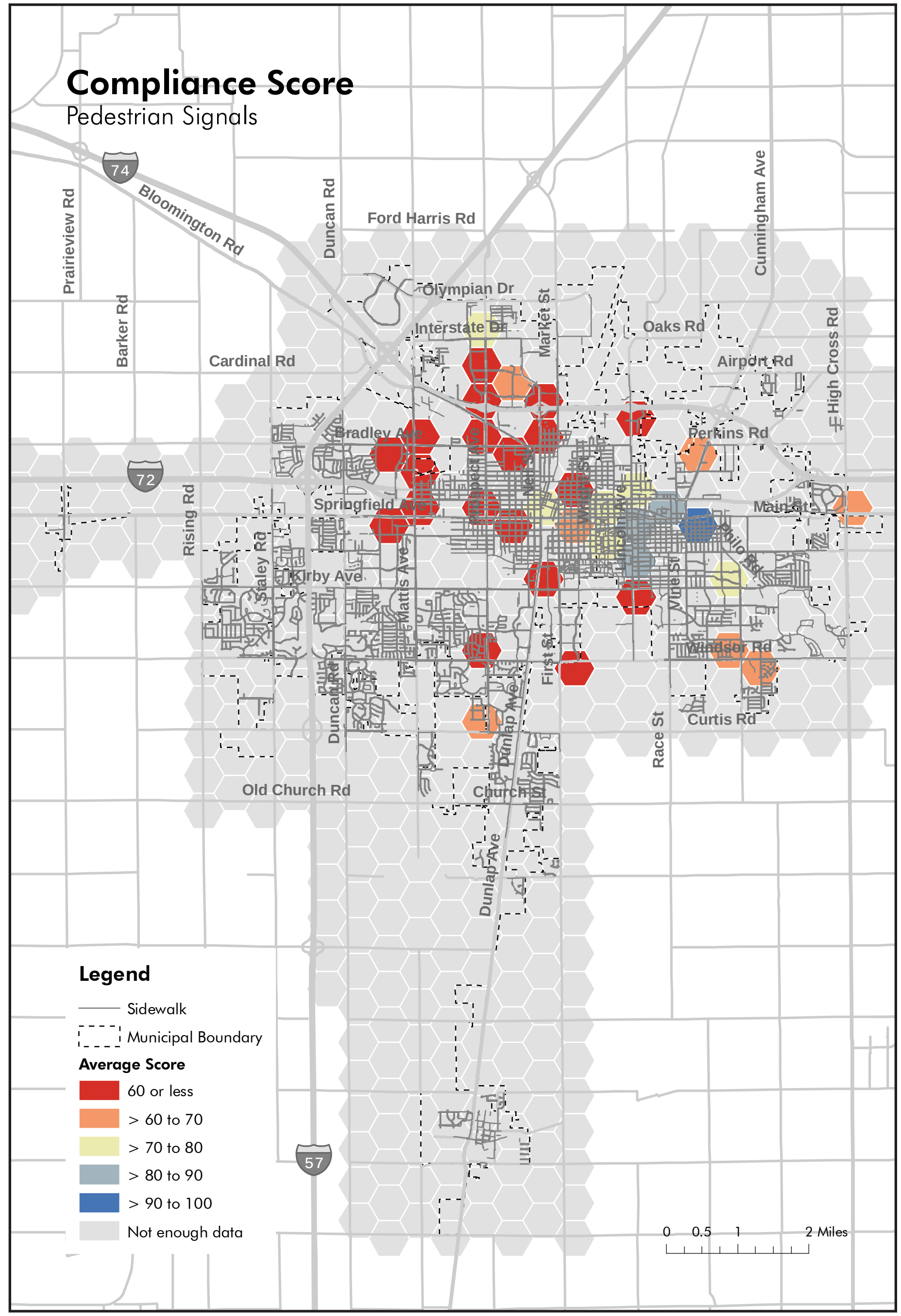


Figure 4-31 **Pedestrian Signal Compliance Scores**

Feature Type Comparison

While the four pedestrian network feature types were evaluated separately, these features interact with one another to determine the overall accessibility of the built environment. The maps that follow display the combined compliance scores for three feature types—sidewalks, curb ramps, and pedestrian signals—for the purpose of comparison (see *Figure 4-32*). Crosswalks are excluded from the comparison because the high proportion of features scoring 100 obscures any spatial trends.

Sidewalks and curb ramps exhibit strong similarities in the spatial distribution of compliance. For both feature types, compliance with PROWAG standards is highest in new development at the fringe of the urbanized area, followed by the core of the community. A ring of neighborhoods around the core of the community, largely comprised of development from the mid to late twentieth century, has the lowest average compliance for both sidewalks and curb ramps.

The ring of noncompliance is significantly narrower for curb ramps than for sidewalks, suggesting that ramps were added to some neighborhoods after the initial construction of sidewalks. Bondville, where sidewalk compliance is low and curb ramp compliance is high, also exhibits this trend.

Pedestrian signals display a spatial pattern similar to sidewalks and curb ramps, except that compliance is highest at the center, rather than the fringe, of the urbanized area. Unlike for sidewalks and curb ramps, where the core of compliance is centered on the University of Illinois campus, the highest level of compliance for pedestrian signals is located in Urbana, east of the campus area.

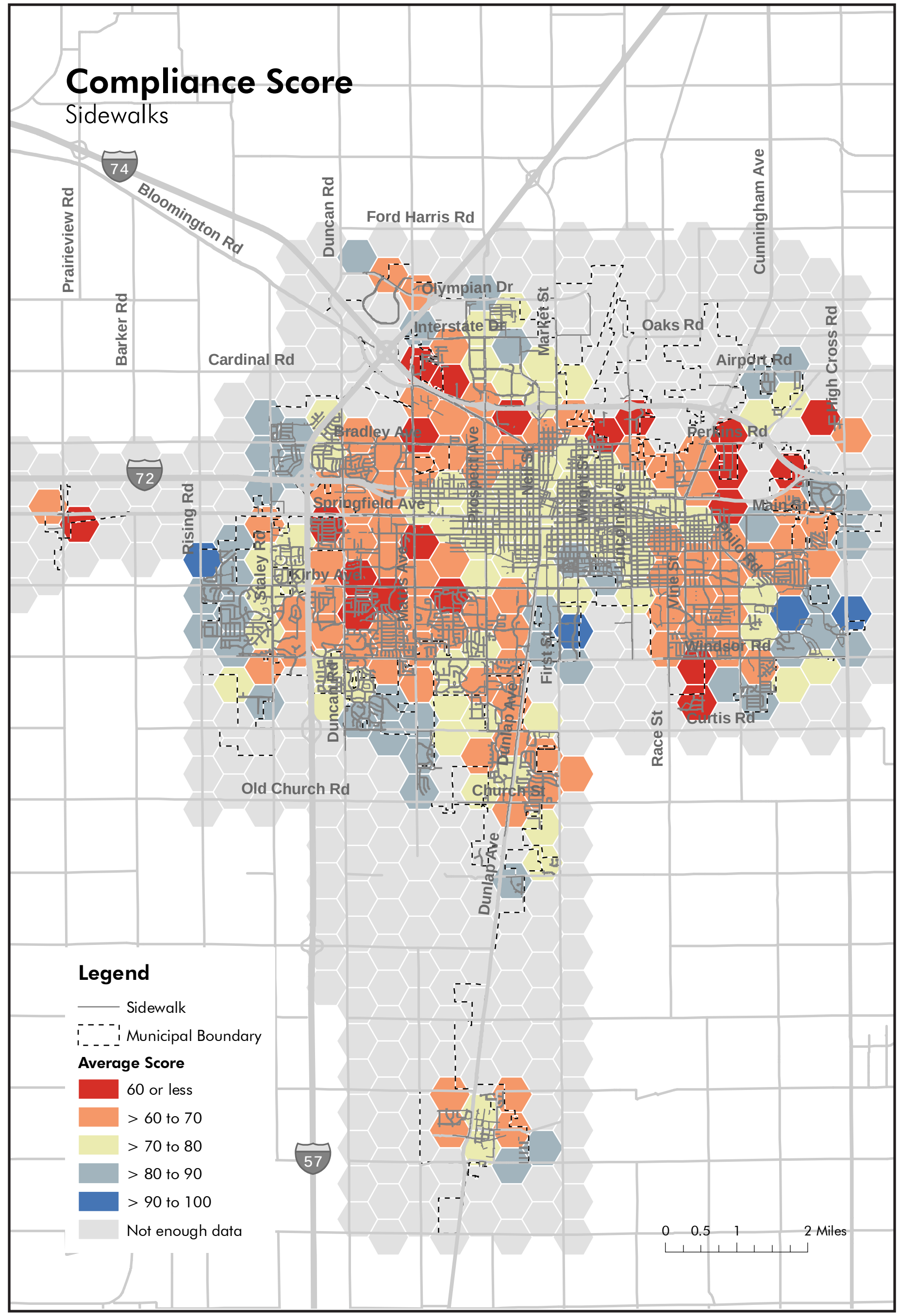
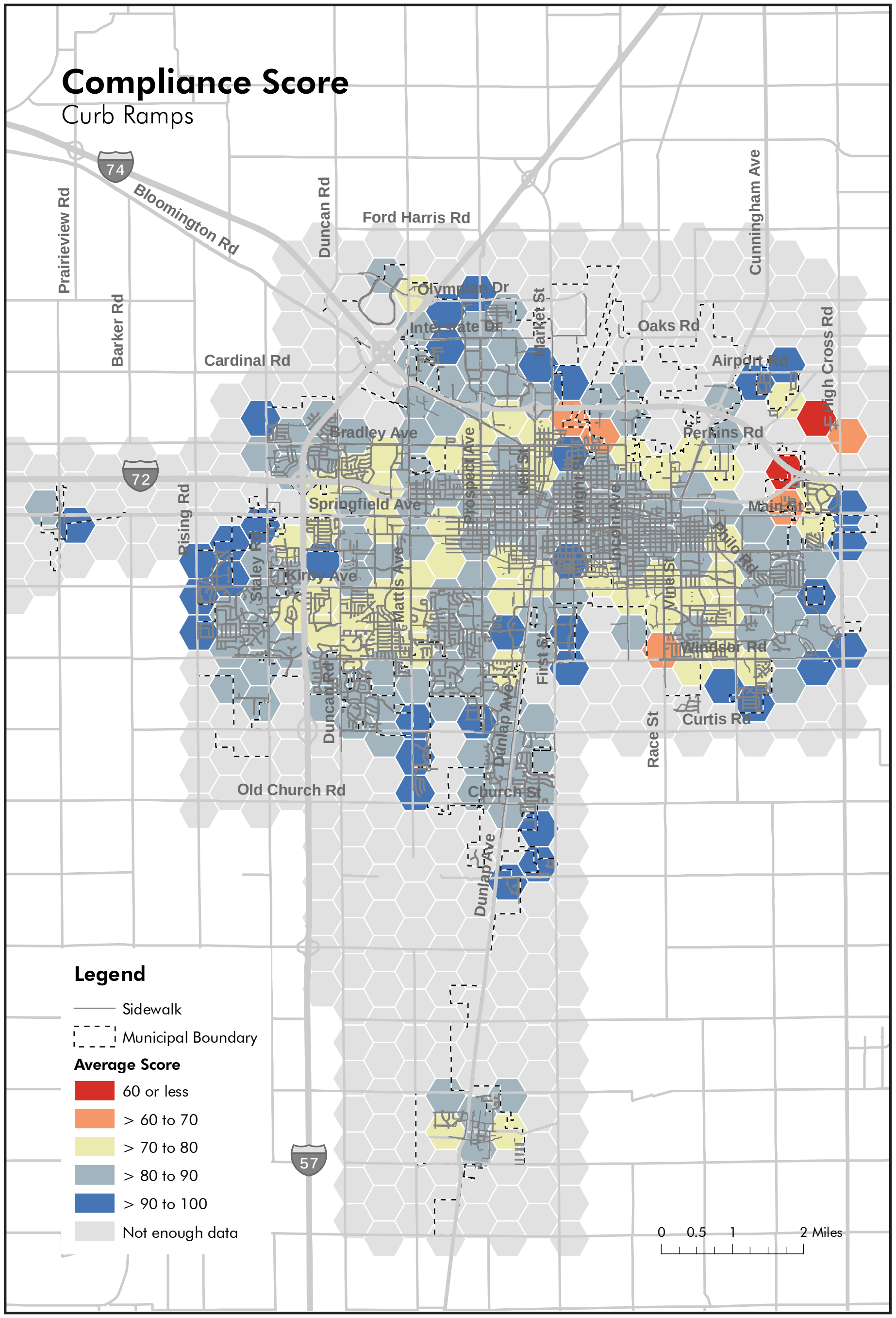
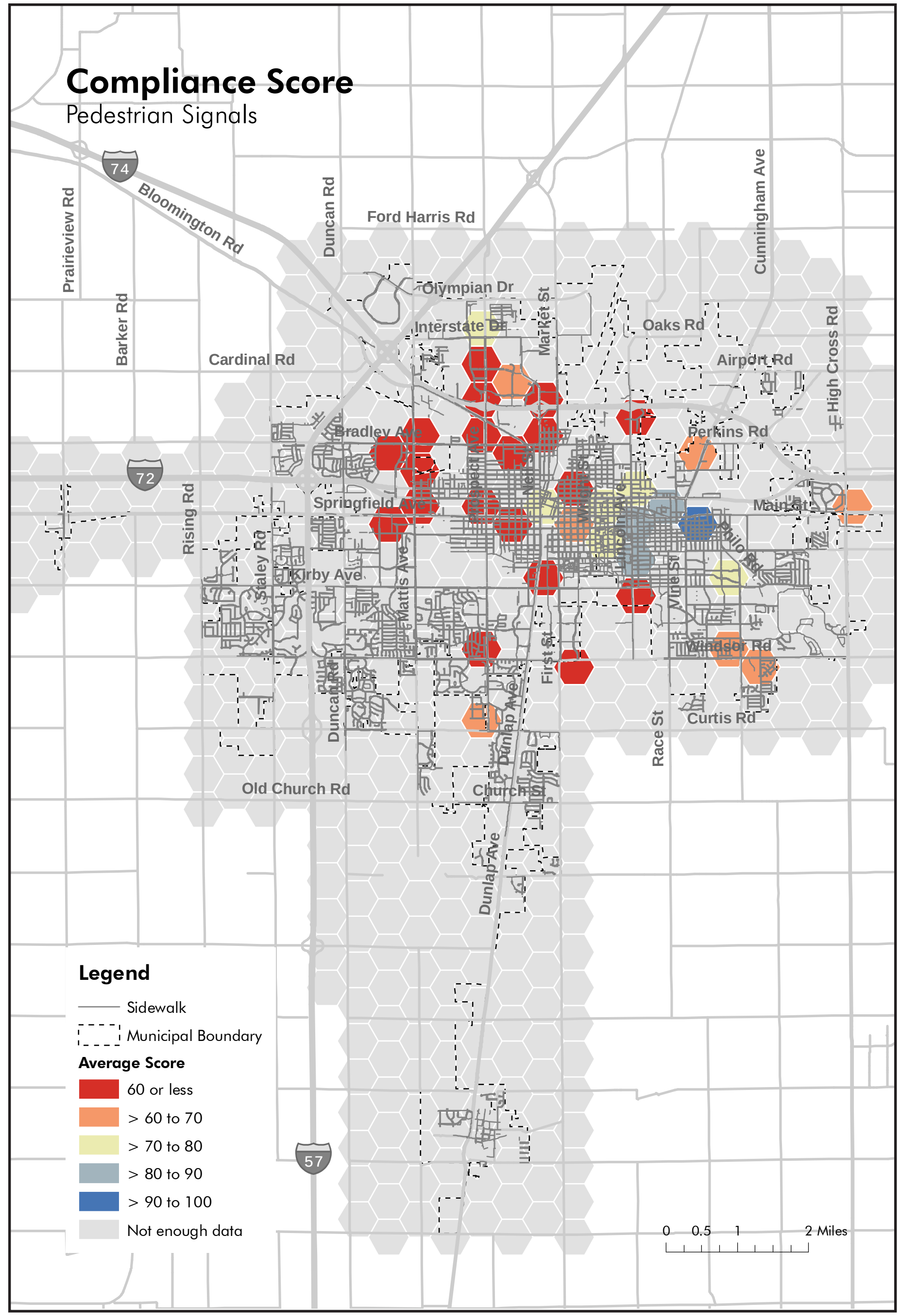


Figure 4-32 **Comparison of Compliance Scores by Feature Type**


Compliance Score
Curb Ramps
Prairieview Rd
Barker Rd
Bloomington Rd
Duncan Rd
Ford Harris Rd
Cardinal Rd
Olympian Dr
Interstate Dr
Market St
Oaks Rd
Airport Rd
Cunningham Ave
High Cross Rd
Bradley Ave
Perkins Rd
Springfield Ave
Main St
Rising Rd
Staley Rd
Kirby Ave
Mattis Ave
Neil St
Wright St
Lincoln Ave
Vine St
Philo Rd
First St
Windsor Rd
Curtis Rd
Race St
Dunlap Ave
Church St
Old Church Rd
74
72
57
Legend
Sidewalk
Municipal Boundary
Average Score
60 or less
> 60 to 70
> 70 to 80
> 80 to 90
> 90 to 100
Not enough data
0 0.5 1 2 Miles


Compliance Score
Pedestrian Signals
Prairieview Rd
Barker Rd
Bloomington Rd
Duncan Rd
Ford Harris Rd
Cardinal Rd
Olympian Dr
Interstate Dr
Market St
Oaks Rd
Airport Rd
Cunningham Ave
High Cross Rd
Bradley Ave
Perkins Rd
Springfield Ave
Main St
Rising Rd
Staley Rd
Kirby Ave
Mattis Ave
Vine St
Philo Rd
First St
Windsor Rd
Curtis Rd
Race St
Dunlap Ave
Church St
Old Church Rd
74
72
57
Legend
Sidewalk
Municipal Boundary
Average Score
60 or less
> 60 to 70
> 70 to 80
> 80 to 90
> 90 to 100
Not enough data
0 0.5 1 2 Miles

5 Condition

Compliance with PROWAG standards is an important first step in making the pedestrian network accessible, but PROWAG includes only a subset of the issues that affect pedestrians. Many of the physical defects that are not covered by PROWAG standards relate to the condition of sidewalk network features.

Condition issues result from degradation over time due to changes in temperature, moisture, wear, and other factors. Freezing and thawing of the ground, which produces expansion and contraction, leads to cracking of sidewalk and curb ramp surfaces. Cracks allow moisture to penetrate the surface, which can lead to further cracking, formation of vertical faults, or the growth of grass and other vegetation. Similarly, water flowing over curb ramps and sidewalks can deposit dirt and other sediment. If these condition issues become serious enough, they can lead to compliance issues, particularly with the PROWAG standards for vertical faults and obstructions.

In general, newer sidewalks and curb ramps tend to suffer from fewer condition issues than older features, though condition is not solely a function of age. New features that are designed incorrectly or that use less resilient surfaces develop condition issues more rapidly than features that follow construction best practices. Site preparation, materials, drainage, and ongoing maintenance all play a role in the lifespan of sidewalk network features.

In order to evaluate the condition of sidewalks and curb ramps, a condition index was developed. The condition index is similar in form to the compliance index (see *Chapter 4*), but it evaluates condition factors not covered by PROWAG. The scores for the index are based on the distribution of values observed in the inventory. Crosswalks and pedestrian signals are not evaluated using the index because structured condition data were not collected for these feature types.

Sidewalks and Curb Ramps

The condition scores for sidewalks and curb ramps are based on three factors:

- Surface condition
- Frequency of vertical faults
- Number of cracked panels

These factors were collected in the same manner for both types of features. For sidewalks, however, the vertical fault and cracked panel values were normalized by the length of the block prior to scoring.

Surface condition issues were the most common condition issues among curb ramps, while sidewalks were more likely to score poorly on frequency of vertical faults or number of cracked panels. Overall, sidewalks at the periphery of the urbanized area and in the core scored highest on condition, while curb ramp condition scores were more scattered. Key findings from the analysis included:

- Surface condition issues in sidewalks were more often structural problems, while curb ramps more often exhibited maintenance issues like dirt and grass.
- Vertical faults and cracked panels were significantly more common in sidewalks than in curb ramps, probably due to the age of the features.
- For sidewalks, low compliance and low condition scores occurred in the same areas, while areas of low curb ramp compliance did not necessarily correspond to areas with condition issues.

Surface Condition

As sidewalks and curb ramps age, they can develop a variety of condition issues. Common surface condition issues, from least to most serious, include:

- **Cracking** – The panels are cracked but generally intact.
- **Dirt** – Water has deposited a layer of dirt, reducing traction.
- **Grass** – Grass or other vegetation is growing through cracks.
- **Spalling** – The smooth top layer of the surface has chipped away.

Field staff recorded the most serious surface condition issue, if any, for each curb ramp and block of sidewalk. This value was used to calculate the surface condition score for sidewalks and curb ramps (see *Table 5-1* and *Table 5-2*).

Table 5-1 **Sidewalk Surface Condition Scores**

Condition Issue	Score	Miles of Sidewalk	Percent of Total Length
None	100	543.1	78.7 %
Other condition issue	80	9.0	1.3 %
Cracking	80	61.3	8.9 %
Dirt	60	8.1	1.2 %
Grass	40	46.5	6.7 %
Spalling	20	21.9	3.2 %

Table 5-2 **Curb Ramp Surface Condition Scores**

Condition Issue	Score	Curb Ramps	Percent of Curb Ramps
None	100	9,205	72.4 %
Other condition issue	80	34	0.3 %
Cracking	80	367	2.9 %
Dirt	60	888	7.0 %
Grass	40	2,027	15.9 %
Spalling	20	196	1.5 %

More than three quarters of sidewalks by length did not have significant surface condition issues. Of those that did, cracking and grass were the most common issues, affecting approximately 9 and 7 percent of sidewalks, respectively.

Approximately 72 percent of curb ramps were free from surface condition defects. Grass was by far the most common surface condition issue observed, affecting nearly 16 percent of ramps, followed by dirt. The greater frequency of dirt and grass on curb ramps suggest that some ramps did not drain correctly, or that poorly-designed gutters deposited dirt and other debris in the ramp area.

Sidewalk surface condition issues were most common in certain clusters, particularly near the fringe of the urbanized area (see *Figure 5-1*). Among these clusters were areas surrounding the I-74/Cunningham Avenue interchange and areas to the north and east of the I-57/I-74 interchange.

Curb ramp surface condition issues appeared more widespread, covering much of the northern portion of the urbanized area, particularly areas north and immediately south of I-74 (see *Figure 5-2*). However, the difference is due in part to the scoring system used. A feature with cracking, the most common issues found on sidewalks, scored twice as high as a feature with grass, the most common issue for curb ramp surfaces.

In some cases surface condition issues on curb ramps coincided with surface condition problem on sidewalks. In other areas, particularly in areas west of I-57 and in the northeast corner of the urbanized area, curb ramp surface condition issues occurred in the absence of significant sidewalk surface condition problems. This spatial mismatch reflects differences in the types of issues affecting sidewalks and curb ramps. Sidewalks surfaces were more likely to suffer from structural defects, such as spalling and cracking, while curb ramp surfaces were more likely to experience maintenance-related issues, such as dirt and grass.

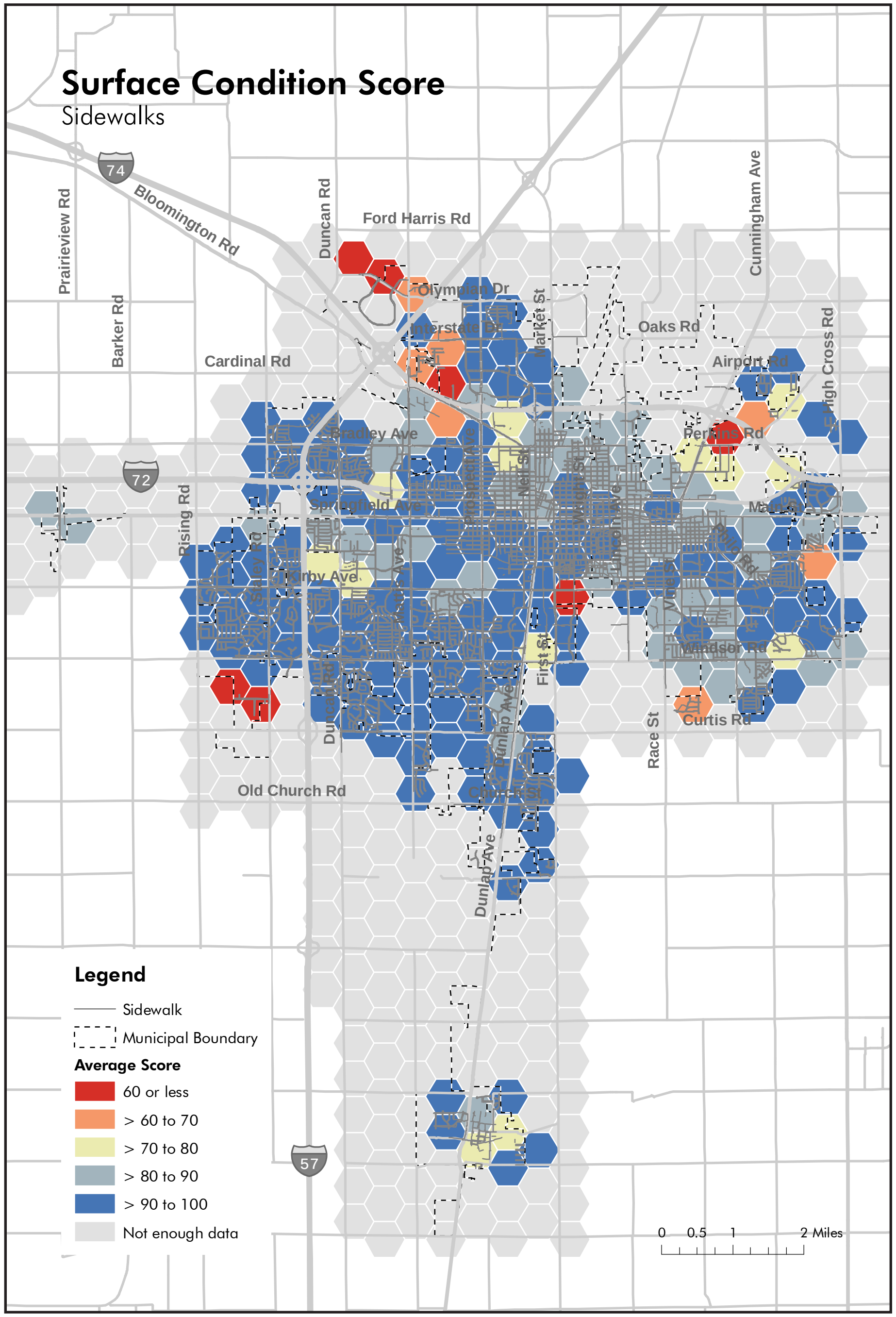


Figure 5-1 **Sidewalk Surface Condition Scores**

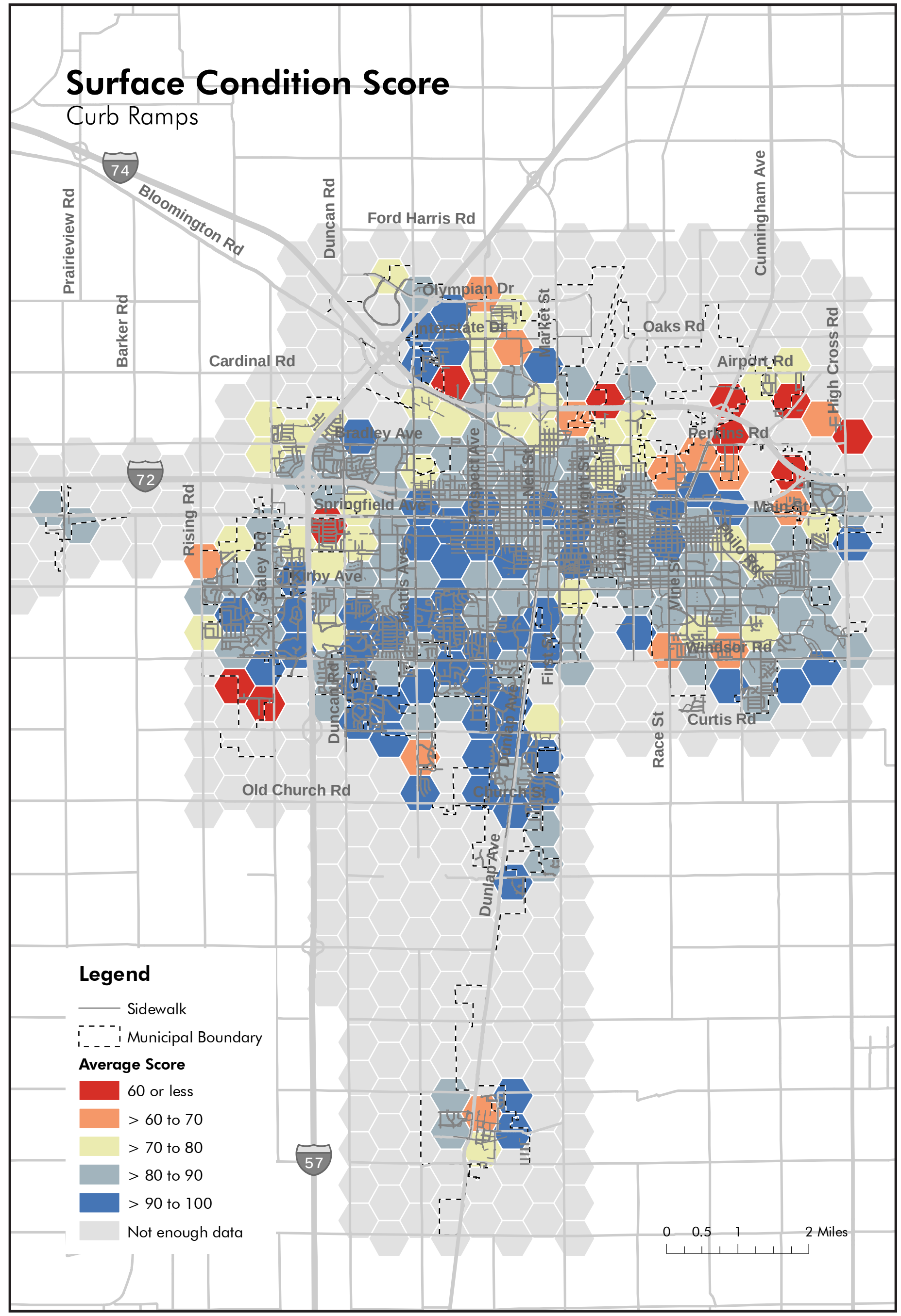


Figure 5-2 **Curb Ramp Surface Condition Scores**

Frequency of Vertical Faults

Vertical faults are points where the panels that make up the sidewalk or curb ramp are uneven, usually due to heaving or settling. A high concentration of vertical faults indicates a generally uneven surface that may pose a greater than average trip hazard.

In addition to the largest vertical fault (included in the compliance index), field staff recorded the total number of vertical faults in each curb ramp and block of sidewalk. For sidewalks, the number of faults was normalized by the length of the block, while for curb ramps, the absolute number of faults was used to calculate the condition score (see *Table 5-3* and *Table 5-4*).

Table 5-3 **Sidewalk Vertical Fault Frequency Scores**

Vertical Faults per Mile	Value	Miles of Sidewalk	Percent of Total Length
49 or fewer	100	279.1	40.5 %
50 to 99	80	188.9	27.4 %
100 to 149	60	113.0	16.4 %
150 to 199	40	60.2	8.7 %
200 or more	20	48.6	7.0 %

Table 5-4 **Curb Ramp Vertical Fault Frequency Scores**

Vertical Faults	Value	Curb Ramps	Percent of Curb Ramps
0	100	8,487	66.7 %
1	80	2,832	22.3 %
2	60	1,094	8.6 %
3	40	237	1.9 %
4 or more	20	67	0.5 %

Over 40 percent of sidewalks by length had fewer than 50 vertical faults per mile, and approximately 84 percent had fewer than 150 faults per mile. Approximately two thirds of curb ramps had no vertical faults, and 22 percent of ramps had one vertical fault. About 11 percent of curb ramps had multiple vertical faults.

Sidewalks at the periphery of the urbanized area had the fewest vertical faults, while those in the core of the community tended to have more frequent faults (see *Figure 5-3*). The highest concentrations of vertical faults occurred in the northern portion of the urbanized area south of I-74; in north Savoy along U.S. 45; and in Bondville and Tolono.

Areas with frequent curb ramp vertical faults were somewhat more scattered, though the I-74 corridor also had a higher concentration of curb ramps with vertical faults than most other parts of the urbanized area (see *Figure 5-4*). The lack of strong spatial correlation between vertical faults in sidewalks and curb ramps suggested that different factors may influence the formation of faults in these feature types.

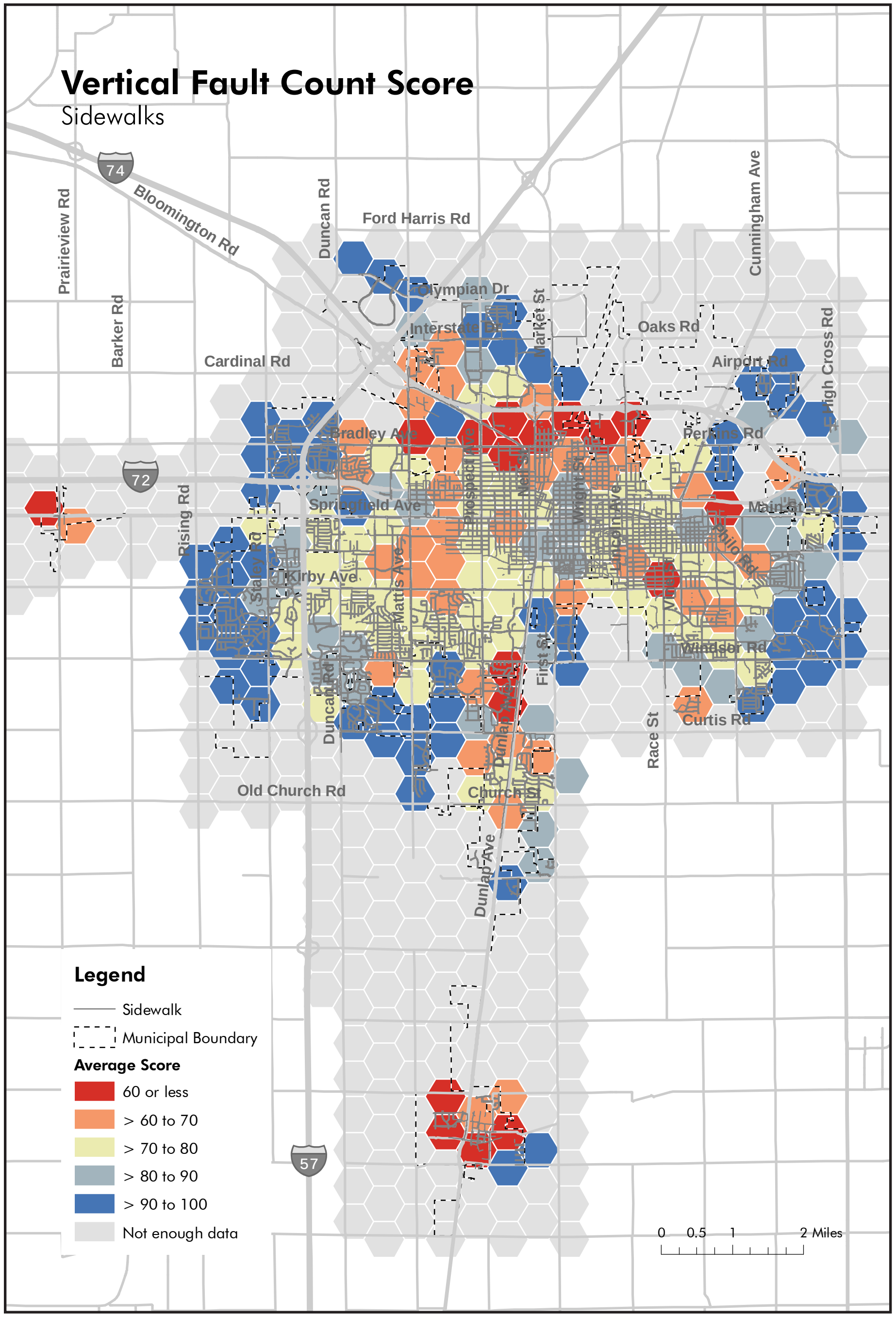


Figure 5-3 **Sidewalk Vertical Fault Frequency Scores**

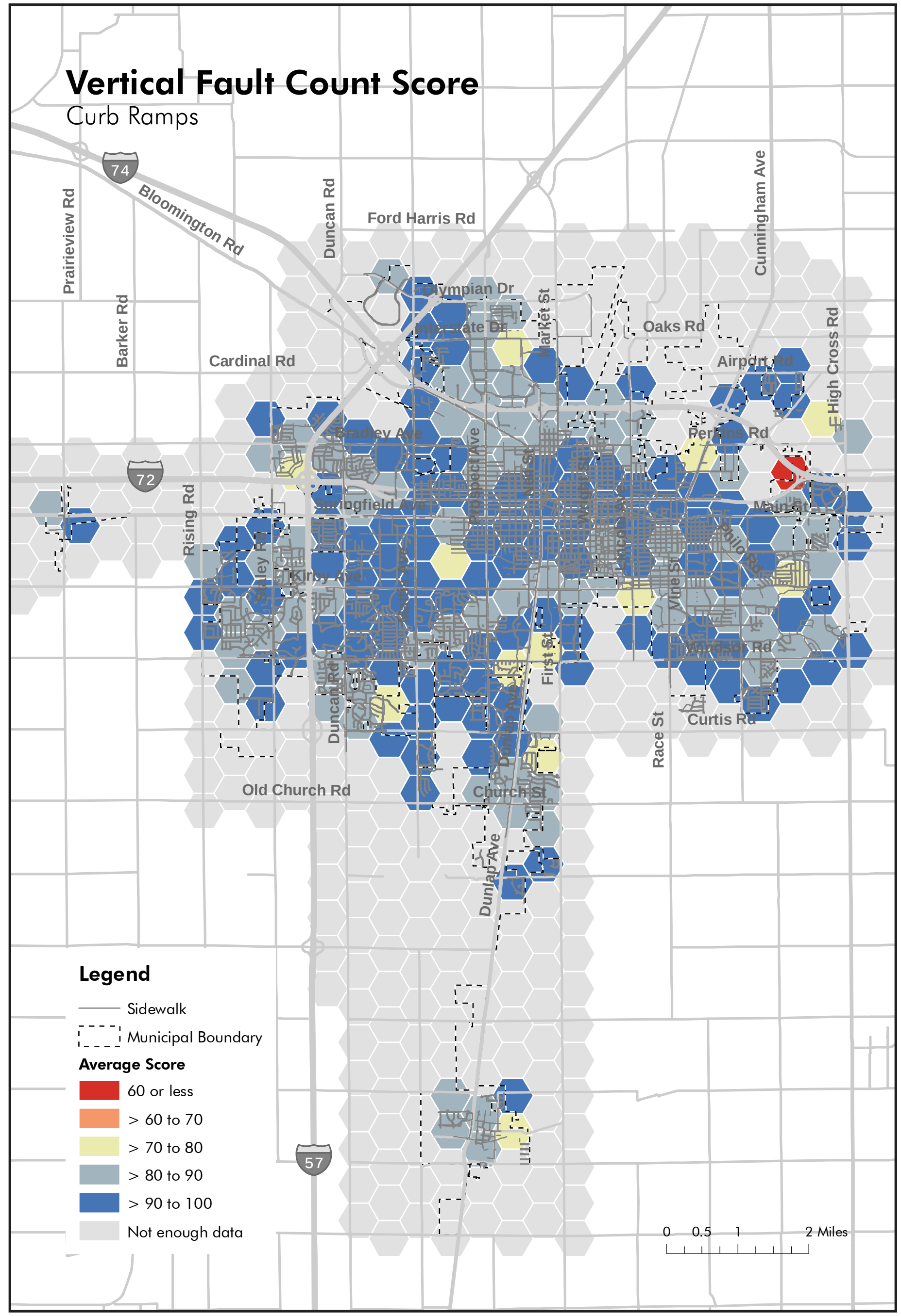


Figure 5-4 **Curb Ramp Vertical Fault Frequency Scores**

Number of Cracked Panels

Cracked panels create an uneven travel surface that can be hazardous to all pedestrians, particularly those who use mobility devices. Since cracks allow water to pass through the surface of the sidewalk or curb ramp, they can also lead to more serious condition issues.

Field staff recorded the number of panels in each curb ramp and block of sidewalk that showed cracking. For sidewalks, the count was converted to an estimated percentage of cracked panels using an average panel length of five feet, and the percentage was used to calculate the condition score (see *Table 5-5*). For curb ramps, the absolute number of cracked panels determined the condition score (see *Table 5-6*).

Table 5-5 **Sidewalk Cracked Panels Scores**

Percent Cracked Panels	Value	Miles of Sidewalk	Percent of Total Length
2.4 % or less	100	263.6	38.2 %
2.5 % to 4.9 %	80	136.6	19.8 %
5.0 % to 7.4 %	60	105.4	15.3 %
7.5 % to 9.9 %	40	64.4	9.3 %
10.0 % or greater	20	119.8	17.4 %

Table 5-6 **Curb Ramp Cracked Panels Scores**

Cracked Panels	Value	Curb Ramps	Percent of Curb Ramps
0	100	10,650	83.7 %
1	80	1,609	12.7 %
2	60	337	2.6 %
3	40	97	0.8 %
4 or more	20	24	0.2 %

More than 38 percent of sidewalks by length scored in the highest tier for cracked panels, with less than 2.5 percent of panels showing cracking. Sidewalks were fairly evenly distributed among the remaining score tiers, with approximately 17 percent of sidewalks exhibiting cracking in 10 percent or more of panels.

Cracking on curb ramps was less common overall. More than 83 percent of curb ramps had no cracked panels, and less than four percent of ramps had more than one cracked panel. The lower incidence of cracking reflects the lower average age of curb ramps compared to sidewalks as well as their shorter length.

Unlike vertical faults, cracked panels in sidewalks were most common in the suburban-style neighborhoods in central Champaign and Urbana, as well as in some of the older urban neighborhoods (see *Figure 5-5*). Sidewalks in the newest neighborhoods at the periphery of the urbanized area and in the commercial areas on the north side of the community had fewer cracked panels.

Because of the relative infrequency of cracked panels in curb ramps, no spatial patterns were evident in the curb ramp data (see *Figure 5-6*).

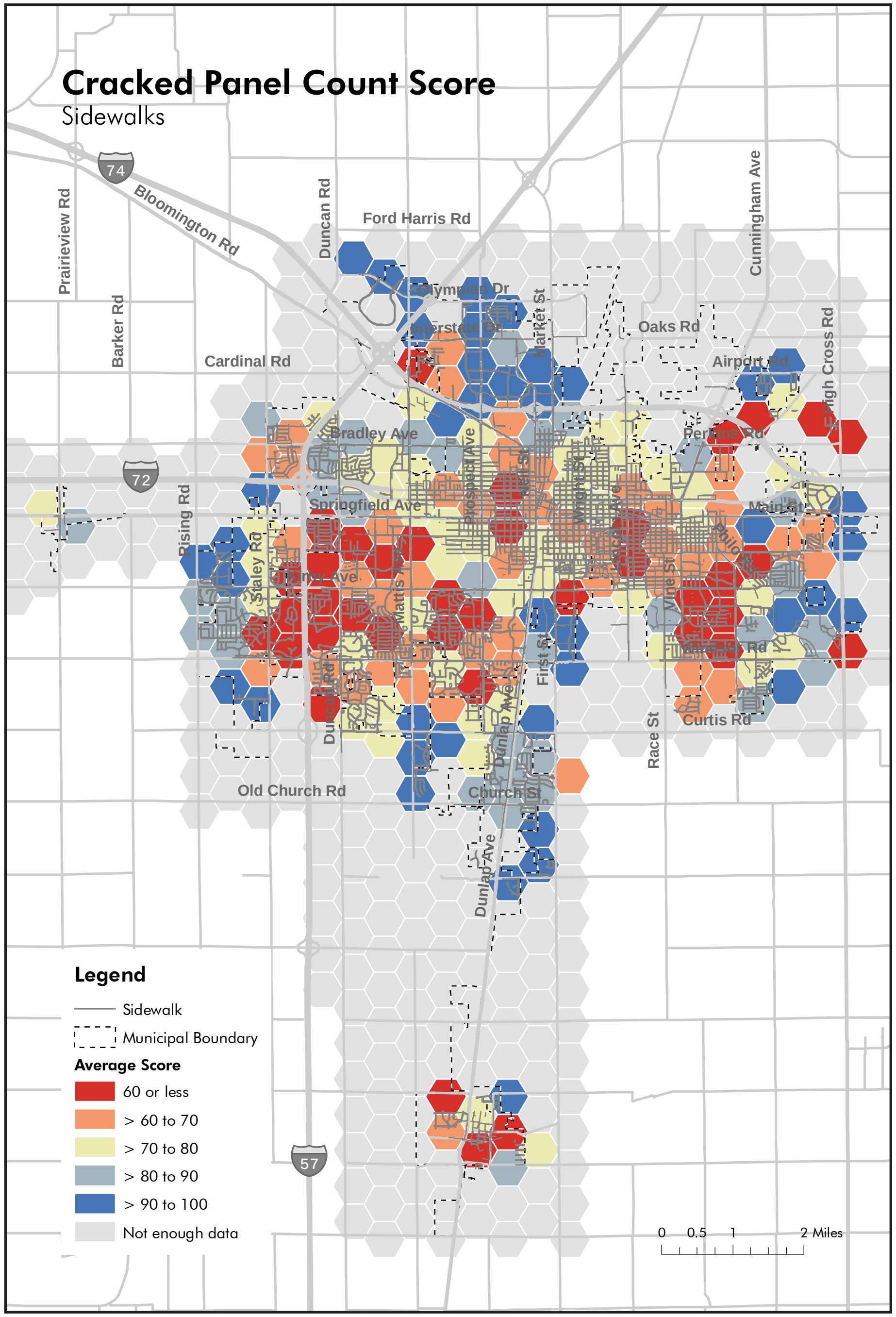


Figure 5-5 **Sidewalk Cracked Panels Scores**

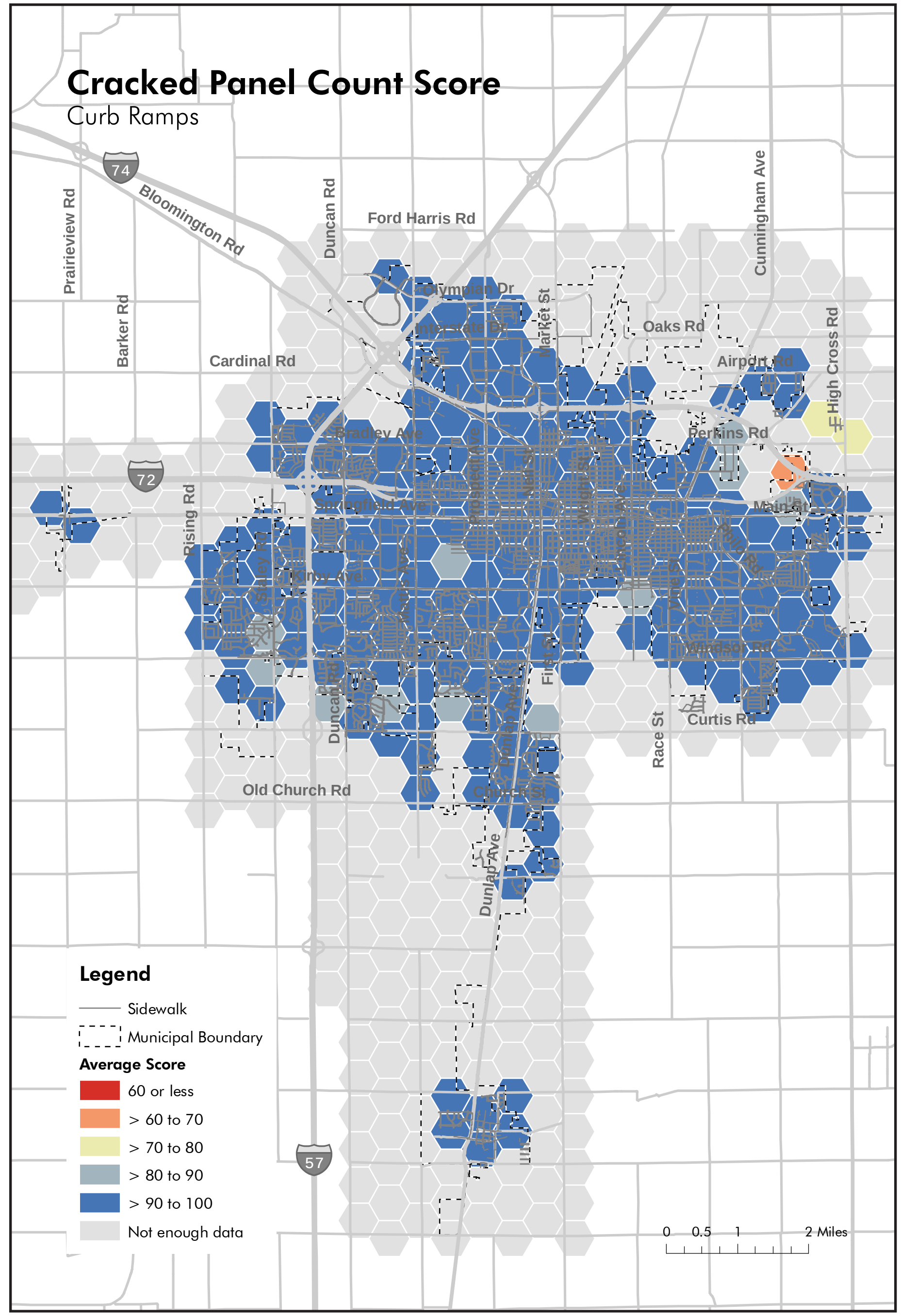


Figure 5-6 **Curb Ramp Cracked Panels Scores**

Combined Condition

The combined condition score for sidewalks and curb ramps was calculated by equally weighting each of the three compliance criteria (see *Table 5-7*). Equal weights were used because any of the defects, if severe, can significantly impact use of the facility, particularly for individuals with disabilities.

Table 5-7 **Condition Weights**

Variable	Weight
Surface condition	33.4 %
Frequency of vertical faults	33.3 %
Number of cracked panels	33.3 %

Table 5-8 **Sidewalk Condition Scores**

Condition Score	Miles of Sidewalk	Percent of Total Length
> 90 to 100	236.4	34.3 %
> 80 to 90	159.1	23.1 %
> 70 to 80	99.8	14.5 %
> 60 to 70	104.7	15.2 %
60 or less	89.8	13.0 %

Table 5-9 **Curb Ramp Condition Scores**

Condition Score	Curb Ramps	Percent of Curb Ramps
> 90 to 100	7,937	62.4 %
> 80 to 90	1,774	13.9 %
> 70 to 80	2,252	17.7 %
> 60 to 70	493	3.9 %
60 or less	261	2.1 %

Slightly more than one third of sidewalks by length scored above 90 on the combined condition index, and about 57 percent scored above 80 (see *Table 5-8*). The remaining sidewalks were distributed fairly evenly among the lowest three score tiers.

Curb ramps scored higher overall, with approximately 60 percent of ramps scoring above 90 on the condition index (see *Table 5-9*). Only about 6 percent of curb ramps scored 70 or below on the index. The higher scores reflect the lower average age of curb ramps compared to sidewalks as well as the exclusion of non-ramp sidewalk endpoints from the index.

The spatial pattern of sidewalk condition scores was similar to that of sidewalk compliance scores, suggesting that ADA compliant sidewalks tend to be newer and in better condition than noncompliant sidewalks (see *Figure 5-7*). As with compliance, condition scores were highest at the fringe of the urbanized area, followed by the core of the community.

Curb ramp condition scores were more scattered with less of a recognizable spatial pattern (see *Figure 5-8*). Areas that scored poorly on sidewalk condition did not necessarily correspond to those with curb ramps in poor condition, suggesting that in some areas, the curb ramps were newer than the adjacent sidewalks. This pattern reflects the compliance mechanism in ADA, which requires curb ramp updates in conjunction with roadway modifications but does not require the replacement of adjacent sidewalks.

The lowest curb ramp condition scores occurred on the north side of the urbanized area, particularly near I-74. This corridor also had relatively low curb ramp compliance scores, though most of the lowest-scoring areas contained relatively few curb ramps.

The results of the condition analysis suggest that most sidewalk condition issues can be addressed in conjunction with compliance updates. For curb ramps, however, separate maintenance efforts may be necessary to address curb ramps that are nearly or fully compliant with PROWAG standards but that suffer from surface condition issues.

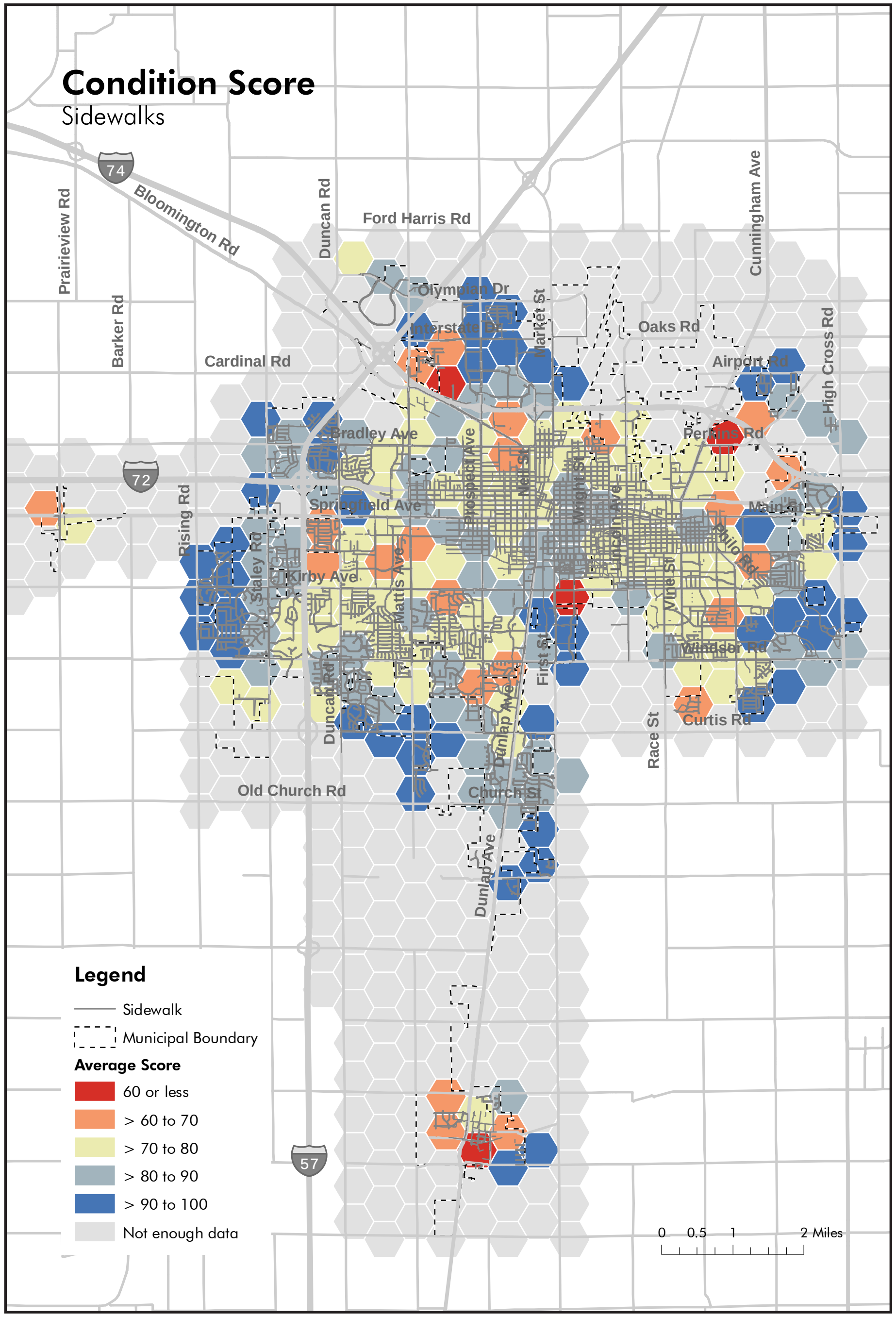


Figure 5-7 **Sidewalk Condition Scores**

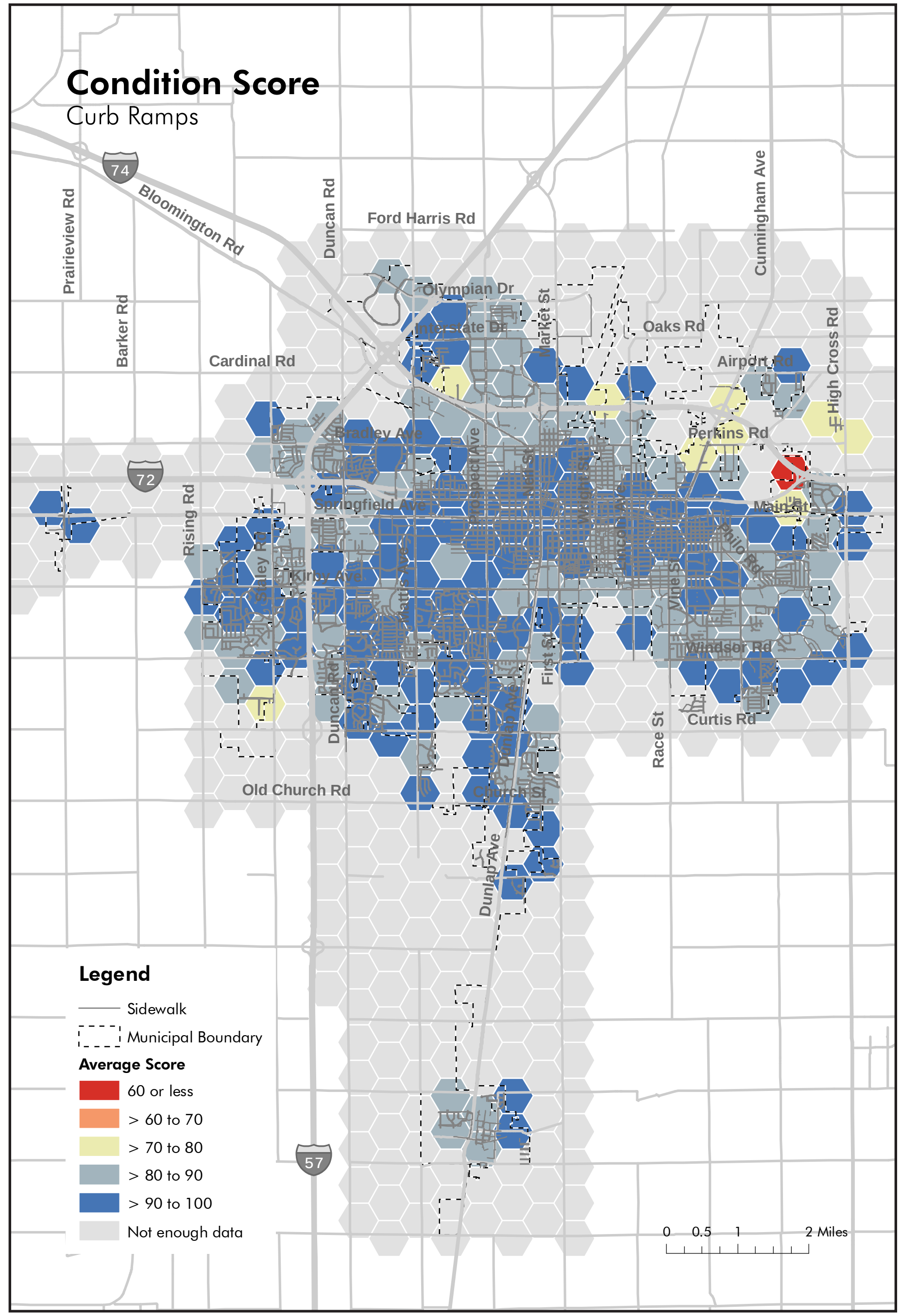


Figure 5-8 **Curb Ramp Condition Scores**

Crosswalks and Pedestrian Signals

Structured data on the condition of crosswalks and pedestrian signals were not collected as part of the inventory process, making a formal evaluation of condition impossible for these feature types. However, field staff recorded informal observations about features that were in particularly poor condition in the comments associated with the data (see *Figure 5-9*).

Crosswalks

In recording the painted marking type for crosswalks, field staff often noted crosswalks where the painted marking were faded. More than 150 crosswalks, or nearly 13 percent, had comments indicating faded markings or the need for restriping. Many of these crosswalks were within or adjacent to arterial streets, where high traffic volumes increase wear on crosswalk markings. In a few cases, crosswalk markings were faded to the point where the marking type was difficult to discern.

Pedestrian Signals

Pedestrian signals and pushbuttons were generally in operable condition, though some older pushbuttons showed signs of wear. Out of 601 total pedestrian signals, field staff noted six cases where pushbuttons were missing or not functional.

In this crosswalk, the standard painted markings and the stop bar are worn, almost to the point of being unrecognizable.

This pushbutton has a variety of accessibility features and appears to be in good condition, but field staff noted that it was not operable.

Figure 5-9 **Crosswalk and Pedestrian Signal Condition Examples**

6 Connectivity

The condition and compliance scores in the preceding chapters describe how well individual sidewalk network features serve people of varying abilities, but they do not capture the interactions among these features. The true accessibility of the sidewalk network is determined not only by the condition and ADA compliance of individual sidewalks, curb ramps, crosswalks, and pedestrian signals, but also by the connectivity among these features. A well-connected network increases mobility and decreases travel time for pedestrians with disabilities, while a poorly-connected network forces them to take indirect routes or risk traveling in the roadway.

In this chapter, two analyses of sidewalk network connectivity are used to describe patterns of connectivity throughout the Urbanized Area. These analyses examine the presence or absence of sidewalks and curb ramps, two of the most critical sidewalk network features, and suggest areas where construction of these features can have the greatest impact on connectivity.

In the sidewalk gap analysis, possible missing sidewalk links are identified and mapped. Based on the length of these links and the length of existing sidewalks in the immediate vicinity, the missing links are classified using a metric called gap length ratio. This ratio serves as an indicator of the potential increase in overall network connectivity from filling the gap.

In the missing curb ramp analysis, each intersection in the priority collection area is evaluated based on the percentage of possible ramp locations that have curb ramps. At intersections with some curb ramps and some non-ramp endpoints, connectivity likely could be increased by constructing additional curb ramps.

PROWAG standards require that all existing pedestrian access routes are accessible to people with disabilities, but they do not require the addition of new pedestrian facilities where none currently exist. As a result, ADA does not compel local agencies to address many of the issues related to sidewalk network connectivity.

However, many local plans and policies identify connectivity as a goal, and some local agencies have programs designed to address sidewalk gaps. The results of these analyses can be used to prioritize local resources most effectively to improve sidewalk network connectivity.

Sidewalk Gap Analysis

Missing sidewalks act as barriers to mobility, particularly for people with disabilities. To identify and assess these barriers, sidewalk gap analysis locates and draws missing links in the sidewalk network. It also rates the contribution each potential link would make in improving the overall connectivity of the network.

Identifying Missing Sidewalks

To locate sidewalk gaps, an algorithm was used to draw all possible sidewalks along both sides of urbanized area roadways. Possible segments adjacent to an existing sidewalk were eliminated, leaving only the missing segments. Finally, missing sidewalk segments were removed in undeveloped areas and along rural roadways, except where these segments connected pockets of development to the larger sidewalk network.

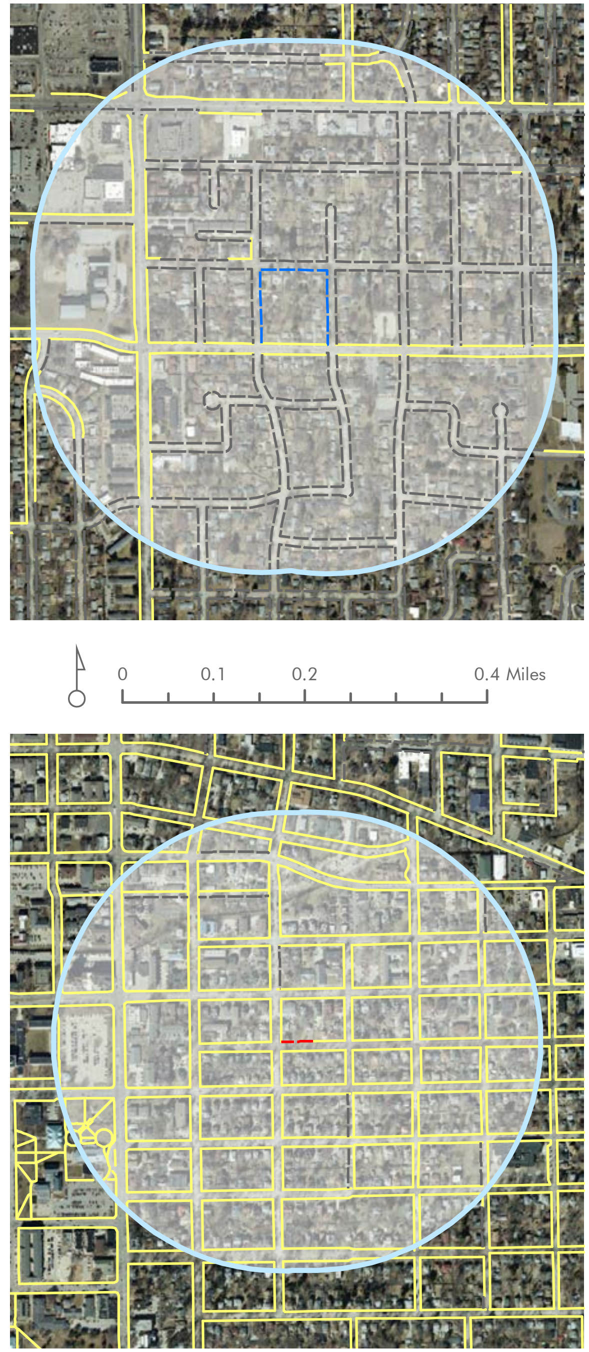
The remaining missing sidewalk segments represent candidates for new sidewalk construction. However, some of the locations identified may not be suitable for sidewalks due to zoning, land use, or other factors.

Assessing Connectivity

To assess connectivity benefits, the gap length ratio was calculated for each missing segment. Gap length ratio is the ratio of the length of the missing segment to the combined length of all existing sidewalks within 1/4 mile of that segment. Missing sidewalks with a low gap length ratio tend to be small gaps in areas with a well-developed sidewalk network. Those with a high gap length ratio tend to be longer segments in areas with few existing sidewalks.

Based on its gap length ratio, each missing segment was assigned a potential connectivity value. Segments with low gap length ratios have the greatest potential for increasing the connectivity of the sidewalk network relative to their cost, while those with high gap length ratios require a greater investment (see *Figure 6-1*).

Sidewalk gaps with high connectivity scores were most common in the core of the community and in older urban neighborhoods (see *Figure 6-2*). Neighborhoods surrounding the core, and many parts of Bondville and Tolono, had larger gaps with lower connectivity value, and some areas lacked sidewalks altogether. Residential areas on the fringe of the community had fewer sidewalk gaps overall, but the gaps tended to be larger and have relatively low connectivity value.



Low Connectivity

Long gaps and those in areas with few existing sidewalks have limited connectivity potential.

Legend

- Study Gap
- Missing Sidewalk
- Existing Sidewalk
- 1/4-Mile Buffer

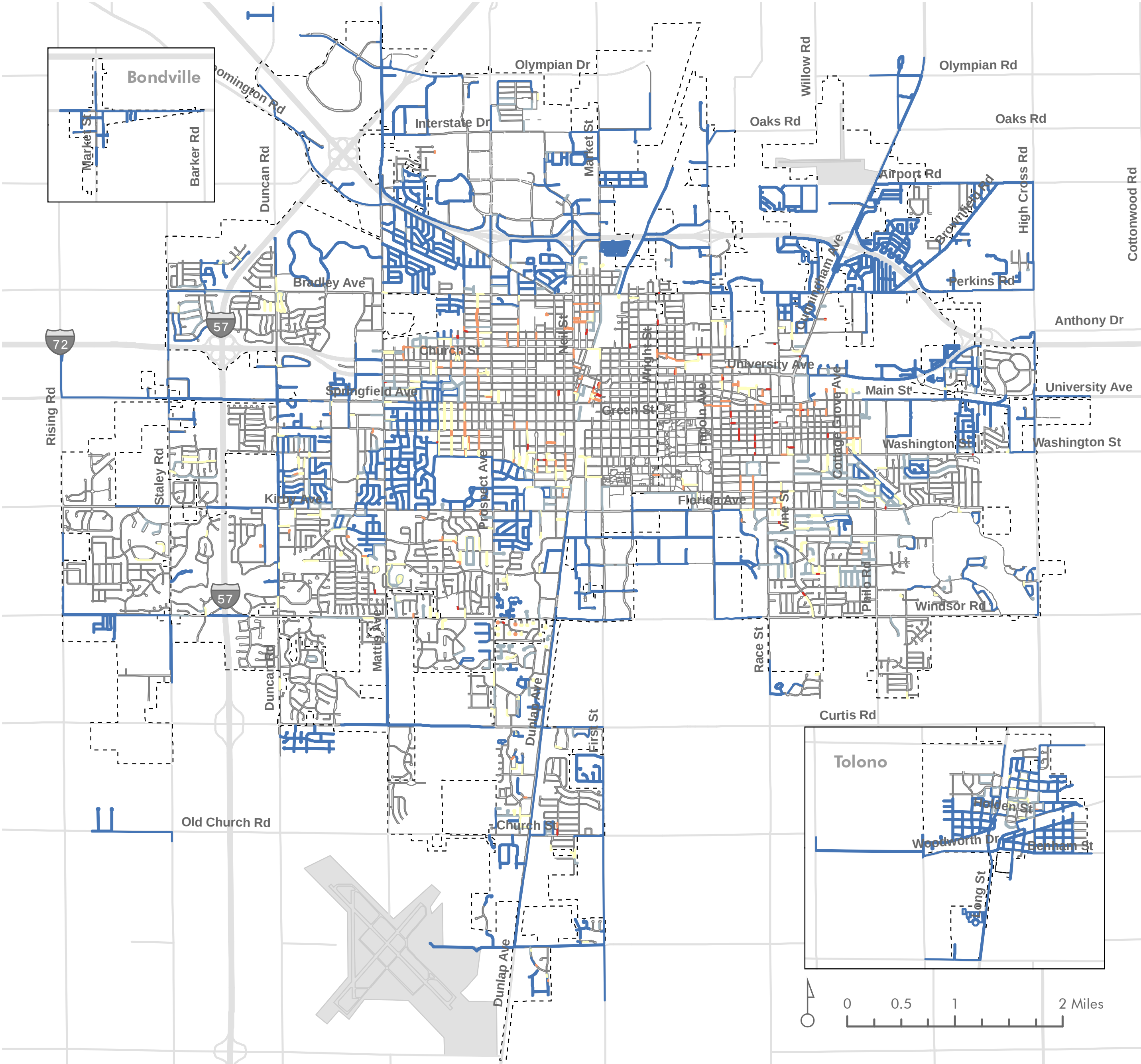
High Connectivity

Short gaps and those in areas with well-developed sidewalk networks have the highest connectivity potential.

Legend

- Study Gap
- Missing Sidewalk
- Existing Sidewalk
- 1/4-Mile Buffer

Figure 6-1 **Missing Sidewalk Segment Connectivity**



Sidewalk Gap Analysis

The connectivity value for missing sidewalk segments is based on the gap length ratio:

High: 0.5% or less
Med-High: > 0.5% to 1.0%
Medium: > 1.0% to 2.5%
Med-Low: > 2.5% to 5.0%
Low: > 5.0%

Missing segments are shown for any non-rural roadway that does not currently have sidewalks on both sides. However, some of these locations may not be suitable for sidewalks due to zoning, land use, or other factors.

Legend

Missing Sidewalk Connectivity Value

- High
- Medium-High
- Medium
- Medium-Low
- Low
- Existing Sidewalk
- Municipal Boundary

Figure 6-2 **Sidewalk Gap Analysis Results**

Missing Curb Ramp Analysis

The Americans with Disabilities Act requires curb ramps where a pedestrian access route crosses an intersection with curbs. The ramp creates a safe transition between the height of the sidewalk and the height of the street that is accessible to people with disabilities, particularly those who use wheelchairs.

Identifying Missing Curb Ramps

The sidewalk inventory collected information about the presence or absence of curb ramps, but it did not collect information about the presence of curbs or curb height. As a result, the inventory data alone are insufficient to make a conclusive determination about whether curb ramps are required at locations that currently lack them.

Since curb treatments tend to be the same on both sides of a street, however, the ramp presence-absence data from the inventory can be used to identify intersections that have some curb ramps and some non-ramp endpoints. These intersections likely need additional ramps in order to be ADA compliant.

To identify intersections that may need additional curb ramps, the ramp and non-ramp endpoints were grouped by their proximity to street intersections. Ramps and non-ramp endpoints associated with mid-block crossings and driveways were excluded from the analysis. For each intersection, the percentage of the total features that were ramps was calculated (see *Figure 6-3*).

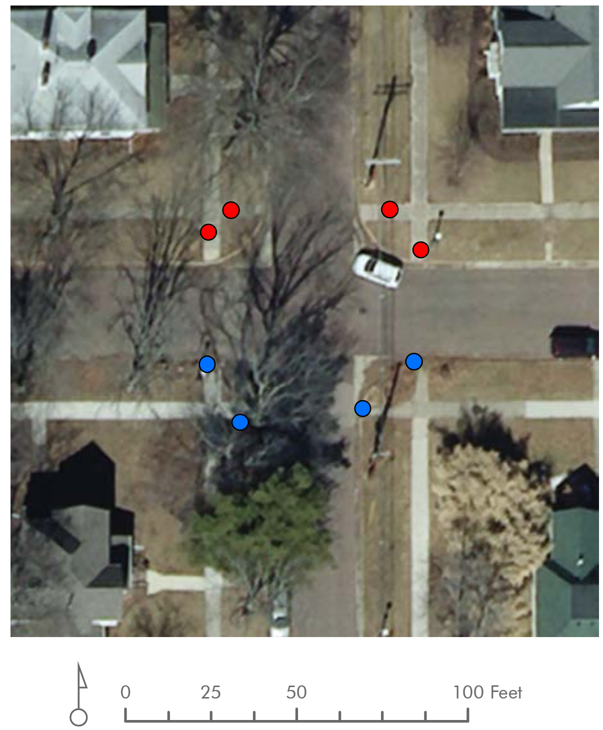
Intersections in the University of Illinois campus area, in downtowns, and along major arterials had curb ramps at most or all sidewalk endpoints (see *Figure 6-4*). Intersections without curb ramps were most common in the suburban-style residential areas surrounding the core of the community, while intersections with partial curb ramp coverage were clustered in neighborhoods throughout the urbanized area.

Prioritizing Curb Ramp Construction

Intersections with a high percentage of curb ramps but at least one non-ramp endpoint represent the highest potential for improving connectivity relative to the cost of ramp construction. However, many of the existing curb ramps at such intersections require upgrades or reconstruction to make them ADA compliant. As a result, the percentage of ramps likely is not the most significant factor in determining which intersections should be prioritized for improvements and curb ramp construction.

ADA requires the addition or remediation of curb ramps when the adjacent roadway is altered. Alterations that trigger ramp construction include roadway reconstruction, resurfacing (including micro-surfacing), and overlays.[1] Because of this requirement, most curb ramp construction and reconstruction takes place in conjunction with roadway projects.

In the absence of roadway alterations, local agencies may choose to construct or upgrade curb ramps in cases where the circumstances warrant it. Proximity to housing for people with disabilities, public services, transit stops, or safe routes to school may justify curb ramp improvements even when the adjacent roadway is in good condition. Based on factors like these, the priority area analysis that follows identifies the areas with the greatest need for accessible curb ramps.



Missing Curb Ramps

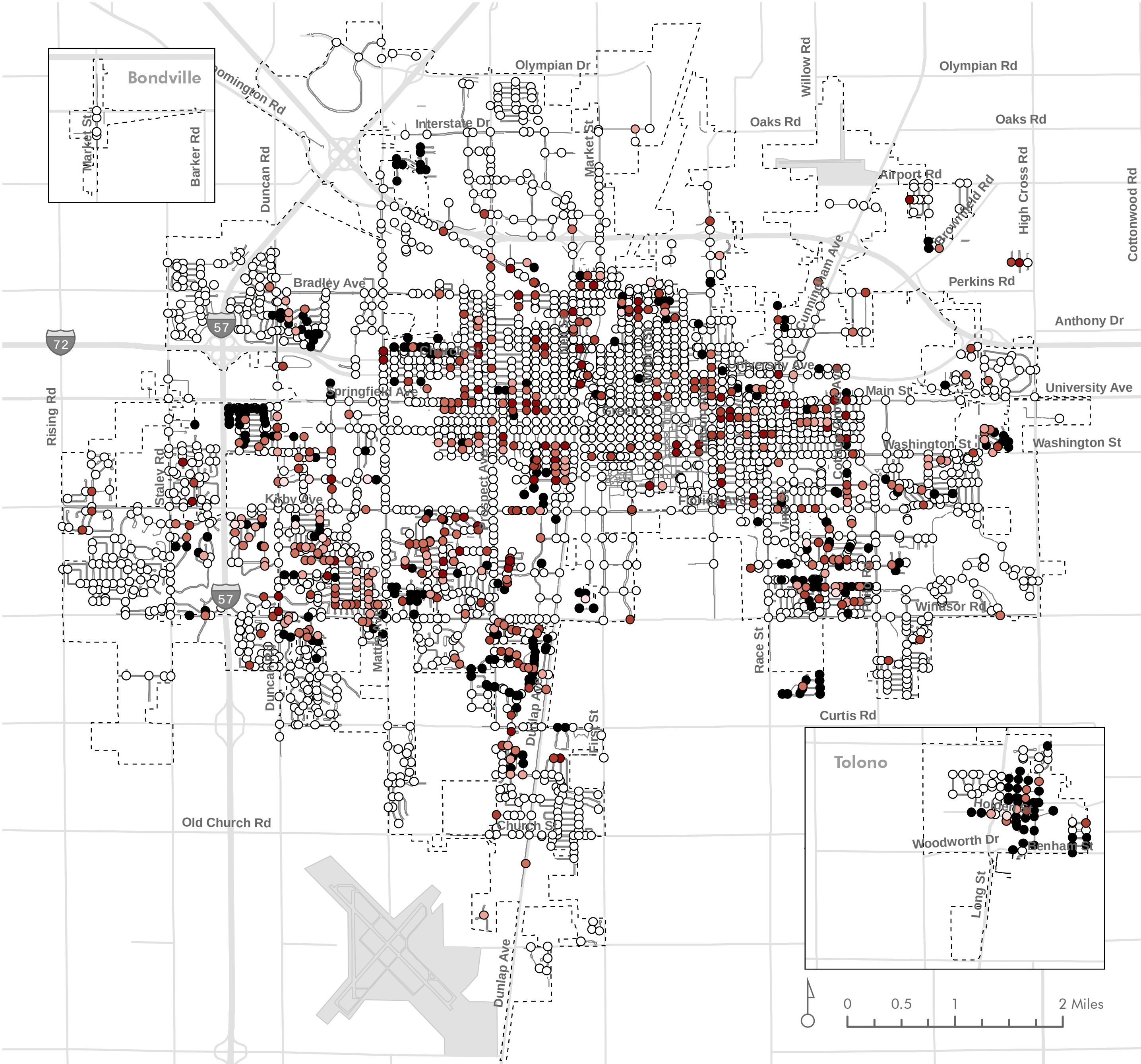
This intersection has curbs on both sides but curb ramps only on the south side. Fifty percent of the possible curb ramp locations currently have ramps.

Legend

- Curb Ramp
- Non-Ramp Endpoint

Figure 6-3 **Missing Curb Ramp Detail**

1 For a detailed list of alterations that trigger ADA curb ramp requirements, see the Department of Justice/Department of Transportation Joint Technical Assistance on the Title II of the Americans with Disabilities Act Requirements to Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing, July 8, 2013, http://www.ada.gov/doj-fhwa-ta.htm.



Missing Curb Ramp Analysis

While not all intersections have curbs or require curb ramps, most intersections that have ramps on one side should have ramps on the other side as well.

Intersection

Percent Existing Curb

- > 0 to 20%
- > 20% to 40%
- > 40% to 60%
- > 60% to 80%
- > 80% to < 100%
- No Curb Ramps
- All Curb Ramps
- Existing Sidewalk
- Municipal Boundary

Figure 6-4 **Missing Curb Ramp Analysis Results**

7 Priority Areas

The Americans with Disabilities Act requires accessible pedestrian infrastructure throughout communities, but in most cases, it allows local agencies to decide the order in which non-compliant features are upgraded or replaced. Agencies are required to develop a system for prioritizing pedestrian network upgrades as part of their ADA transition plans. The system is required to give priority to features serving "government offices and facilities, transportation, places of public accommodation, and employers." 28 C.F.R. §§ 35.150(d)(2).

The purpose of the priority area analysis is to identify zones that have the greatest dependence on accessible pedestrian infrastructure. Local agencies can use this information in prioritizing improvements. The factors considered in the analysis fall into two broad categories: target populations and pedestrian trip generators.

The target populations factors identify areas where people with a special need for accessible infrastructure live. For the purpose of the analysis, the target populations are defined as people with disabilities (see *Figure 7-1*) and seniors age 65 or older (see *Figure 7-2*). Using data from the Champaign-Urbana Mass Transit District and the U.S. Census Bureau, these factors identify areas where residences of members of the target populations are concentrated.

Pedestrian trip generators are destinations or transit facilities that attract pedestrian activity. The locations considered in these factors include:

- Schools and public facilities, including government offices, specialized housing, medical facilities, and public safety buildings (see *Figure 7-3*)
- Transit stops, weighted by the number of weekly trips (see *Figure 7-4*)
- Retail business locations (see *Figure 7-5*)

Housing density is also included as a pedestrian trip generator since high-density neighborhoods tend to be associated with lower automobile ownership and more pedestrian activity (see *Figure 7-6*).

Employment centers are not included as a separate factor because employment data do not capture the actual work locations of employees of some of the region's largest employers, such as the University of Illinois. Instead, other factors like transit connectivity and retail businesses serve as proxies for employment centers in the community.

For each factor, the location data are transformed into a heat map using kernel density estimation. In this process, an isotropic Gaussian kernel with a bandwidth of 1/8-mile is used to smooth the locations and create a continuous surface. The relatively narrow bandwidth is appropriate for pedestrian network analysis, which is highly location-specific.

The target populations and pedestrian trip generators sections that follow contain the heat maps for individual variables included in the analysis. Where appropriate, the original location data for the factor are also included in the map.

In the results section, the individual factors are aggregated using weights that reflect priorities embedded in ADA. The combined results are used to identify zones of high, medium, and low priority for pedestrian improvements. Because of the limited availability of data for smaller municipalities, the analysis is confined to the City of Champaign, the Village of Savoy, and the City of Urbana.

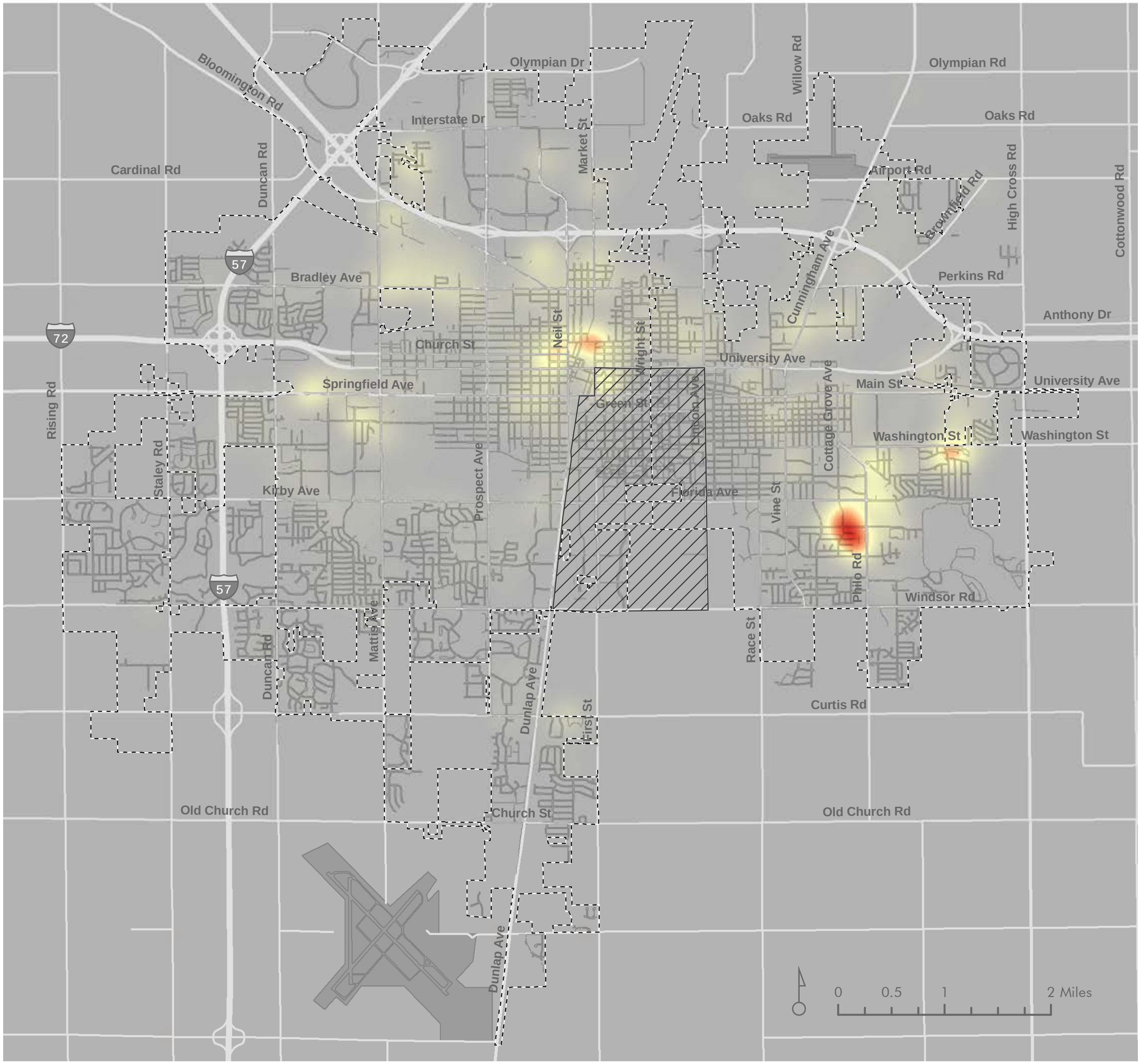


Figure 7-1 **People with Disabilities**

People with Disabilities

While ADA requires accessible sidewalk infrastructure throughout the community, areas where people with disabilities live represent the highest priority for pedestrian network improvements. This priority score is based on the home addresses of people with disabilities as listed on their registration for a free transit pass. Individual addresses are not mapped in order to protect privacy. The dataset excludes more than 2,000 University of Illinois students with disabilities.

Data Source: CUMTD DASH Card Registrations, January 2015

Legend

Municipal Boundary

University District

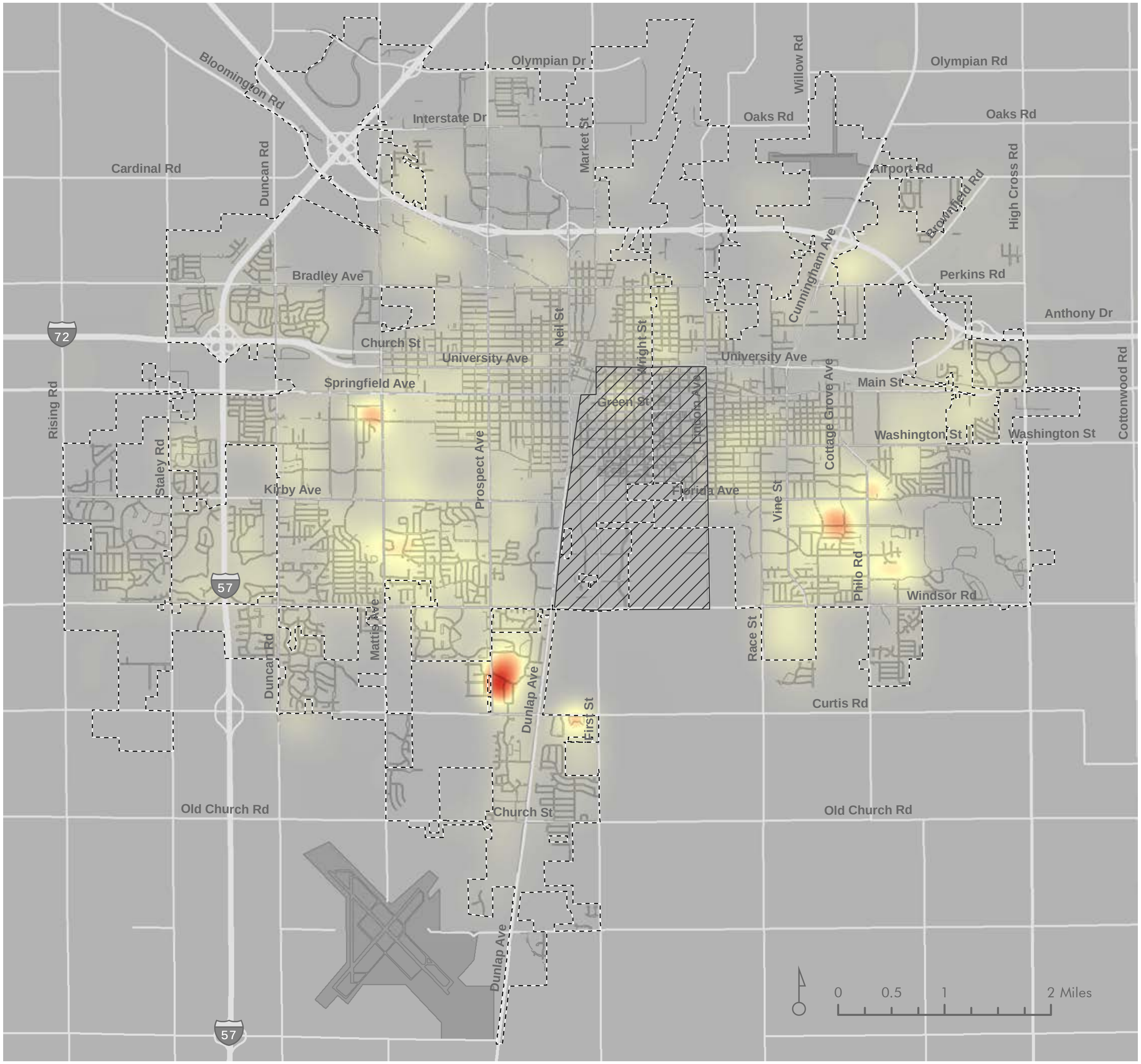
(see p. 90)

Sidewalk

Priority Score

High : 100

Low : 0



Seniors

While not a population specifically identified in the Americans with Disabilities Act, seniors tend to have lower mobility and a greater need for accessible infrastructure than the population as a whole. The priority score for seniors is based on 2010 Census counts of people age 65 or older. For the purpose of determining areas with a high density of senior residences, the analysis assumes an even spatial distribution of seniors within each Census block.

Data Source: U.S. Census Bureau, 2010 Census, Table P12

Legend

Municipal Boundary

University District

(see p. 90)

Sidewalk

Priority Score

High : 100

Low : 0

Figure 7-2 **Seniors**

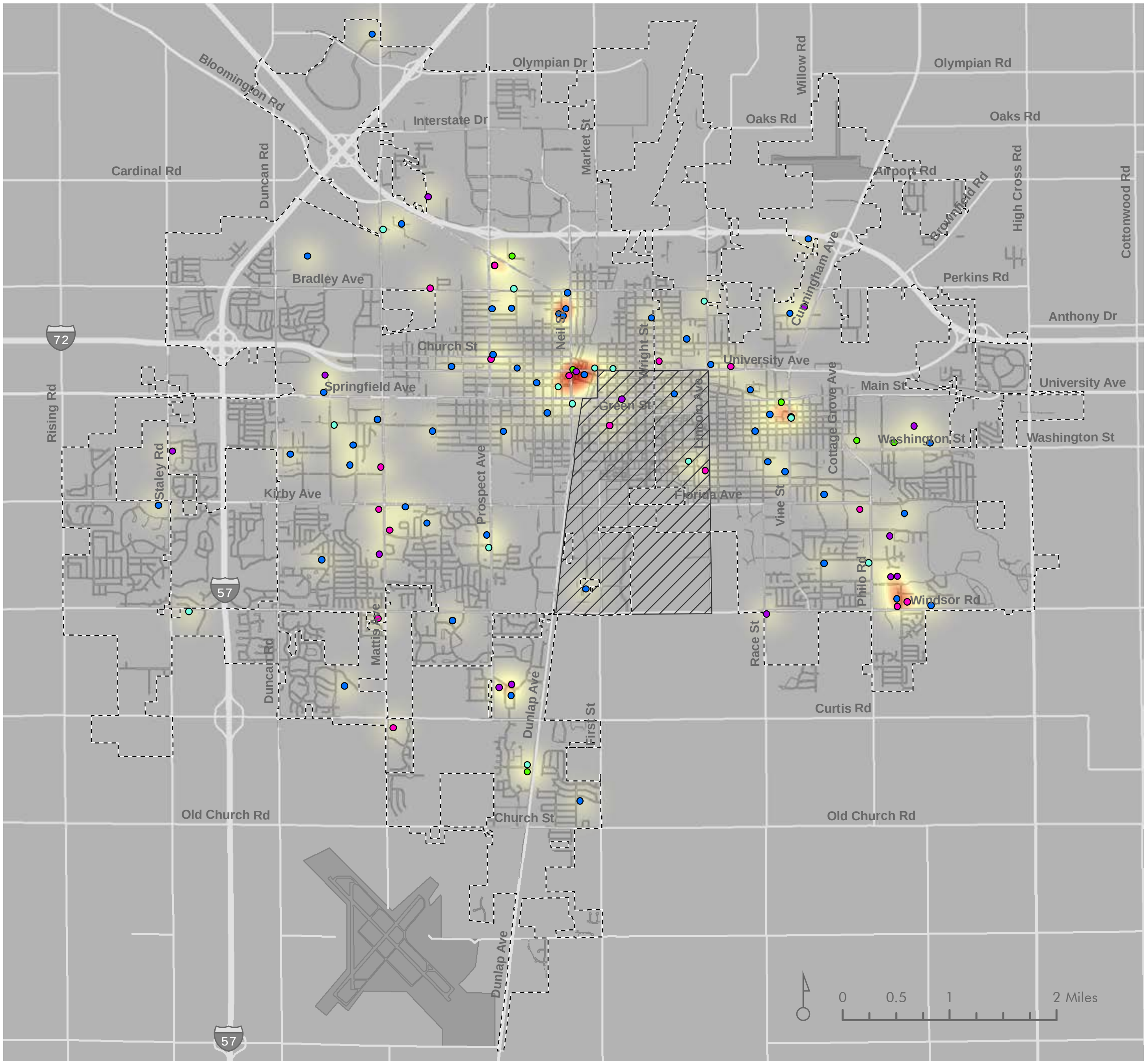


Figure 7-3 **Schools and Public Facilities**

Schools and Public Facilties

Schools and public facilities serve as important generators of pedestrian trips. The priority score for schools and public facilites is based on the density of these locations.

Data Source: CUUATS Public Facility Locations

Legend

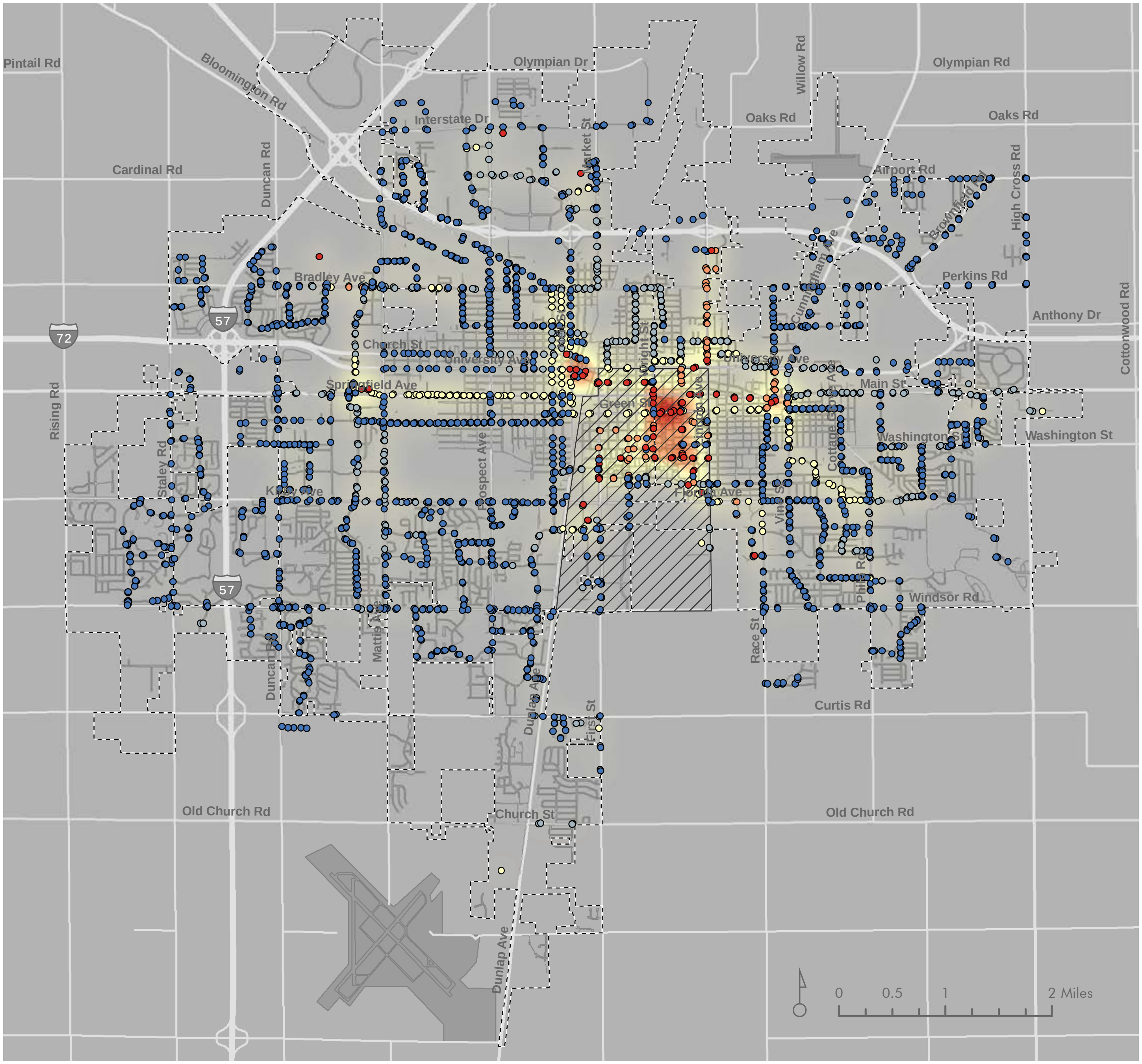
Facility Type

- Education
- Government Office
- Housing
- Medical
- Public Safety
- Municipal Boundary
- University District
  (see p. 90)
- Sidewalk

Priority Score

High : 100

Low : 0



Transit Connectivity

Transit activity generates pedestrian activity because most transit trips start and end with pedestrian trip legs. The priority score for transit connectivity is based on bus stop locations. Each stop is weighted by the number of weekly scheduled trips that include the stop.

Data Source: CUMTD GTFS Data, Aug. 16 - Dec. 19, 2015

Legend

Bus Stop

Weekly Trips

- 200 or fewer
- > 200 to 400
- > 400 to 600
- > 600 to 800
- More than 800
- Municipal Boundary
- University District

(see p. 90)

- Sidewalk

Priority Score

High : 100

Low : 0

Figure 7-4 **Transit Connectivity**

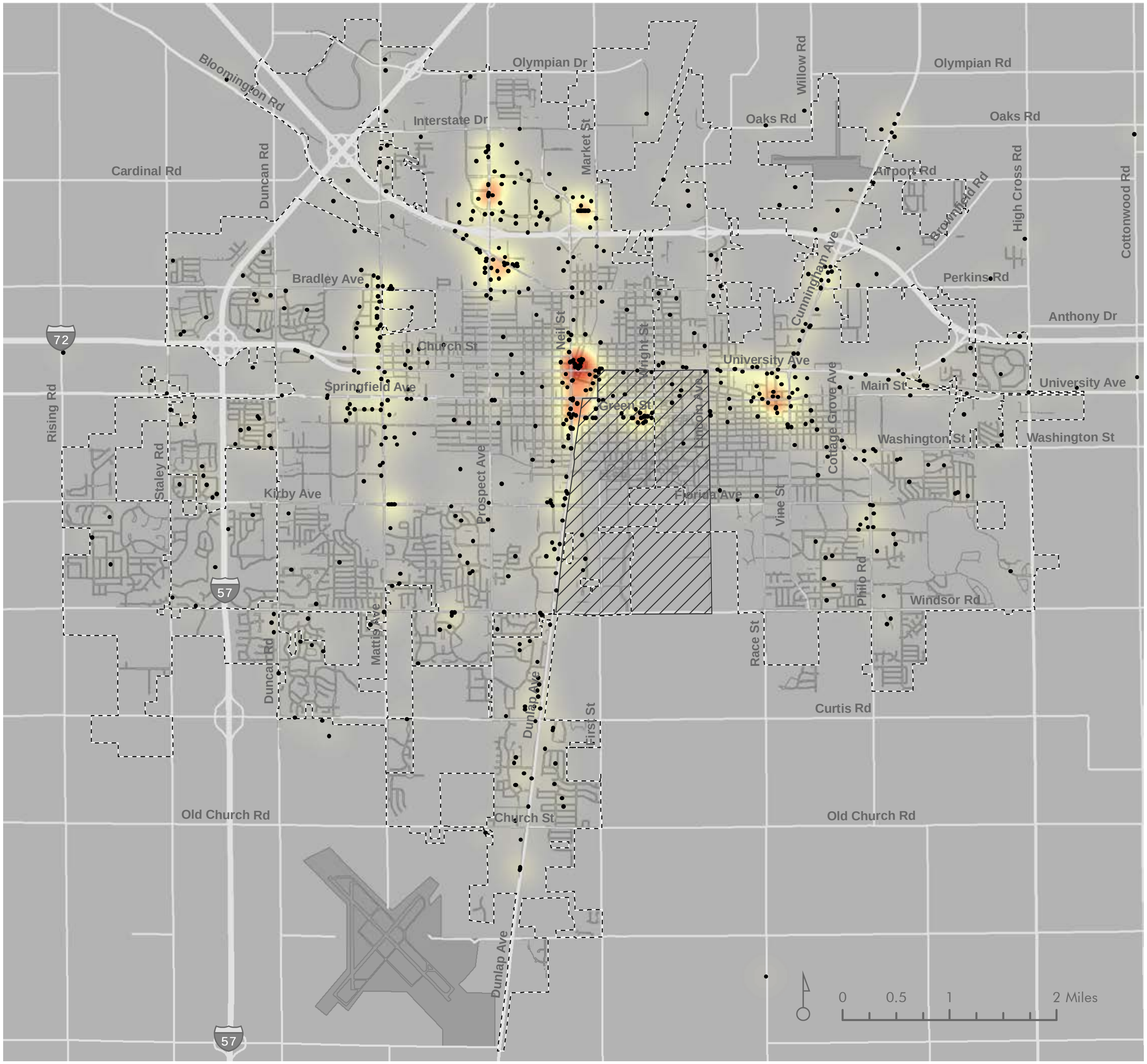


Figure 7-5 **Retail Businesses**

Retail Businesses

Retail establishments generate pedestrian trips by attracting customers and employees. The priority score for retail businesses represents the density of retail establishments. All retail locations are weighted equally in the analysis. Market Place Mall is treated as a single retail business since most pedestrian travel between stores occurs within the building.

Data Source: ESRI Business Analyst, 2014

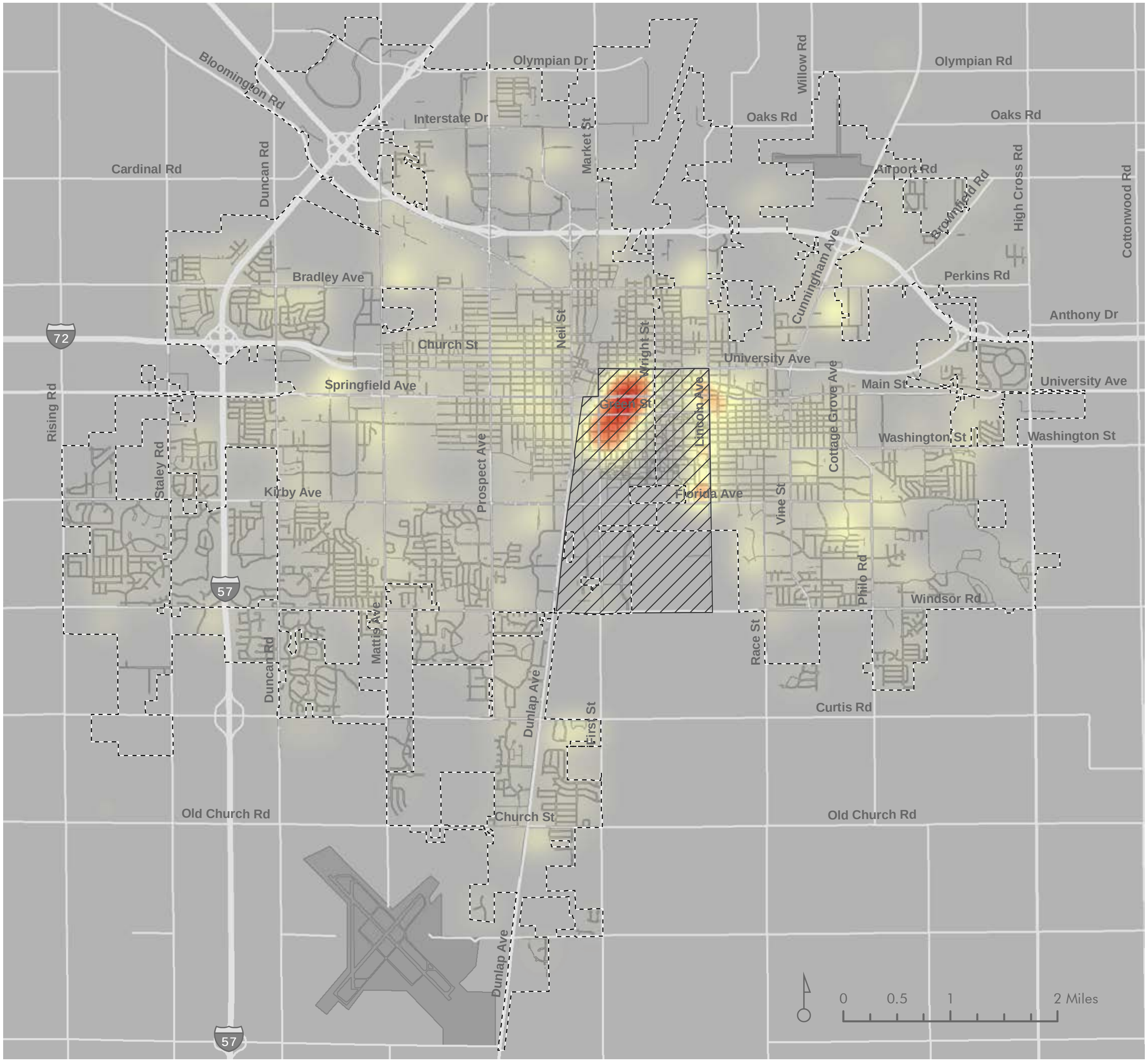
Legend

- Retail Business
- Municipal Boundary
- University District *(see p. 90)*
- Sidewalk

Priority Score

High : 100

Low : 0



Housing Density

Areas with a higher density of housing units encourage pedestrian trips through increased accessibility of destinations and lower vehicle ownership. The priority score for housing density weights residential parcels based on the estimated number of housing units they contain.

Data Source: CUUATS Housing Unit Estimates, 2014

Legend

Municipal Boundary

University District

(see p. 90)

Sidewalk

Priority Score

High : 100

Low : 0

Figure 7-6 **Housing Density**

Analysis Results

To determine the priority areas, the heat maps for individual factors are overlaid and weighted according to their importance. As the focus of the Americans with Disabilities Act, people with disabilities are given the highest weight of any individual factor in the analysis (see *Table 7-1*). In addition, public facilities and transit stops are given higher weight than other types of destinations since they are specifically identified in ADA.

Table 7-1 **Priority Area Analysis Variable Weights**

Variable	Weight
Target populations	**50 %**
People with disabilities	30 %
Seniors	20 %
Pedestrian trip generators	**50 %**
Schools and public facilities	15 %
Transit connectivity	15 %
Retail businesses	10 %
Housing density	10 %

Based on the results of the analysis, five high priority areas emerged (see *Figure 7-7* and *Figure 7-8*). The areas in each municipality with the highest priority include:

- Champaign
  - Downtown-Midtown-Campustown (see *Figure 7-9*)
  - South Mattis Avenue at John Street (see *Figure 7-10*)
- Urbana
  - Lincoln Square (see *Figure 7-11*)
  - The intersection of Philo Road and Florida Avenue (see *Figure 7-12*)
- Savoy
  - The area south of Burwash Avenue (see *Figure 7-13*)

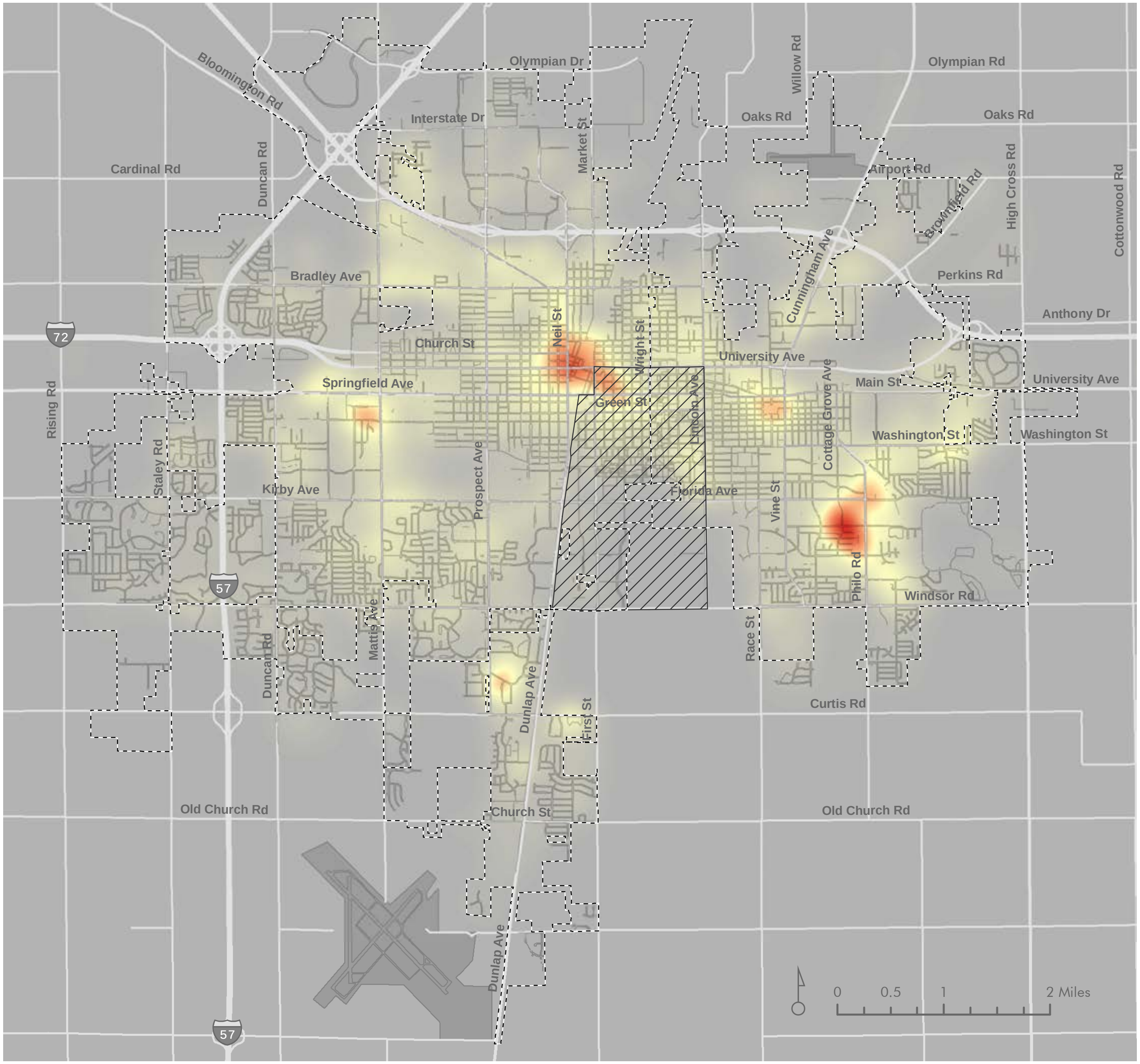
For each of the high priority areas, the compliance and condition scores for individual features are mapped (see *Figure 7-14* to *Figure 7-23*). While these scores provide an indication of the PROWAG compliance and physical condition of the features, they do not, by themselves, represent a prioritized list of improvements. In prioritizing and scheduling sidewalk network improvements, local agencies consider a variety of factors, including the condition and compliance of the feature; public input and complaints received; funding available; and coordination with other construction and utility work.

University of Illinois Campus Area

One of the limitations of a region-wide analysis is that it breaks down in zones, such as the University of Illinois campus area, where the usual relationships between factors do not apply. The campus area has unique demographics and travel patterns compared to the urbanized area as a whole, and traditional data sources do not accurately capture these trends. For example, students with disabilities do not use DASH cards to ride transit, and dormitories are counted by the Census as group quarters rather than housing units. As a result, the identified priority areas do not accurately capture the demand for accessible pedestrian infrastructure in the campus area.

The Division of Disability Resources and Educational Services (DRES) reports that there are more than 2,000 registered students with disabilities on the Urbana campus. This count represents students with all types of disabilities, including disabilities that impact mobility, but excludes students who do not self-identify in order to receive support services. DRES provides accessible bus service to all University housing facilities and Private Certified Housing locations. This service provides more than 23,000 accessible trips per year.

Specific data on the locations and travel patterns of students with disabilities were not available for analysis due to confidentiality issues. However, these data can be used by University staff, in combination with data from this analysis, to identify meaningful priority areas in the University campus.



Combined Priority Score

Weighting the priority scores for each of the factors reveals several areas with a high demand for accessible pedestrian infrastructure, including Downtown-Midtown-Campustown and the Springfield Avenue/Mattis Avenue area in Champaign; the area south of Burwash Avenue in Savoy; and Lincoln Square and the Philo Road/Florida Avenue area in Urbana.

Legend

Municipal Boundary

University District (see p. 90)

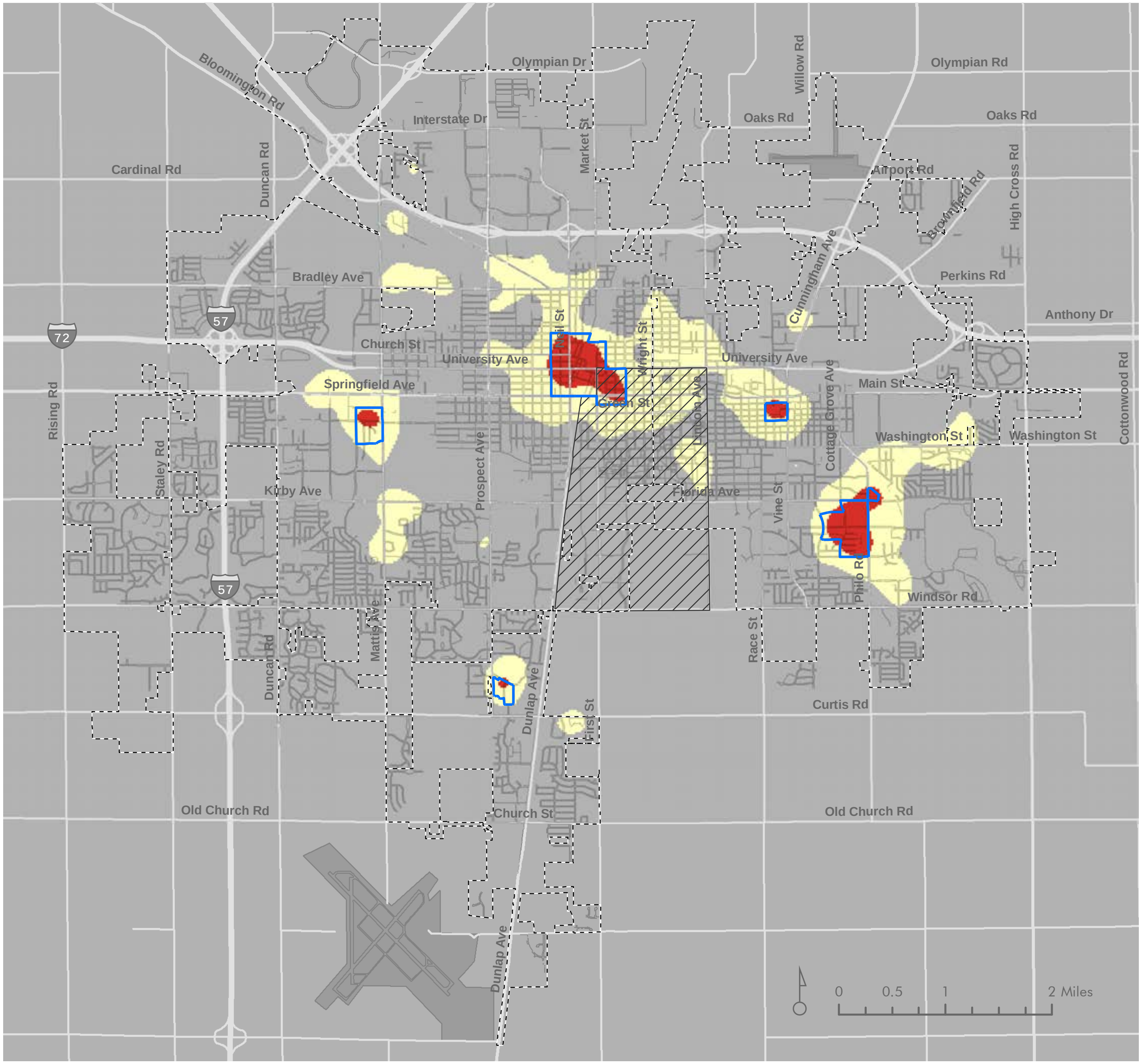
Sidewalk

Priority Score

High : 50.8

Low : 0

Figure 7-7 **Combined Priority Score**



Priority Areas

Priority areas are created by classifying the urbanized area based on the combined priority score:

Low Priority: 0 to 15
Medium Priority: > 15 to 30
High Priority: > 30

Based on the priority scores, there are five high priority zones in the urbanized area:

- Downtown-Midtown-Campustown Champaign
- South Mattis Avenue
- Lincoln Square
- Philo Road and Florida Avenue
- Burwash Avenue

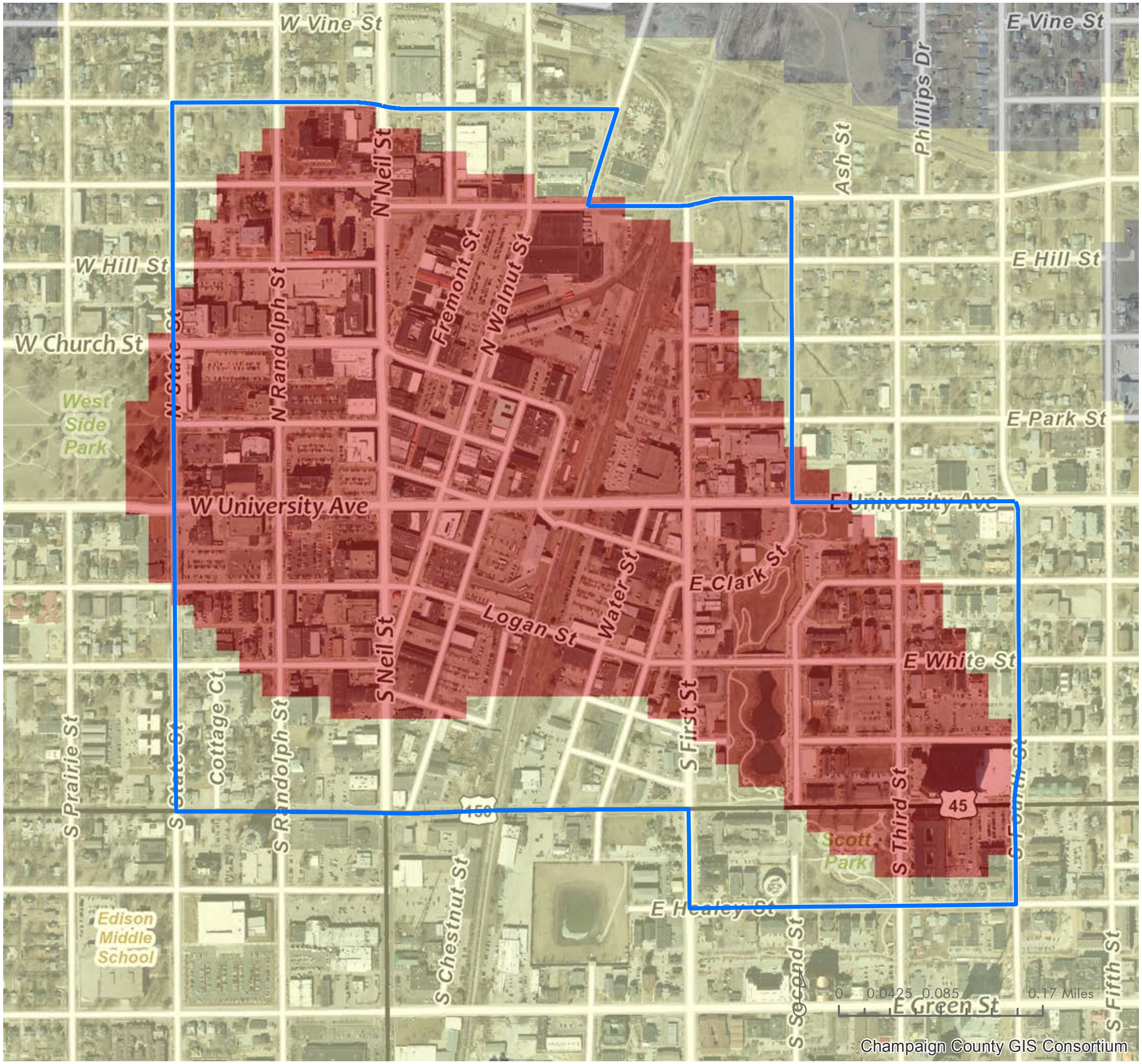
Legend

High Priority Zone
Municipal Boundary
University District
(see p. 90)
Sidewalk

Priority

High Priority
Medium Priority
Low Priority

Figure 7-8 **Priority Areas Overview**



Downtown-Midtown-Campustown Champaign

The Downtown-Midtown-Campustown Champaign priority area was home to relatively few seniors but had a high concentration of individuals with disabilities relative to the rest of the urbanized area. The area included a variety of public facilities and retail establishments and high levels of transit service due to the presence of the Illinois Terminal. Housing density was relatively low in the commercial core and high in the eastern portion of the high priority because of the concentration of student apartments.

Legend

- High Priority Zone

Priority

- High Priority
- Medium Priority
- Low Priority

Figure 7-9 **Downtown-Midtown-Campustown Champaign Priority Area**

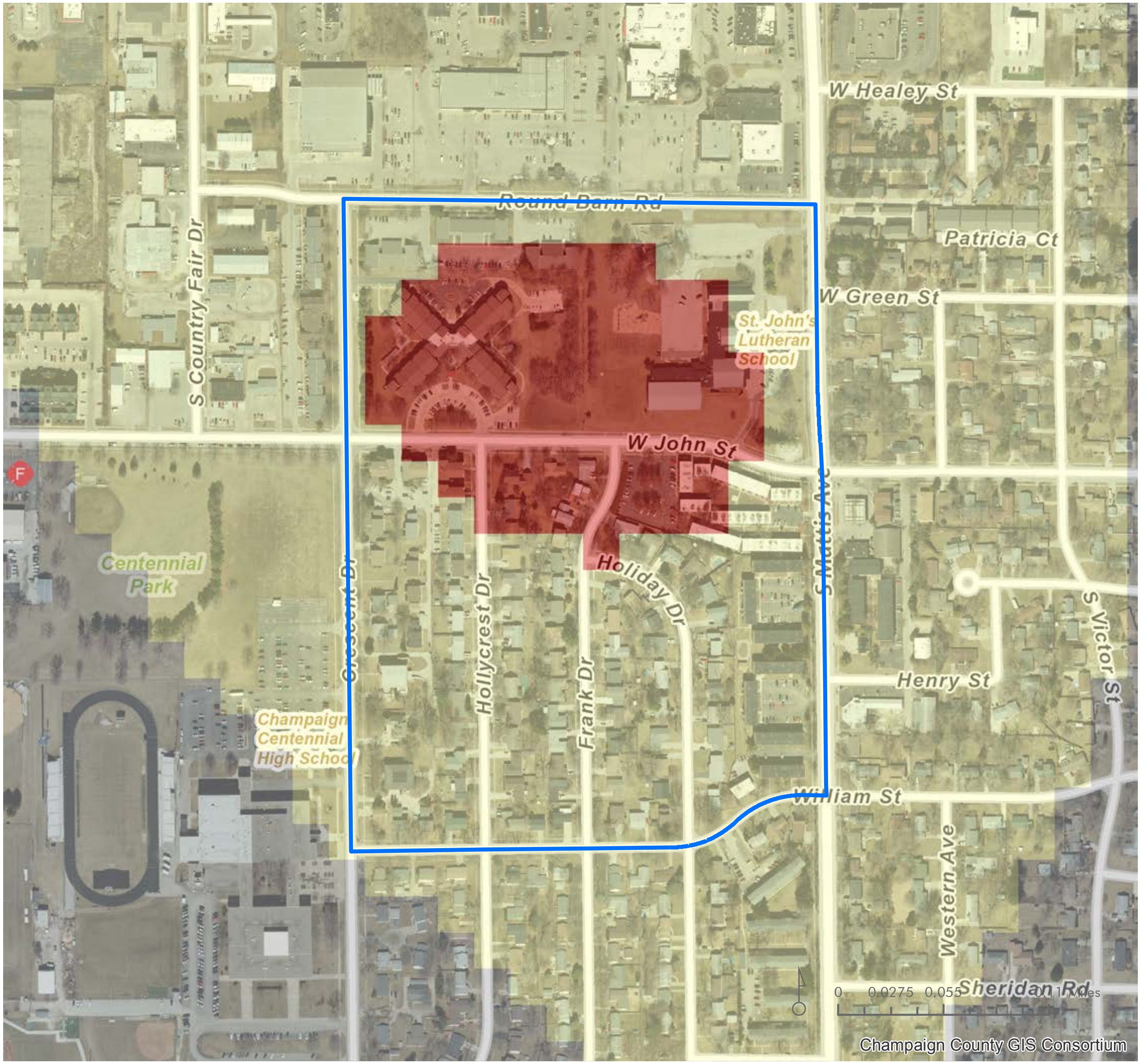


Figure 7-10 **South Mattis Avenue Priority Area**

South Mattis Avenue

The South Mattis Avenue priority area included a relatively high concentration of seniors as well as a small cluster of individuals with disabilities. Located within a major retail corridor, the area was also near several public facilities and schools, including Centennial High School. The area had moderately high levels of transit service and higher housing density than most of the surrounding area.

Legend

High Priority Zone

Priority

- High Priority
- Medium Priority
- Low Priority

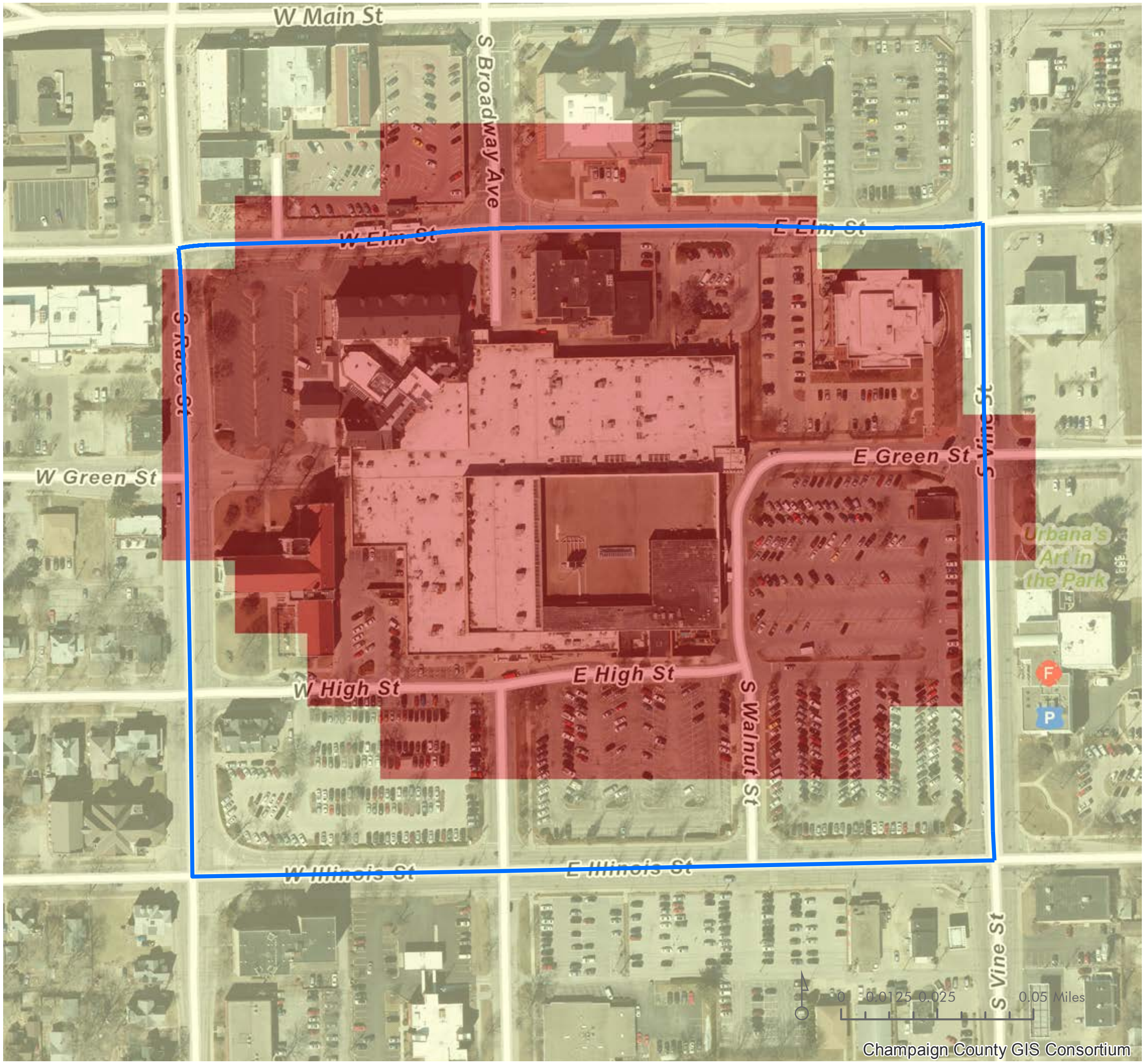


Figure 7-11 **Lincoln Square Priority Area**

Lincoln Square

The Lincoln Square priority area had moderate levels of individuals with disabilities and seniors. The area was located near a school and several public facilities, including the Champaign County Courthouse, and included a wide variety of retail establishments in the mall and nearby Main Street. Adjacent to Urbana's primary transit hub, Lincoln Square had high levels of transit service. Housing density, by contrast, was relatively low due to the area's commercial character.

Legend

High Priority Zone

Priority

High Priority

Medium Priority

Low Priority

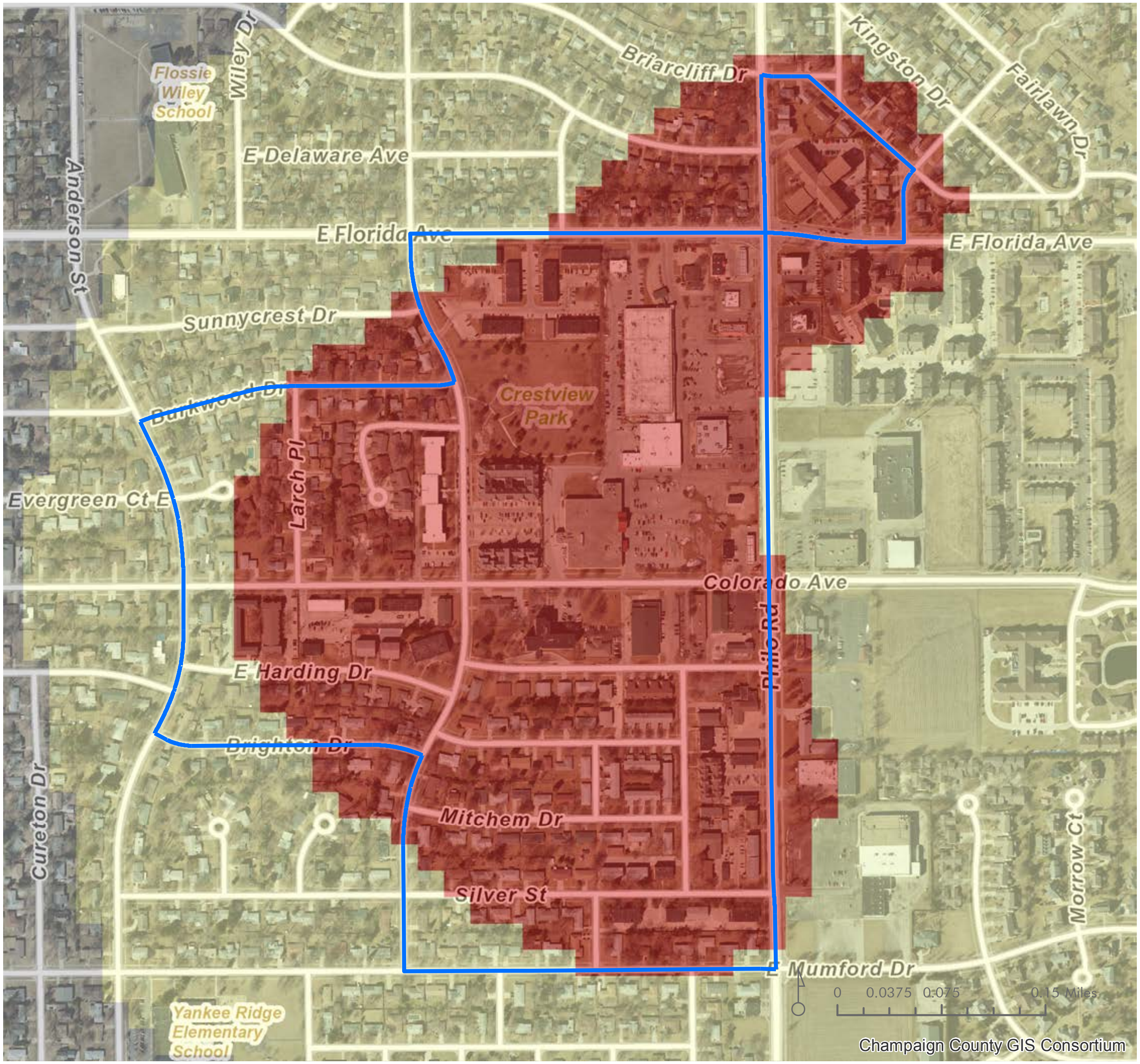


Figure 7-12 **Philo Road and Florida Avenue Priority Area**

Philo Road and Florida Avenue

The Philo Road and Florida Avenue priority area contained significant clusters of both individuals with disabilities and seniors. The concentration of schools and public facilities of in the area was typical of Urbana, and transit activity was moderate. The area included a variety of retail establishments in the Philo Road commercial corridor, and housing density was high due to the abundance of multi-family housing.

Legend

High Priority Zone

Priority

- High Priority
- Medium Priority
- Low Priority

Figure 7-13 **Burwash Avenue Priority Area**

Burwash Avenue

The Burwash Avenue priority area included few individuals with disabilities but a significant cluster of seniors. The area had a school and two housing facilities in the immediate vicinity. However, it lacked transit service, with no bus stops within the high priority zone. The area was relatively close to retail located along Dunlap Avenue and included moderate housing density due to its mixed residential-commercial character.

Legend

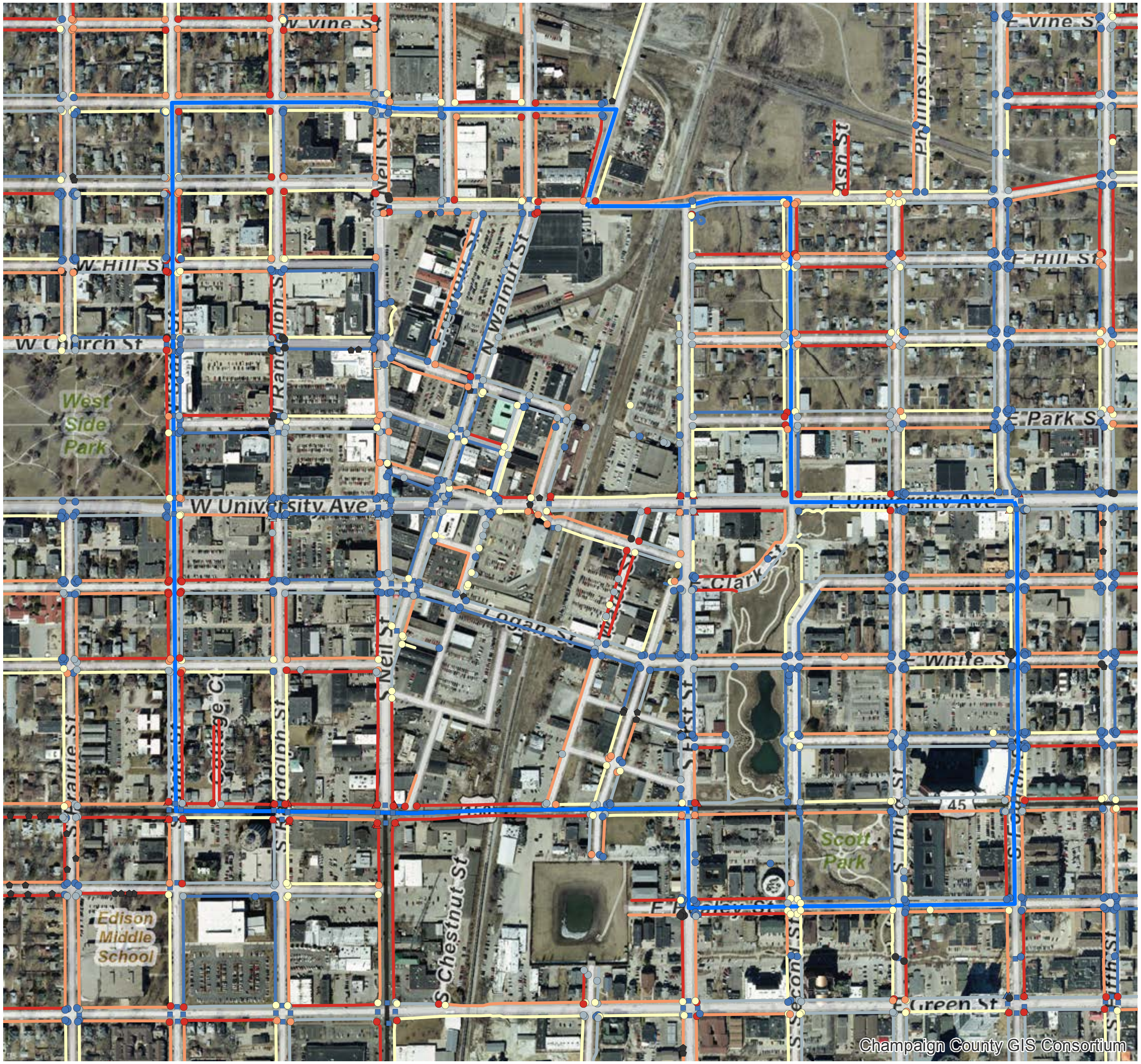
High Priority Zone

Priority

High Priority

Medium Priority

Low Priority



Downtown-Midtown-Campustown Champaign Compliance Scores

Compliance scores represent the level of compliance with PROWAG standards. See Chapter 4 for a detailed description of the compliance index used to score pedestrian network features.

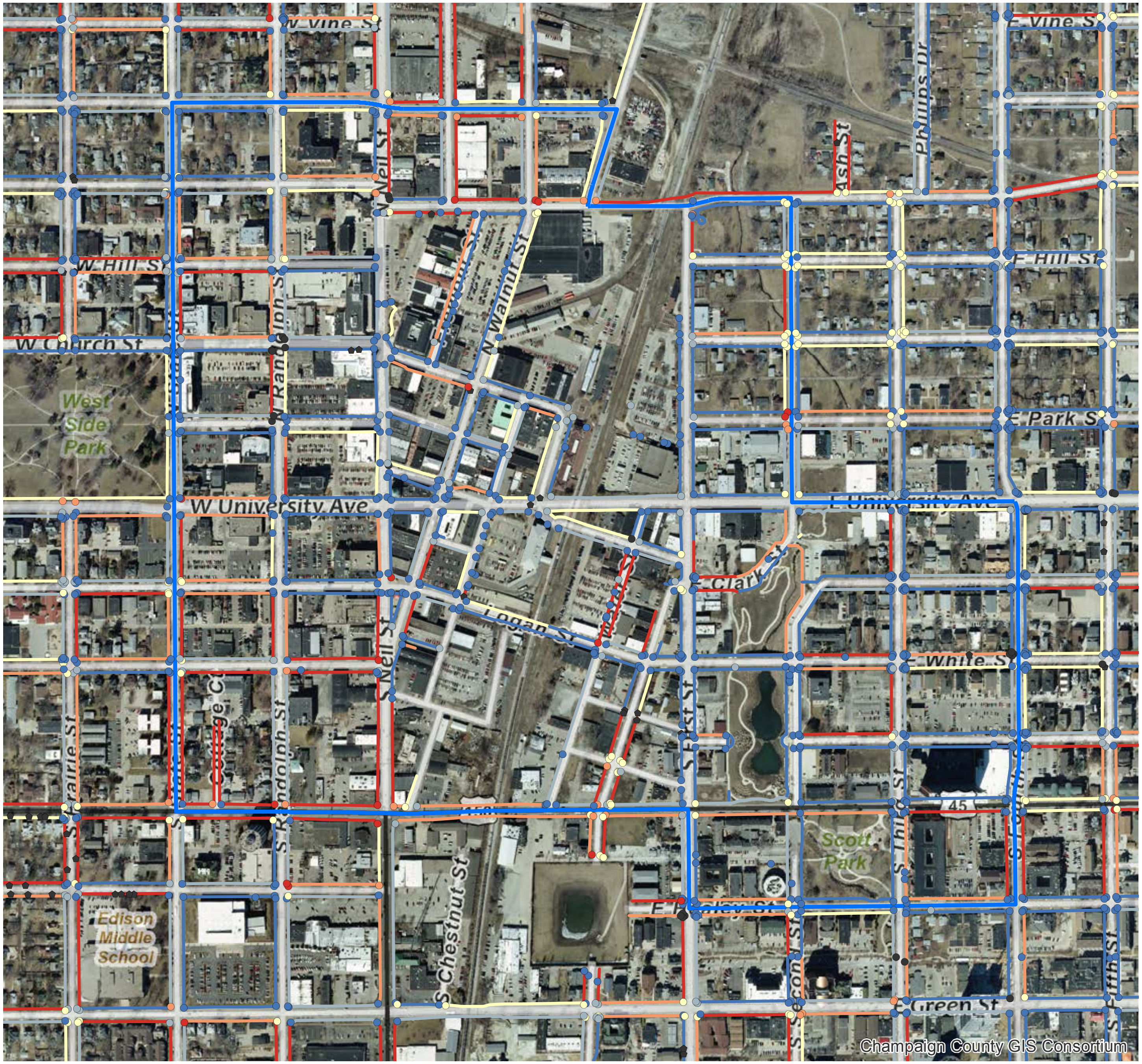
Legend

- Curb Ramp
- Non-Ramp Endpoint
- Crosswalk
- Pedestrian Signal
- Sidewalk
- High Priority Zone

ADA Compliance Score

- 0 to 60
- > 60 of 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-14 **Downtown-Midtown-Campustown Compliance Scores**



Downtown-Midtown-Campustown Champaign Condition Scores

Condition scores represent the physical condition of sidewalks and curb ramps. See Chapter 5 for a detailed description of the condition index used to score pedestrian network features.

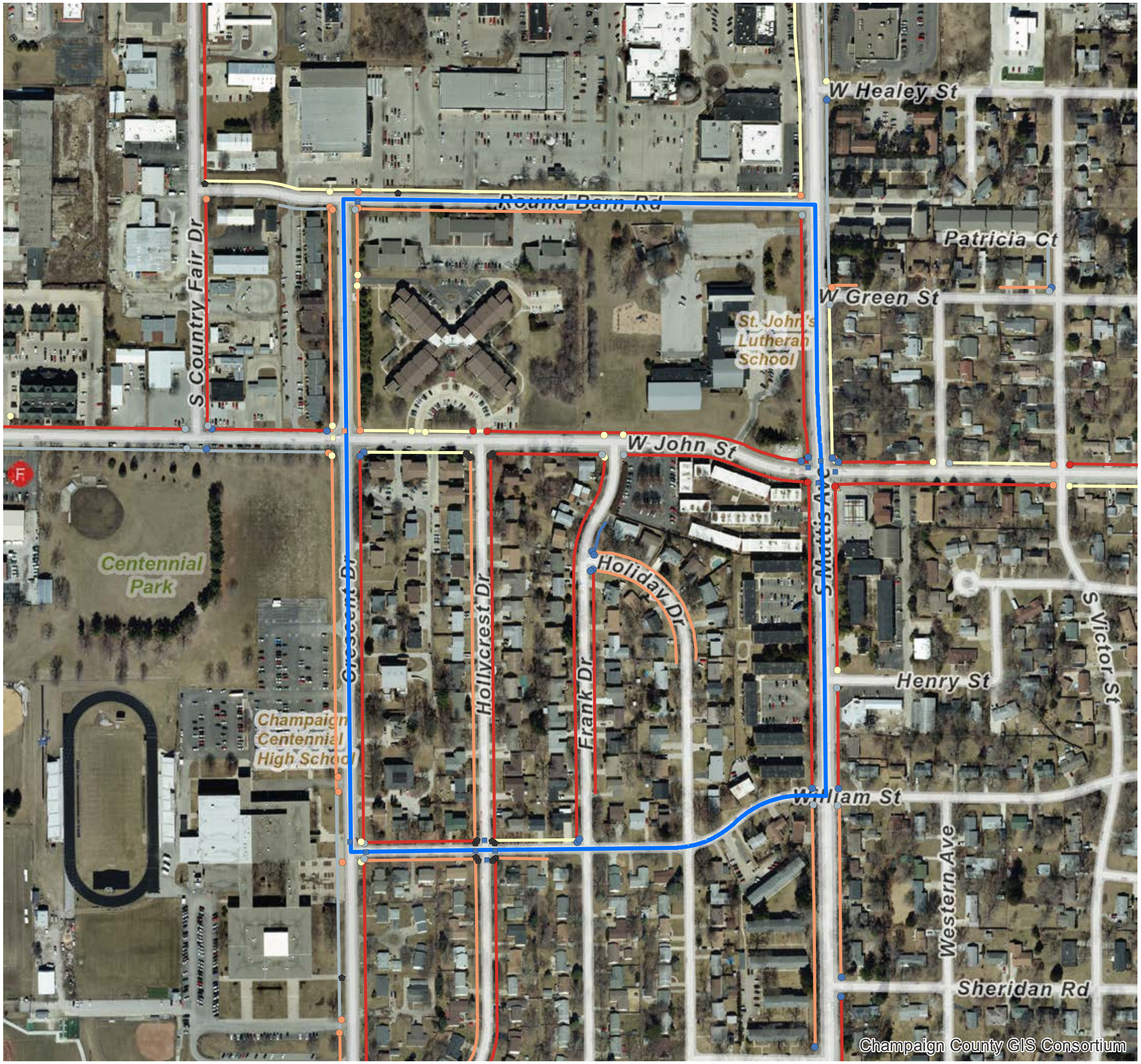
Legend

- Curb Ramp
- Non-Ramp Endpoint
- Sidewalk
- High Priority Zone

Condition Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-15 **Downtown-Midtown-Campustown Condition Scores**



South Mattis Avenue Compliance Scores

Compliance scores represent the level of compliance with PROWAG standards. See Chapter 4 for a detailed description of the compliance index used to score pedestrian network features.

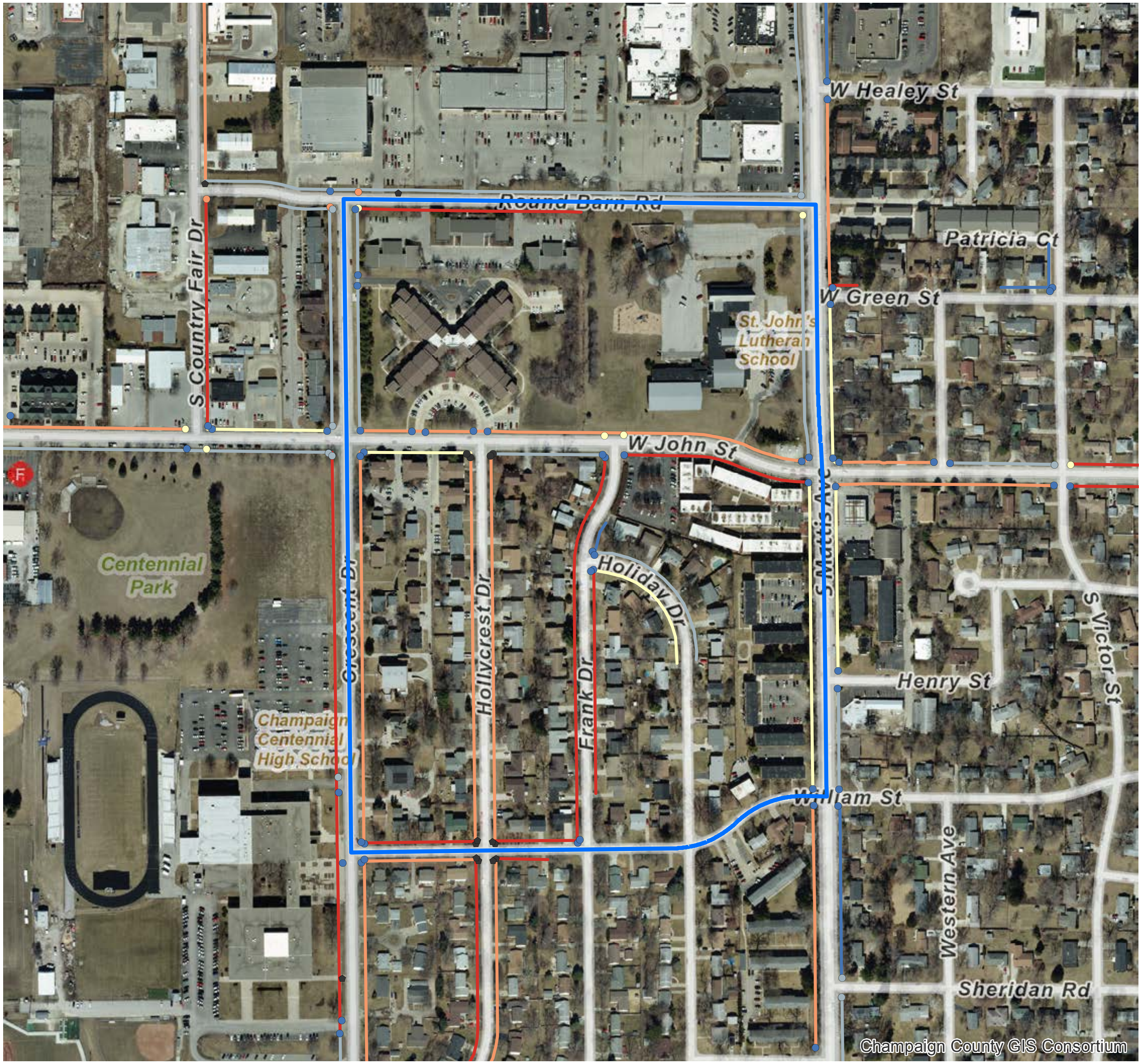
Legend

- Curb Ramp
- Non-Ramp Endpoint
- Crosswalk
- Pedestrian Signal
- Sidewalk
- High Priority Zone

ADA Compliance Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-16 **South Mattis Avenue Compliance Scores**



South Mattis Avenue Condition Scores

Condition scores represent the physical condition of sidewalks and curb ramps. See Chapter 5 for a detailed description of the condition index used to score pedestrian network features.

Legend

- Curb Ramp
- Non-Ramp Endpoint
- Sidewalk
- High Priority Zone

Condition Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-17 **South Mattis Avenue Condition Scores**

Lincoln Square Compliance Scores

Compliance scores represent the level of compliance with PROWAG standards. See Chapter 4 for a detailed description of the compliance index used to score pedestrian network features.

Legend

- Curb Ramp
- Non-Ramp Endpoint
- Crosswalk
- Pedestrian Signal
- Sidewalk
- High Priority Zone

ADA Compliance Score

- 0 to 60
- > 60 of 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-18 **Lincoln Square Compliance Scores**

Lincoln Square Condition Scores

Condition scores represent the physical condition of sidewalks and curb ramps. See Chapter 5 for a detailed description of the condition index used to score pedestrian network features.

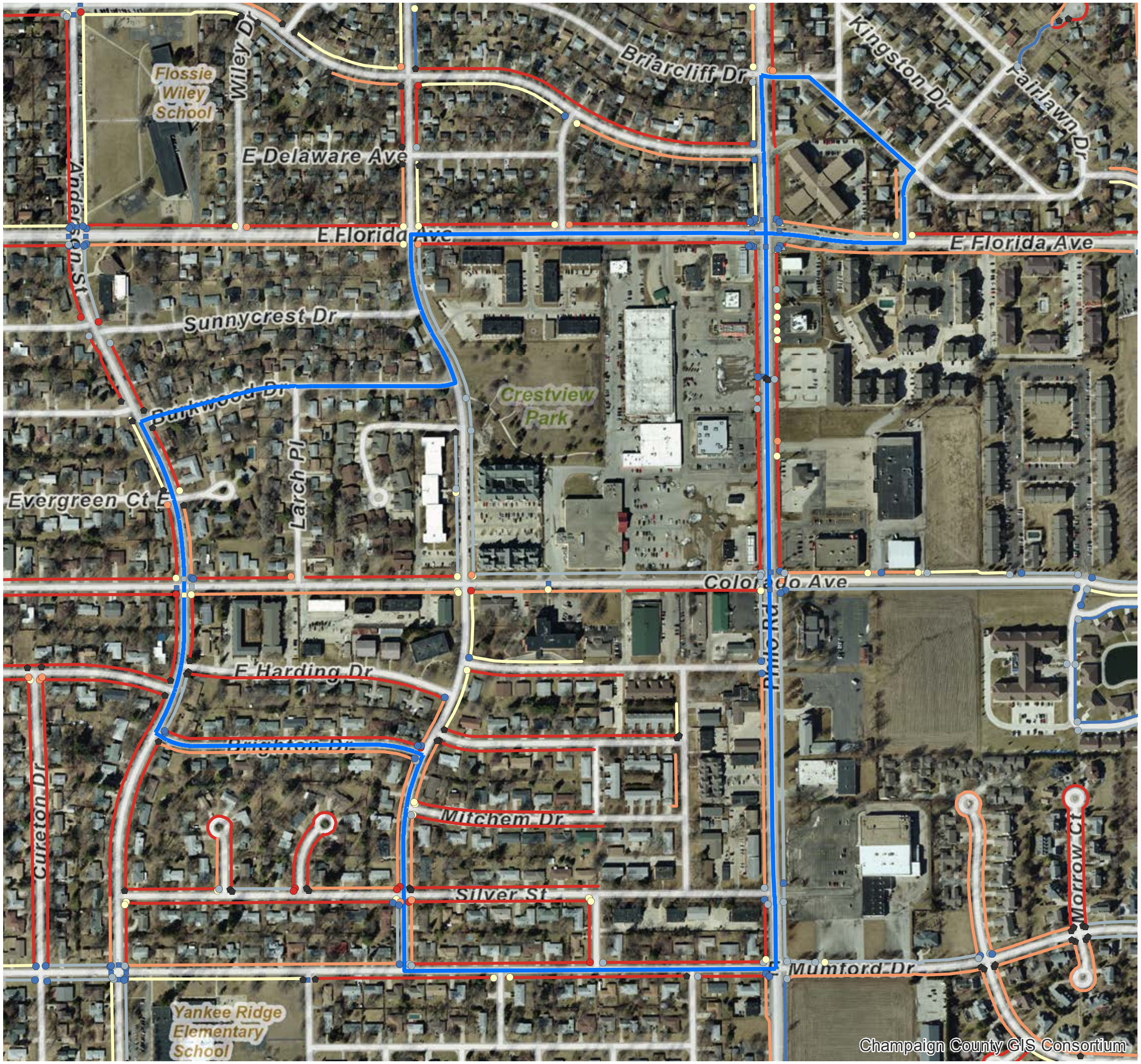
Legend

- Curb Ramp
- Non-Ramp Endpoint
- Sidewalk
- High Priority Zone

Condition Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-19 **Lincoln Square Condition Scores**



Philo Road and Florida Avenue Compliance Scores

Compliance scores represent the level of compliance with PROWAG standards. See Chapter 4 for a detailed description of the compliance index used to score pedestrian network features.

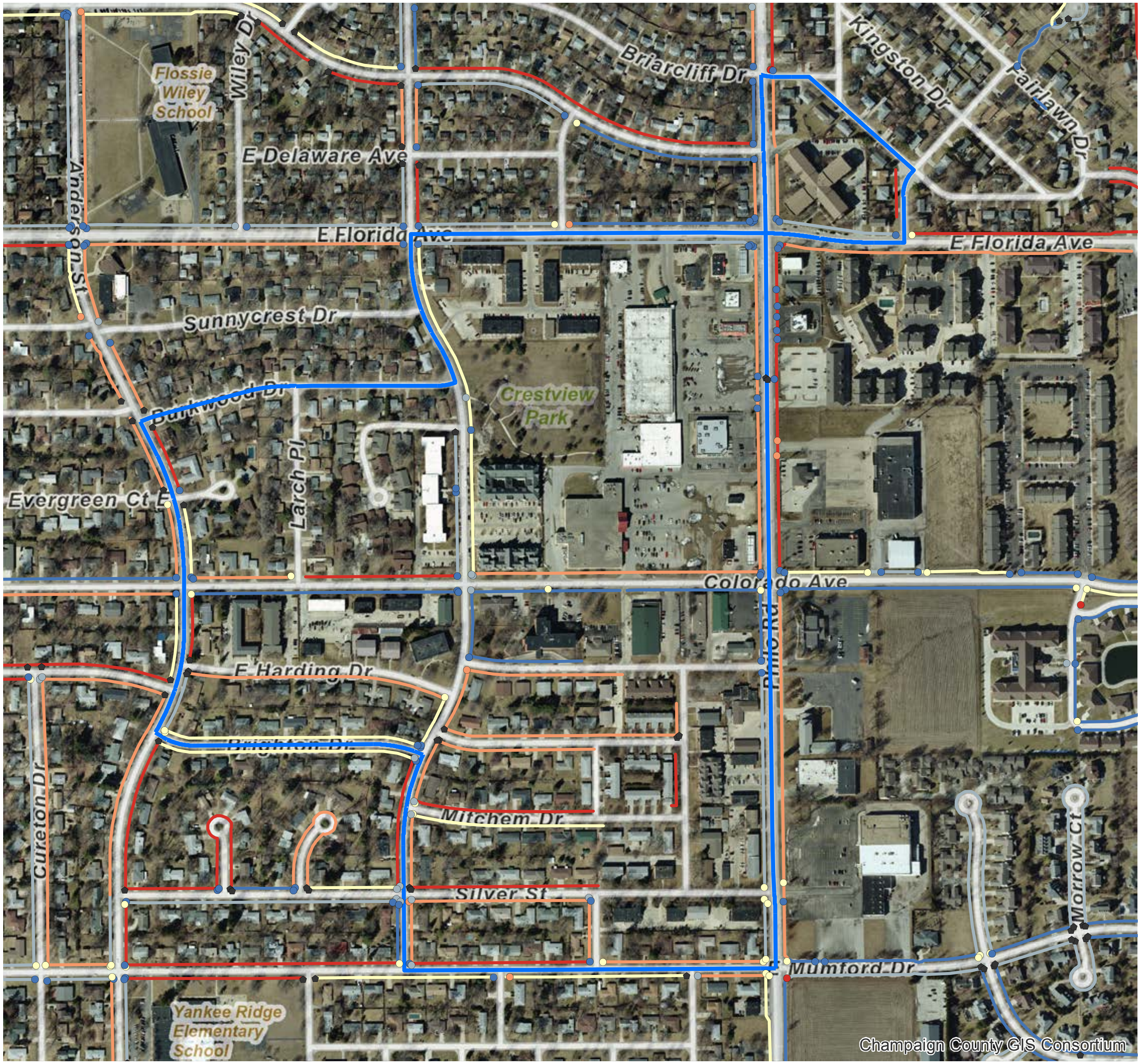
Legend

- Curb Ramp
- Non-Ramp Endpoint
- Crosswalk
- Pedestrian Signal
- Sidewalk
- High Priority Zone

ADA Compliance Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-20 **Philo Road and Florida Avenue Compliance Scores**



Philo Road and Florida Avenue Condition Scores

Condition scores represent the physical condition of sidewalks and curb ramps. See Chapter 5 for a detailed description of the condition index used to score pedestrian network features.

Legend

- Curb Ramp
- Non-Ramp Endpoint
- Crosswalk
- Pedestrian Signal
- Sidewalk
- High Priority Zone

ADA Compliance Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-21 **Philo Road and Florida Avenue Condition Scores**

Burwash Avenue Compliance Scores

Compliance scores represent the level of compliance with PROWAG standards. See Chapter 4 for a detailed description of the compliance index used to score pedestrian network features.

Legend

- Curb Ramp
- Non-Ramp Endpoint
- Crosswalk
- Pedestrian Signal
- Sidewalk
- High Priority Zone

ADA Compliance Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-22 **Burwash Avenue Compliance Scores**

Burwash Avenue Condition Scores

Condition scores represent the physical condition of sidewalks and curb ramps. See Chapter 5 for a detailed description of the condition index used to score pedestrian network features.

Legend

- Curb Ramp
- Non-Ramp Endpoint
- Sidewalk
- High Priority Zone

Condition Score

- 0 to 60
- > 60 ot 70
- > 70 to 80
- > 80 to 90
- > 90 to 100
- No Score

Figure 7-23 **Burwash Avenue Condition Scores**

8 Recommendations

The primary purpose of the Sidewalk Network Inventory and Assessment was to collect and analyze data about the pedestrian network in the Champaign Urbana Urbanized Area. The data and analysis results were designed to allow local agencies to update their ADA transition plans and prioritize accessibility improvements, but they also offer related opportunities to strengthen the pedestrian network. Recommendations growing out of the results fall into four broad categories corresponding to the structure of the analysis:

- Compliance
- Condition
- Connectivity
- Priority Areas and Funding

The compliance recommendations focus on bringing pedestrian network features into compliance with PROWAG standards (see *Table 8-1*). Using trends identified in the inventory data, they propose means of ensuring that newly constructed features meet relevant standards and that existing noncompliant features are identified and addressed. They also suggest policies that can help to integrate PROWAG standards with existing design, construction, and review processes.

The condition recommendations focus on routine maintenance of sidewalk network features (see *Table 8-2*). They seek to address the most common condition issues observed in the inventory and provide opportunities for agency staff and members of the public to evaluate the condition of sidewalk network features.

The connectivity recommendations are designed to increase the connectivity of the sidewalk by maximizing the value of new sidewalk and curb ramp investments (see *Table 8-3*). Based on the findings of the sidewalk gap analysis and the missing curb ramp analysis, these recommendations are designed to aid in decisions about where scarce construction resources should be spent.

Further guidance on prioritization of features appears in the final recommendation category, priority areas and funding (see *Table 8-4*). These recommendations draw on the priority area analysis to suggest means of developing and communicating to the public a prioritized list of accessibility improvements. They also offer guidance on developing revenue sources to fund the construction of pedestrian network features.

Taken together, these recommendations provide concrete steps that local agencies can take to address the key findings of the inventory and assessment process, moving the community toward a safer and more accessible sidewalk network for all pedestrians.

Table 8-1 **Compliance Recommendations**

Feature Types	Findings	Recommendations
Sidewalks	Vertical fault size was a persistent problem, though more than one third of total sidewalk length could be brought into compliance with beveling alone.	• Expand current beveling programs to bring vertical faults between ¼ and ½ inch into compliance with PROWAG.
Sidewalks	More than 65 percent of the sidewalks in the urbanized area had a maximum cross slope between 2.1 and 6.0 percent. The maximum cross slopes of sidewalks were often at driveway crossings.	• Encourage or require developers to install sidewalks prior to construction of driveways. • Inspect sidewalk cross slopes at new driveway crossings as a condition of issuing an occupancy permit.
Sidewalks	Tree trunks and other vegetation were the most common type of obstruction, affecting seven percent of sidewalks by length. Tree roots were the third most common type of obstruction, followed by grates, manholes, and handholes.	• Evaluate tree type and space requirements for new developments to ensure that future maintenance and growth needs are considered. • Develop a policy to address existing large trees that are damaging sidewalks, including guidance on tree removal. • Revise the site plan review process to address future maintenance needs of pedestrian facilities, growth area for street trees, and siting of utilities.
Curb Ramps	Truncated domes were present in less than 40 percent of ramps that required detectable warning surfaces. Of ramps with truncated domes, only about 53 percent had detectable warning surfaces that spanned the full width of the ramp or landing.	• Where feasible, install truncated domes in curb ramps with pavement grooves that are otherwise compliant. • Match the width of truncated dome panels to curb ramps and landings, and ensure that detectable warning surfaces are properly oriented and positioned.
Curb Ramps	Almost 10 percent of curb ramps had running slopes greater than 10.3 percent, and nearly 8 percent were exempt from the running slope standard because their length exceeded 15 feet.	• Where feasible, use combination ramps to break up long ramps and reduce the slope of ramp runs.
Curb Ramps	Cross slopes were consistently above the 2.0 percent threshold in curb ramps, landing areas, and approaches. The most extreme cross slopes often coincided with nonstandard ramp configurations, but many ramps with modern accessibility features also had cross slopes outside the compliant range.	• Perform periodic audits of newly constructed curb ramps to ensure that actual cross slopes match the design specifications. • Where possible, use IDOT curb ramp designs, and avoid combining ramp types to minimize the risk of excessive cross slope.
Sidewalks and Curb Ramps	Grates, manholes, and handholes were the second most common type of obstruction, affecting almost 3 percent of ramps. Poles and signposts obstructed more than 80 curb ramps and more than 100 blocks of sidewalk.	• Work with utility providers to locate grates, manholes, and handholes outside pedestrian access routes. • Encourage pole consolidation, especially in areas where space is limited, pedestrian demand is high, and pole replacement is anticipated.

Table continued on the next page.

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Feature Types	Findings	Recommendations
Sidewalks and Curb Ramps	Some sidewalk network design standards in local municipal codes conflict with current PROWAG standards, particularly in cross slope requirements. Several municipalities have adopted complete streets policies, but these policies are not well integrated with other sidewalk network standards and policies.	• Adopt PROWAG as the official standard for pedestrian network features. • Review all design standards related to pedestrian facilities, including sidewalks, overpasses, underpasses, and stairway improvements. Revise standards that conflict with PROWAG, and integrate complete streets features such as curb bulbs, street trees, transits stops, and signage. • Increase the minimum width requirement for sidewalks to five feet, eliminating the need for passing spaces.
Pedestrian Signals	More than 80 percent of pushbuttons were mounted close enough to the curb, but nearly half were located too close to another pushbutton.	• Review and revise the policies for the placement, location, design, and removal of pedestrian pushbuttons.
Pedestrian Signals	Tactile arrows were present at only about 41 percent of pedestrian signals.	• Install tactile arrows indicating crossing direction, particularly where pushbuttons cannot be mounted at least 10 feet apart.
Pedestrian Signals	Overall compliance scores for pedestrian signals were low, with only about one third of all pedestrian signals scoring above 70 on the compliance index. Locator tones and vibrotactile signals or buttons were the least common accessibility features.	• Update guidelines related to Accessible Pedestrian Signals (APS) design features, including policies regarding installation and removal of APS as well as guidance for setting the tone and volume of the signal device.

Table 8-2 **Condition Recommendations**

Feature Types	Findings	Recommendations
Sidewalks	Sidewalks scored considerably lower on the condition index than curb ramps, with only about one third of sidewalks by length scoring in the top condition tier. Sidewalk condition scores reflected the same spatial pattern as compliance scores.	• Incorporate sidewalks into routine roadway maintenance programs, including assessment and repair of existing facilities.
Curb Ramps	The spatial pattern of curb ramp condition often did not mirror the pattern of compliance. The surface condition issues affecting curb ramps tended to be maintenance issues, such as dirt and grass, rather than structural issues.	• Monitor patterns of dirt and grass on curb ramps to determine if there are problematic ramp or gutter designs that contribute to these issues. • Study the feasibility of including curb ramps in routine street cleaning and maintenance programs. • Develop a mechanism, such as a website or smartphone app, that allows pedestrians to report curb ramps and other sidewalk network features that are in poor condition or require maintenance.
Crosswalks	Though structured data on crosswalk condition were not collected, many crosswalks were noted as having faded paint, sometimes to the point where markings were not discernible.	• Define a maintenance cycle for crosswalk restriping to ensure that markings are clear and highly visible to drivers and pedestrians. Identify maintenance cycles appropriate to levels of intersection use for municipal maintenance, as well as guidance for utility or other private development work.

Table 8-3 **Connectivity Recommendations**

Feature Types	Findings	Recommendations
Sidewalks	Sidewalk gaps with high connectivity scores were most common in the core of the community and in older urban neighborhoods. Neighborhoods surrounding the core, and many parts of Bondville and Tolono, had larger gaps with lower connectivity value.	• Use existing sidewalk gap programs or establish new programs to fill sidewalk gaps, focusing on gaps with the highest connectivity value, those in high priority zones (see *Figure 7-8*), and those adjacent to bus stops.
Curb Ramps	Intersections without curb ramps were most common in the suburban-style residential areas surrounding the core of the community, while intersections with partial ramp coverage were clustered in neighborhoods throughout the urbanized area.	• Consider the presence or absence of curb ramps in prioritizing roadway resurfacing projects that trigger ADA ramp updates. • Prioritize ramp installation in high priority zones, particularly at intersections where some curb ramps are present.
Crosswalks	Marked crosswalks were most prevalent in core of the community, including the downtowns of Champaign and Urbana and the University of Illinois campus area.	• Create guidelines for installing marked crosswalks and stop bars, addressing issues such as the criteria for marking crosswalks, stop bar placement, and coordination with existing loop detectors.

Table 8-4 **Priority Area and Funding Recommendations**

Feature Types	Findings	Recommendations
Sidewalks	A review of municipal sidewalk policies revealed that sidewalks are most often constructed by private developers, while maintenance is often the responsibility of the municipality.	• Explore public-private cost sharing possibilities for sidewalk and streetscape improvements. • Where possible, track agency spending on sidewalks and other pedestrian network features.
All Feature Types	The priority area analysis identified several high priority zones in Champaign, Urbana, and Savoy. These zones represent areas with the greatest demand for accessible pedestrian infrastructure due to concentrations of people with disabilities and the elderly; housing density; transit activity; and proximity to key types of destinations.	• Develop a system for prioritizing features for accessibility updates based on compliance scores, condition scores, and designated priority areas. • Maintain and update the sidewalk network inventory, allowing ongoing prioritization based on up-to-date field data. • Develop and launch an online dashboard for reporting key indicators, focusing on progress toward specific goals (e.g., the average compliance score for sidewalk network features in high priority areas). • Expand existing sidewalk snow removal requirements to include all properties within high priority zones.

(A) Curb Ramp Type Reference

Chapter three provides standard definitions of common curb ramp types along with diagrams listing the parts of a typical curb ramp. However, curb ramps observed in the field frequently combined characteristics of multiple ramp types, forcing field staff to make decisions about how to collect the ramp.

Placement of detectable warning surfaces often contributed to ambiguity about the correct ramp type. Field staff frequently encountered curb ramps in which the detectable warning placement resembled that of two perpendicular ramps, but the ramp geometry appeared more like that of a blended transition (see *Figure A-1*). In cases like these, field staff were instructed to rely on slopes and other empirical indicators of ramp type.

The photographs that follow illustrate some of the common ambiguous ramp type scenarios encountered in the field and describe the ways in which these ramps were collected. Considerations influencing the ramp type determination are also described, allowing these descriptions to serve as training materials for field staff.

Figure A-1 **Ambiguous Ramp Type Example**

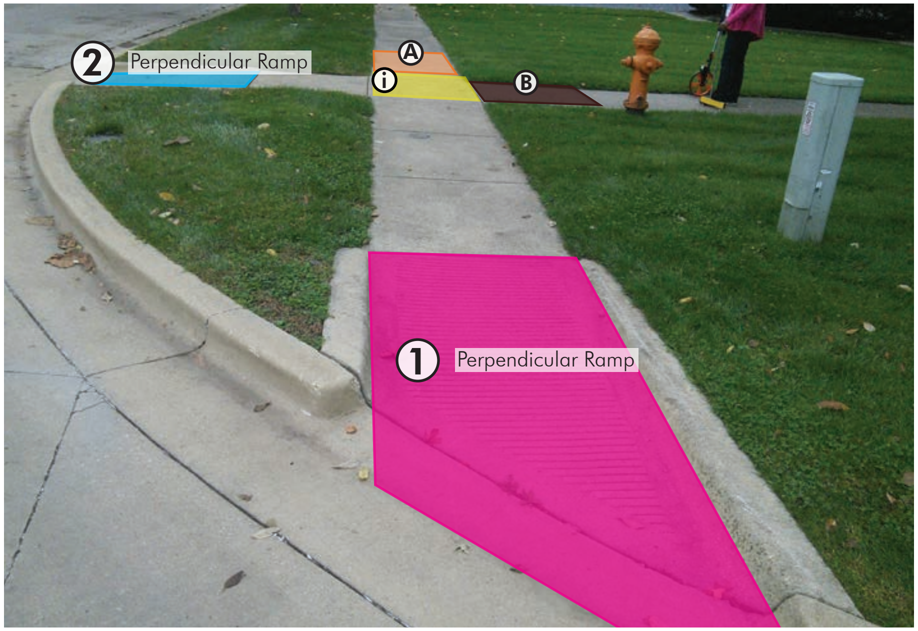

Figure A-2 **Two Perpendicular Ramps with a Remote Landing**

Ramp	Left Approach	Right Approach	Landing Area
1 Perpendicular Ramp	A	B	i
2 Perpendicular Ramp	A	B	i

Ramp Components: ● Feature present ○ Feature absent

The landing area and curb ramps may not be directly adjacent in all cases (see *Figure A-2*). The landing measurements are taken from the common landing area for both curb ramps where pedestrians change direction.

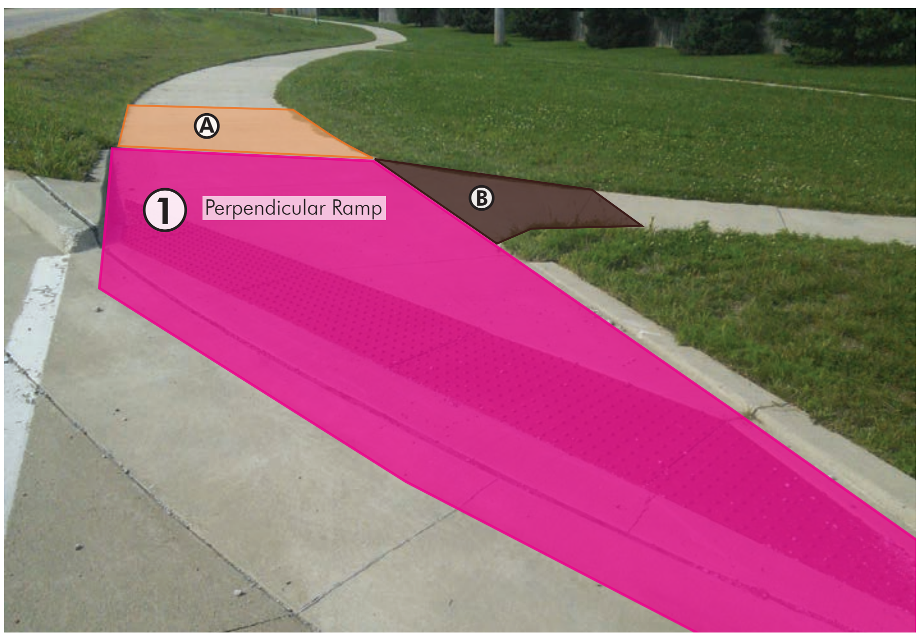

Figure A-3 **Single Perpendicular Ramp without a Landing**

Ramp	Left Approach	Right Approach	Landing Area
1 Perpendicular Ramp	A	B	○

Ramp Components: ● Feature present ○ Feature absent

There is no landing, or flat turning space, at this corner (see *Figure A-3*). The apparent ramp type is recorded as perpendicular because of the shape and orientation of the ramp. However, the ramp may be evaluated under the PROWAG standards for blended transitions, which do not require a landing, depending on its running slope.

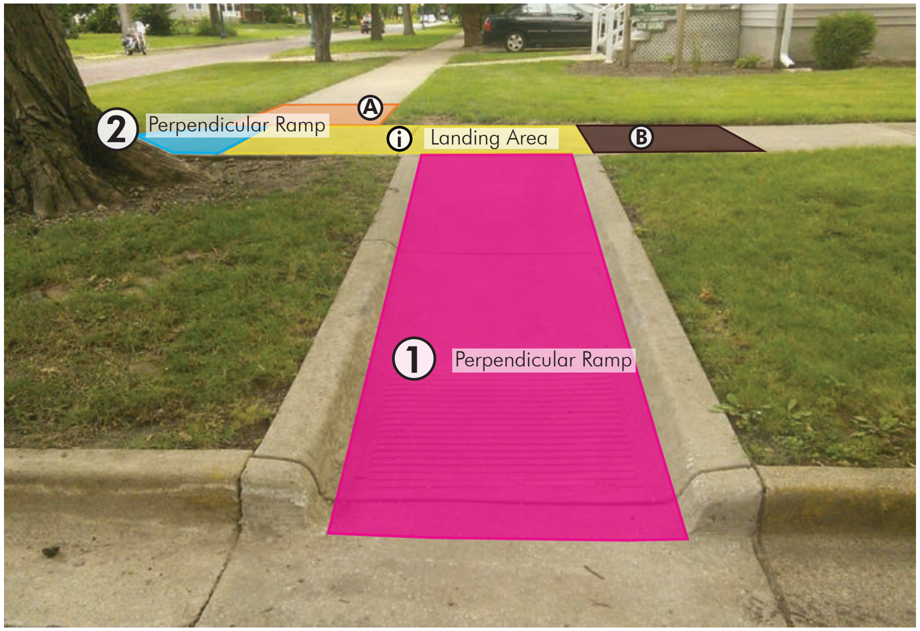

Figure A-4 **Offset Perpendicular Ramps with an Extended Landing**

Ramp	Left Approach	Right Approach	Landing Area
1 Perpendicular Ramp	A	B	i
2 Perpendicular Ramp	A	B	i

Ramp Components: ● Feature present ○ Feature absent

In some cases, perpendicular ramps are offset from each other at a corner, causing the landing area to be extended (see *Figure A-4*).

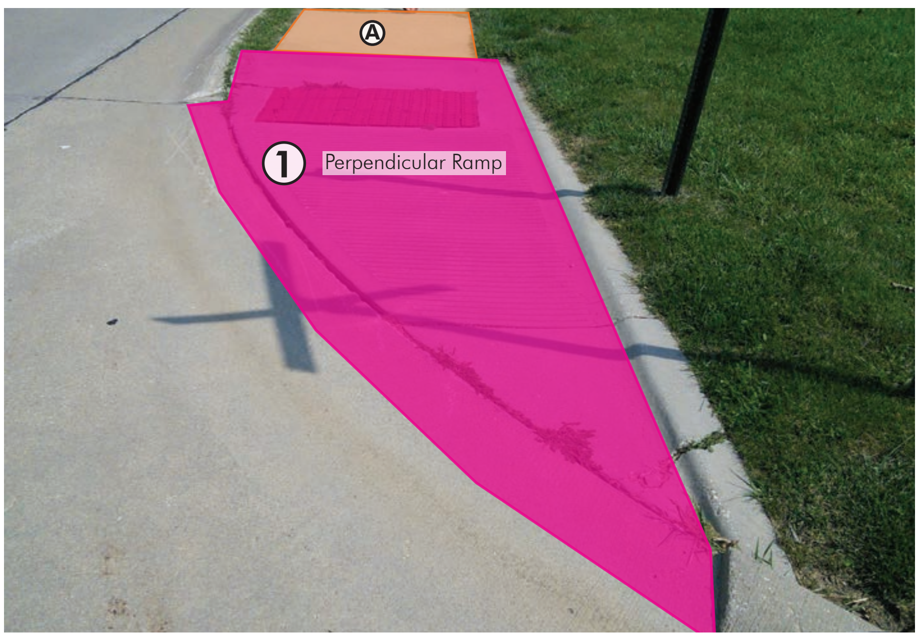

Figure A-5 **Curb Ramp with Multiple Detectable Warning Surfaces**

Ramp	Left Approach	Right Approach	Landing Area
1 Perpendicular Ramp	A	○	○

Ramp Components: ● Feature present ○ Feature absent

Some curb ramps include both truncated domes and pavement grooves (see *Figure A-5*). Since truncated domes are the compliant type, they are measured for the detectable warning surface fields. In such cases, the presence of pavement grooves can be noted in the feature comments.

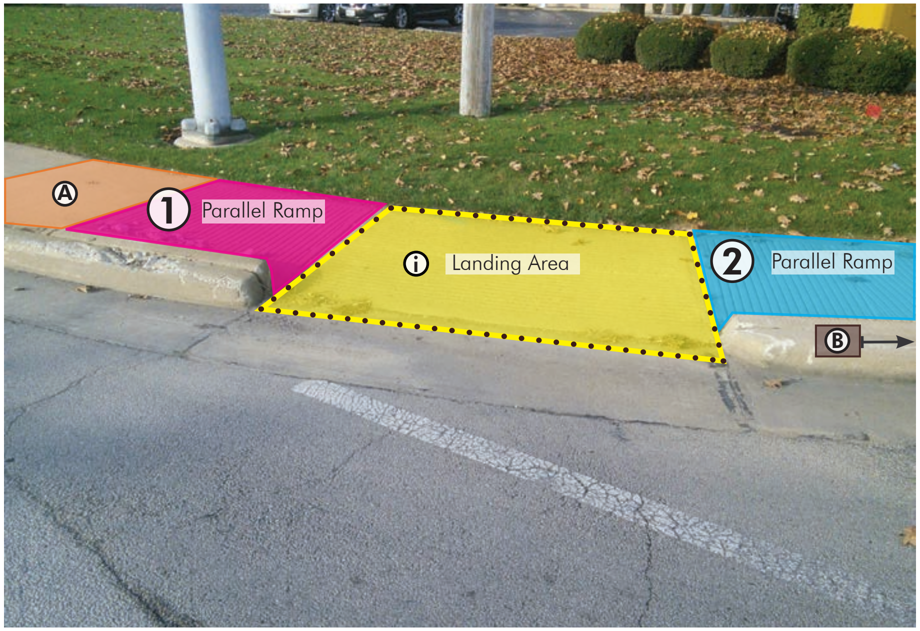

Figure A-6 **Facing Parallel Ramps with a Sloped Landing**

Ramp	Left Approach	Right Approach	Landing Area
1 Parallel Ramp	A	○	i
2 Parallel Ramp	○	B	i

Ramp Components: ● Feature present ○ Feature absent

Parallel ramps are often indicated by the presence of curbs adjacent to a landing area opening. In many older parallel ramps, however, the landing area is also sloped toward the street (see *Figure A-6*). If the slope of the center panel is greater than that of the side panels, the corner is collected as a single perpendicular ramp with no landing, and the side panels are measured as approaches. If the slope of the side panels is greater, they are collected as parallel ramps, as shown.

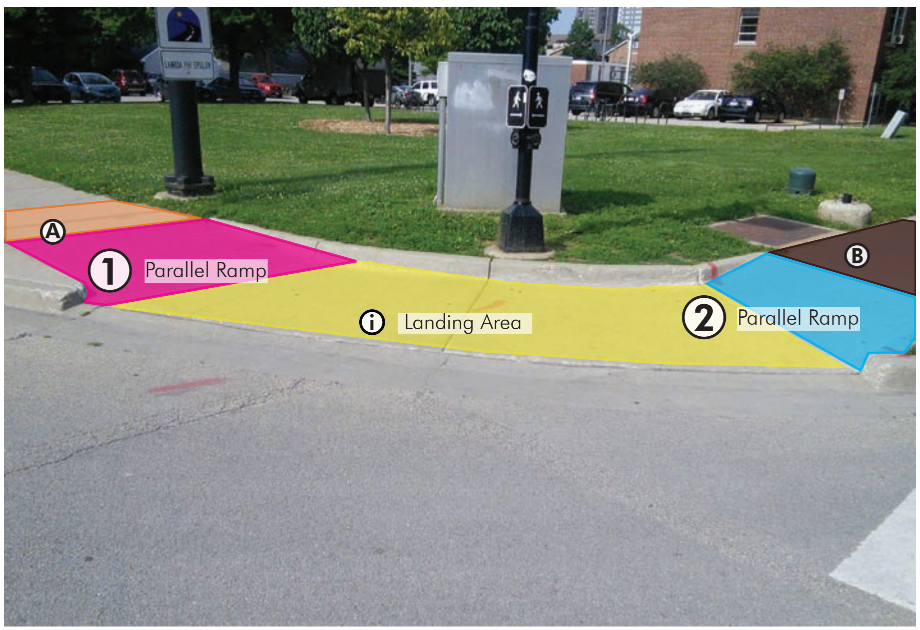

Figure A-7 **Approaches for Parallel Ramps**

Ramp	Left Approach	Right Approach	Landing Area
1 Parallel Ramp	A	○	i
2 Parallel Ramp	○	B	i

Ramp Components: ● Feature present ○ Feature absent

In most parallel ramp configurations, each ramp has a single approach (see *Figure A-7*). The opposite approaches are not recorded for each ramp because pedestrians have to cross over another ramp to access the approach.

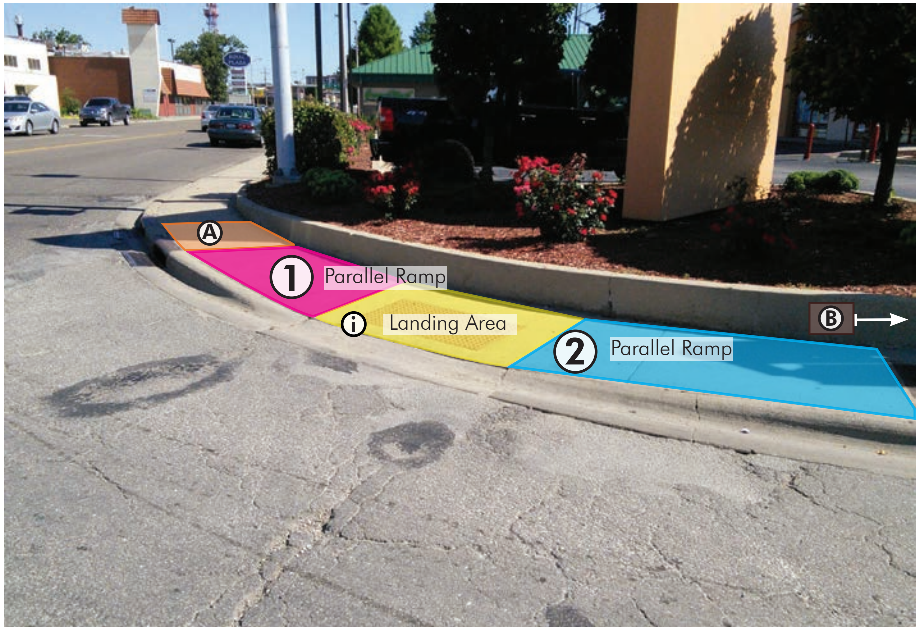

Figure A-8 **Facing Parallel Ramps with a Detectable Warning Surface**

Ramp	Left Approach	Right Approach	Landing Area
1 Parallel Ramp	A	○	●
2 Parallel Ramp	○	B	●

Ramp Components: ● Feature present ○ Feature absent

In most parallel ramp configurations, the detectable warning surface is located on the landing area at the back of the curb (see *Figure A-8*). However, some parallel ramps also have detectable warning surfaces on the ramp, though this is not a compliant position under PROWAG standards.

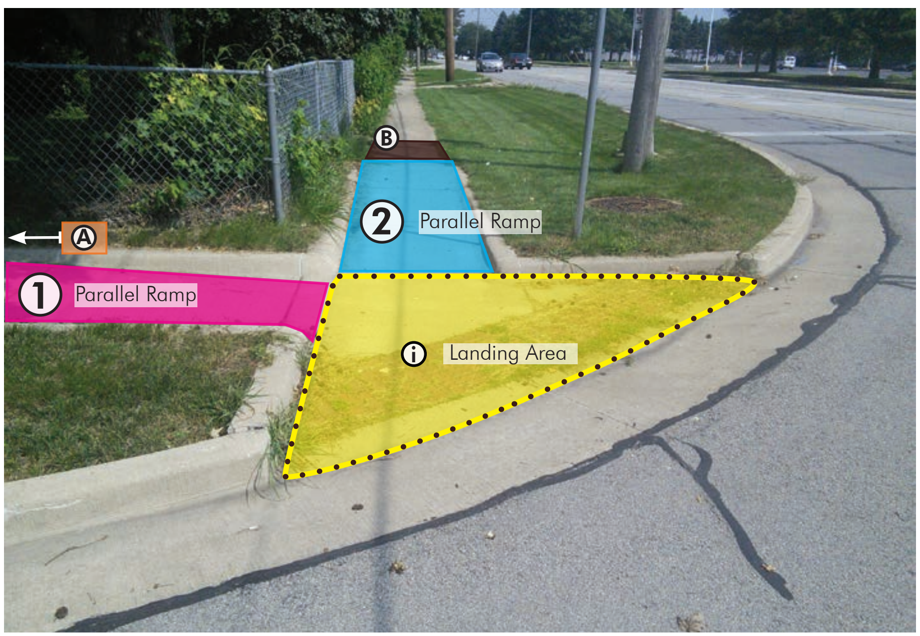

Figure A-9 **Corner Parallel Ramps with a Triangular Landing**

Ramp	Left Approach	Right Approach	Landing Area
1 Parallel Ramp	A	○	●
2 Parallel Ramp	○	B	●

Ramp Components: ● Feature present ○ Feature absent

In some cases, parallel ramps meet at right angles with a triangular bottom landing area (see *Figure A-9*). As long as the running slope of the triangular area is less than the running slopes of the upper segments, the corner is collected as two parallel ramps, as shown. If the running slope of the triangular area is greater, the bottom area is collected as a blended transition, and the upper segments are recorded as approaches.

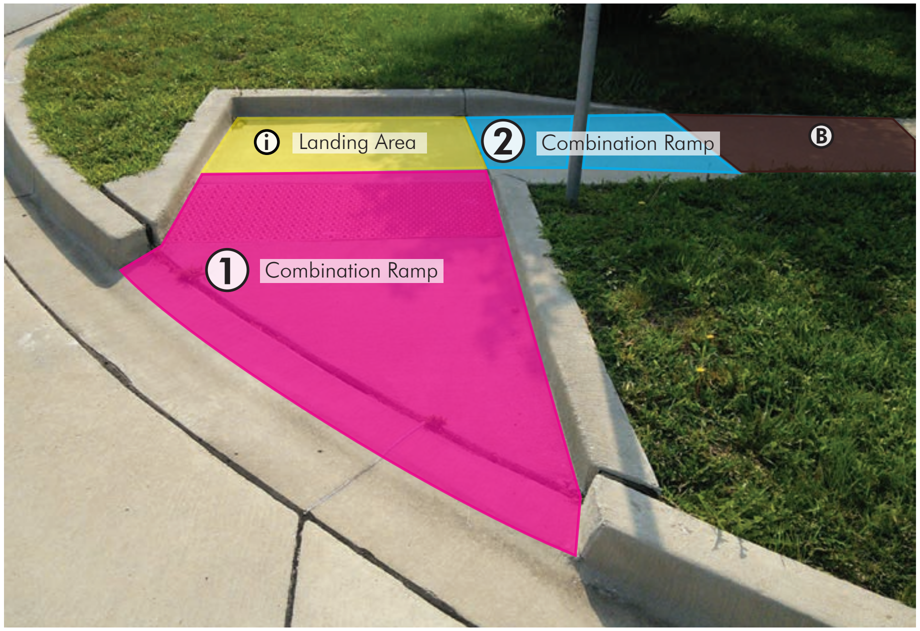

Figure A-10 **Single Combination Ramp with a Landing**

Ramp	Left Approach	Right Approach	Landing Area
1 Combination Ramp	○	○	● i
2 Combination Ramp	○	● B	● i

Ramp Components: ● Feature present ○ Feature absent

Combination ramps are a set of ramps with both perpendicular and parallel components. A new combination ramp is recorded for each segment that is sloped in a different direction (see *Figure A-10*).

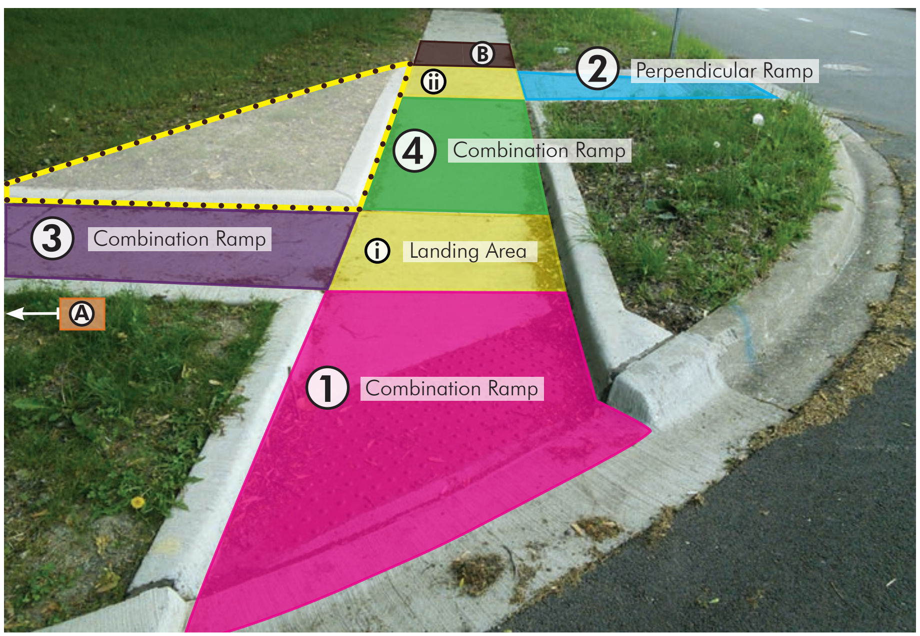

Figure A-11 **Three Combination Ramps and a Perpendicular Ramp**

Ramp	Left Approach	Right Approach	Landing Area
1 Combination Ramp	○	○	● i
2 Perpendicular Ramp	○	● B	● ii
3 Combination Ramp	● A	○	● i
4 Combination Ramp	○	● B	● ii

Ramp Components: ● Feature present ○ Feature absent

Returned curbs above the landing area often signal a set of combination ramps (see *Figure A-11*). In cases where a ramp is adjacent to a set of combination ramps but does not have upper and lower segments, this ramp is collected as a perpendicular ramp.

Figure A-12 **One Upper and Two Lower Combination Ramps**

Ramp	Left Approach	Right Approach	Landing Area
1 Combination Ramp	○	○	i
2 Combination Ramp	○	○	i
3 Combination Ramp	A	○	i

Ramp Components: ● Feature present ○ Feature absent

Some combination ramp sets include one upper (parallel) ramp and two lower (perpendicular) ramps (see *Figure A-12*). All of these ramps are collected with combination as the ramp type.

Figure A-13 **One Lower and Two Upper Combination Ramps**

Ramp	Left Approach	Right Approach	Landing Area
1 Combination Ramp	○	○	i
2 Combination Ramp	○	B	i
3 Combination Ramp	A	○	i

Ramp Components: ● Feature present ○ Feature absent

Some combination ramp sets include two upper (parallel) ramps but only a single lower (perpendicular) ramp (see *Figure A-13*). All of these ramps are collected with combination as the ramp type.

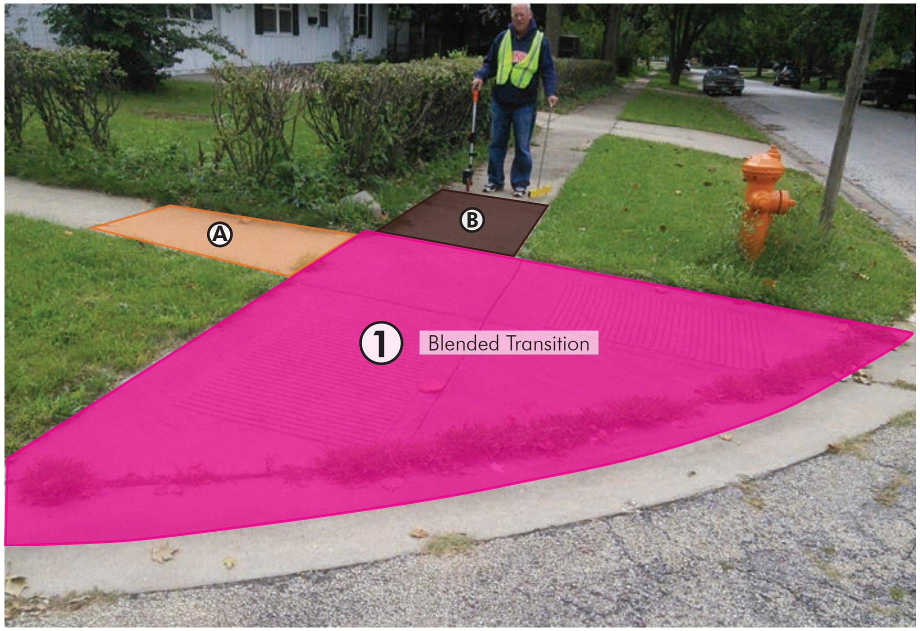

Figure A-14 **Blended Transition with Ambiguous Detectable Warnings**

Ramp	Left Approach	Right Approach	Landing Area
1 Blended Transition	A	B	○

Ramp Components: ● Feature present ○ Feature absent

At some corners, the geometry of the ramp suggests a blended transition, but the detectable warning surfaces indicate two parallel ramps. In such situations, the slope of the panel adjacent to the approaches is compared to the running slope of the panel with the detectable warning surface. If the slopes are similar, indicating a smooth transition from the approaches to the street, the entire corner is collected as a blended transition, as shown. If the slopes are significantly different, each panel with a detectable warning surface is collected as a perpendicular ramp, and the top panel is collected as the landing area.

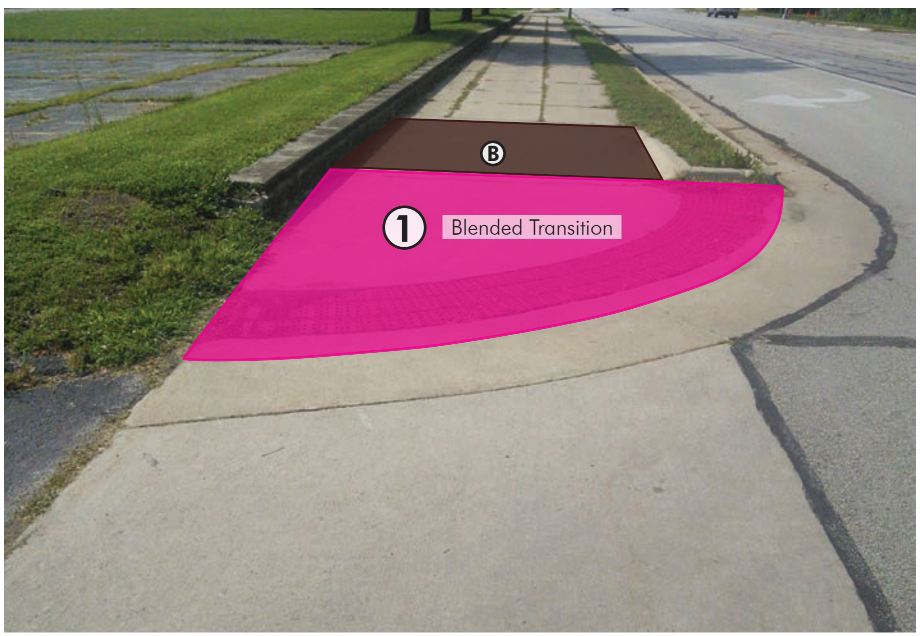

Figure A-15 **Blended Transition with a Single Approach**

Ramp	Left Approach	Right Approach	Landing Area
1 Blended Transition	○	B	○

Ramp Components: ● Feature present ○ Feature absent

In some cases, blended transitions may have only a single approach (see *Figure A-15*). The orientation of the shape of the feature and the direction of slope indicate that it is a blended transition rather than a perpendicular ramp.

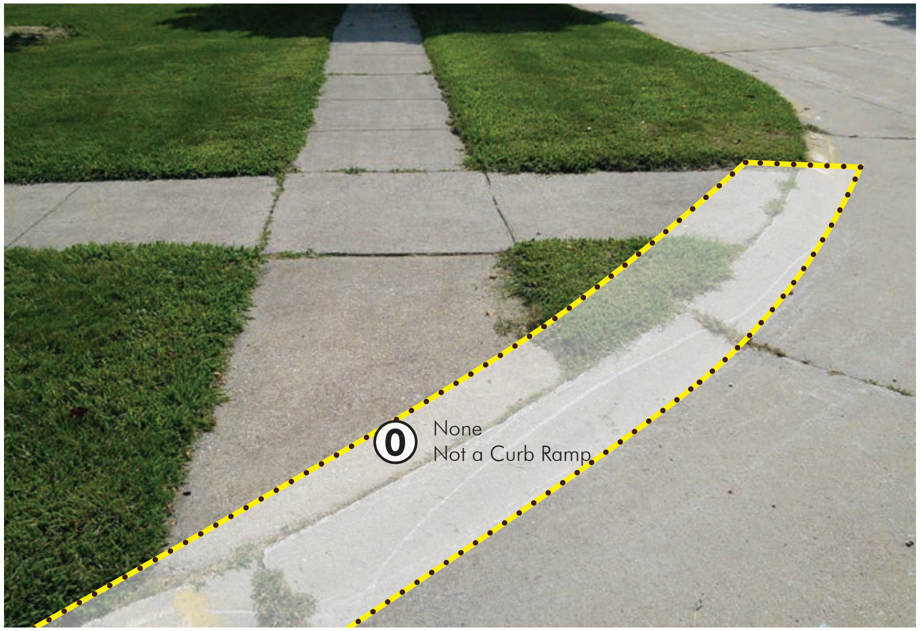

Figure A-16 **Non-Ramp Sidewalk Endpoints with a Low Curb**

Ramp	Left Approach	Right Approach	Landing Area
⓪ None (Not a Ramp)	○	○	○

Ramp Components: ● Feature present ○ Feature absent

Sidewalk endpoints that do not have any features of a ramp (returned curbs, detectable warning surfaces, etc.) are classified as non-ramp endpoints when a curb is present. This remains true even when the curb is relatively low (see *Figure A-16*). Such endpoints cannot be evaluated as ramps because the ADA compliance index does not take into consideration curb height, leading to an artificially high score.

B Funding Sources

Maintaining the sidewalk network in good condition and ensuring that features comply with PROWAG standards involves considerable expense for local agencies. Communities across the United States have employed a variety of tools to fund sidewalk maintenance and improvements, including:

- Bonds
- Special assessments
- Sidewalk millage
- Sales tax
- Property tax levies
- Federal programs

The sections that follow describe each of these funding sources and provide examples of communities that have used them to pay for sidewalk improvements. The referenced sources provide further information about how these programs have been used to fund sidewalk construction and maintenance.

Bonds

Local governments can sell municipal bonds to raise revenue for large capital expenses, such as installation or replacement of sidewalks. The bonds are paid off over a predetermined period of time, usually corresponding to the projected life of the infrastructure. General obligation bonds, the most common type, are paid from the municipality's general tax revenue.

BOULDER, CO

In 2011, Boulder, Colorado's Capital Improvements Bond for the West Pearl Streetscape Improvements was approved by voters with an estimated project cost of $1 million.[1] Improvements included widening sidewalks to accommodate patio seating, bus stops, American with Disabilities Act compliance measures and sidewalk amenities.[2] Also in 2011, Boulder voters approved a capital improvement bond of up to $49 million to finance transportation projects, including sidewalk replacement.[3]

DURHAM, NC

Voters in Durham, North Carolina approved two bond measures, in 2005 and 2007. Together, they raised $8.45 million, or about 86 percent of the city's funding for sidewalks, for sidewalk replacement and ADA improvements.[4]

LEE'S SUMMIT, MO

The City of Lee's Summit, Missouri raised almost $12 million in general obligation

1 "West Pearl Streetscape Improvements: Public Open House Meeting," City of Boulder, July 30, 2013, https://www-static.bouldercolorado.gov/docs/west-pearl-streetscape-improvements-meeting-presentation-1-201307300847.pdf.

2 "West End Improvements," City of Boulder, https://bouldercolorado.gov/bond-projects/downtown-commercial-district-improvements.

3 "A Guide for Maintaining Pedestrian Facilities for Enhanced Safety Research Report," Federal Highway Administration, 2013, http://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa13037/research_report/chap2f.cfm.

4 "A Guide for Maintaining Pedestrian Facilities."

bonds to fund sidewalk and curb ramp construction and replacement.[5] Recommendations for allocating the funding were part of the City's Public Sidewalk Inventory Analysis Report, as were recommendations for new bond funding.[6]

Special Assessments

Most municipalities place the burden of sidewalk maintenance on property owners. Special assessments, which increase property taxes for certain properties or districts, can help to distribute the costs of sidewalk network improvements among property owners that benefit from them.

ITHACA, NY

The City of Ithaca, New York is divided into five sidewalk improvement districts, which are used to allocate sidewalk funding. Each property within a district is given a special assessment based on the lot characteristics. The assessment includes an annual maintenance fee based on the amount of pedestrian traffic; a square footage fee based on the building size; and a frontage fee based on the lot's street frontage.[7]

MADISON, WI

With total sidewalk program of over $1 million, about one quarter of the funding for sidewalks in the City of Madison comes from special assessments.[8] The city requires property owners to pay the full cost of sidewalk replacements and half of the cost of sidewalk repairs.

Sales Tax

Sales taxes generate revenue by increasing the cost of goods. Most sales tax revenues are collected by states, but in some states, including Illinois, certain types of municipalities are authorized to impose sales taxes. Local sales tax revenues can be used to fund sidewalk network construction and improvements.

PINAL COUNTY, AZ

Pinal County imposed a half-cent sales tax in 1986 to address transportation issues, including sidewalk maintenance. In 2005, residents voted to re-approve the tax and to allocate resources toward street and roadway improvements, including sidewalk construction. From 1986 to 2005, the tax generated $107.7 million in revenue.[9] State funding from taxes on gasoline, as well as vehicle registration fees, also were allocated toward local sidewalk improvements.[10]

Sidewalk Millage

A millage is a special property tax designated for a particular purpose. Property owners are charged based on the assessed value of their property, increasing their overall tax liability.

ANN ARBOR, MI

Ann Arbor's Street Reconstruction Millage (0.125-mil) raised approximately $46 million between 2007 and 2011.[11] Households paid approximately $13 annually, on average, toward the millage.[12]

Property Tax Levies

Property tax levies are one of the primary funding mechanisms for local governments. Taxes levied on real property can be designated for particular purposes, such as constructing or repairing the sidewalk network.

SEATTLE, WA

In 2006, Seattle implemented a $356 million dollar levy, Bridging the Gap, to support transportation projects. Among other projects, the funding was used to restore, repair, or construct more than 300 blocks of sidewalk.[13] In 2015, Seattle voters approved Move Seattle, a replacement of the former levy, allocating $930 million dollars toward transportation efforts over the next nine years. The Move Seattle tax will cost a median household in Seattle approximately $275 per year.[14]

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5 "A Guide for Maintaining Pedestrian Facilities."

6 "Public Sidewalk Inventory Analysis Report," Burnes & McDonnell Engineering, August, 2009, http://www.cityofls.net/LinkClick.aspx?fileticket=rmLDOHOrpxo%3d&tabid=914.

7 "§ C-73: Sidewalk Improvement Districts," City of Ithaca Municipal Code, http://ecode360.com/28006366.

8 "A Guide for Maintaining Pedestrian Facilities."

9 Pinal County Transportation Excise Tax, Office of Auditor General, State of Arizona, 2006, http://www.azauditor.gov/sites/default/files/06-03_highlights.pdf.

10 "A Guide for Maintaining Pedestrian Facilities."

11 Street and Sidewalk Millage http://www.a2gov.org/departments/engineering/Pages/Street-and-Sidewalk-Millage.aspx

12 "A Guide for Maintaining Pedestrian Facilities."

13 "Bridging the Gap: Building a Foundation that Lasts," Seattle Department of Transportation, May 28, 2015, http://www.seattle.gov/transportation/bridgingthegap.htm.

14 "Transportation Levy to Move Seattle," Seattle Department of Transportation, January 4, 2016, http://www.seattle.gov/transportation/levytomoveseattle.htm,

Federal Programs

Passed by Congress in 2015, the Fixing America's Surface Transportation Act, or FAST Act, is the nation's current transportation funding legislation. The FAST Act establishes or extends several programs from the previous transportation bill that can be used to fund sidewalk construction and improvements.

SAFE ROUTES TO SCHOOL

The Safe Routes to School (SRTS) program is designed to create safer opportunities for children to walk or bike to school. The FAST Act extends funding for the SRTS program until 2020.[15]

SURFACE TRANSPORTATION BLOCK GRANT PROGRAM

The Surface Transportation Block Grant Program combines the former Surface Transportation Program and Transportation Alternatives Program.[16] It provides funding for transportation infrastructure, including pedestrian infrastructure.

CAPITAL INVESTMENT GRANTS

Capital Investment Grants provide funding for metropolitan transportation planning projects, including sidewalk accessibility. From 2016 to 2020, the General Fund is authorized to allocate more than $2.3 billion toward Capital Investment Grants.[17] This program, administered by the Federal Transit Administration, is designed to improve mobility for people with disabilities and seniors. Eligible activities include "traditional" transit services as capital. In addition, up to 45 percent of the funding can be used for "nontraditional" projects, including constructing sidewalks, curb ramps, and accessible pedestrian signals that serve a bus stop.[18]

15 " New Transportation Legislation Maintains SRTS Funding through 2020," National Center for Safe Routes to School, http://saferoutesinfo.org/about-us/newsroom/new-transportation-legislation-maintains-srts-funding-through-2020.

16 "Summary: FAST Act," U.S. House of Representatives Transportation and Infrastructure Committee, http://transportation.house.gov/uploadedfiles/highway_bill_conference_2-pager.pdf.

17 "Fixing America's Surface Transportation (FAST) Act," Association of Metropolitan Planning Organizations, December 2015, http://www.ampo.org/wp-content/uploads/2015/12/FAST-Summary-.pdf.

18 "Fact Sheet: Enhanced Mobility of Seniors and Individuals with Disabilities," Federal Transit Administration, http://www.fta.dot.gov/documents/5310_Enhanced_Mobility_of_Seniors_and_Disabled_Fact_Sheet.pdf.

C Assessment Resources

The Sidewalk Network Inventory and Assessment was designed for the Champaign Urbana Urbanized Area, but many of the tools developed for use in the assessment process can be applied in other communities. This appendix documents the technical tools and scripts published by CUUATS on GitHub, an open-source code sharing service.

CUUATS Data Model

https://github.com/cuuats/cuuats.datamodel

While not specific to the sidewalk inventory, this Python package is a dependency of several of the assessment scripts. It provides a lightweight data access layer for ArcGIS, allowing for the creation of declarative data models that correspond to geodatabase feature classes. The package is distributed as a Python egg and must be installed using pip or a similar tool.

Sidewalk Inventory

https://github.com/cuuats/sidewalk-inventory

The sidewalk inventory repository contains scripts used to clean, check, and analyze sidewalk network data. With the exception of the sidewalk gap analysis script, which requires PostGIS, all of the scripts are designed to run in an ArcGIS for Desktop environment using arcpy and cuuats.datamodel. The scripts were developed and tested using ArcGIS 10.2.2 but may also run on later versions of the ArcGIS platform.

The scripts in the sidewalk inventory repository include:

- **aggregate_results.py** – Aggregates the condition and compliance scores for all feature types to the provided polygons.
- **auto_qa.py** – Performs automated quality assurance on field data, updating the quality assurance status and comment fields.
- **datamodel.py** – Contains the data schema, quality assurance constraints, and scoring logic for each feature type.
- **gap_analysis.sql** – Identifies and analyzes missing sidewalk segments based on existing sidewalks and street centerlines (requires PostgreSQL/PostGIS).
- **production.py** – Stores references to the input and output feature classes for the analysis. Its settings are imported by the other scripts.
- **track_progress.py** – Calculates and logs the status of the data collection process by quality assurance status and sidewalk segment length.
- **update_scores.py** – Updates the compliance and condition scores for features based on the current field data.
- **utils.py** – Provides common utility functions used in the other scripts.

In a typical data collection workflow, *auto_qa.py* is run at the end of each data collection shift to verify the data, and *track_progress.py* is run at the end of the day to summarize overall progress. The other scripts are run as needed, usually when data collection and quality assurance are complete.