

# KFH GROUP, INC.

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## Arlington County, Virginia Americans with Disabilities Act Evaluation Study

*Final Report*

August, 2012

*Prepared for the:*

Metropolitan Washington Council of Governments

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# Chapter 1

## Americans with Disabilities Act (ADA) Standards and Guidelines

### INTRODUCTION

The ADA of 1990 provides civil rights protections to individuals with disabilities and prohibits discrimination with regard to services and accommodations provided by local and state governments. Currently, Arlington County is developing a Transition Plan to identify physical obstacles that limit accessibility and create a process for making the public right-of-way fully accessible.

As part of this effort, Arlington County hired KFH Group to evaluate the current conditions of sidewalks, curb ramps, and intersections within the Rosslyn-Buckingham transit corridor. The Study Area included the neighborhoods and Transit Oriented Developments (TODs) of Ballston, Buckingham, Clarendon, Court House, Rosslyn, and Virginia Square.

### OVERVIEW

Arlington County, Virginia has a long history of providing a high quality of life, due in part to a variety of transit options and attractive, walkable communities. One of the goals of the County's most recent Master Transportation Plan is to 'Move more people without more traffic'. A key component in achieving this goal is to ensure pedestrian facilities are accessible to all residents, including people with disabilities and mobility limitations.

Arlington is an established leader in following ADA guidelines for the public right-of-way. Since the U.S. Access Board's publication of the original Americans with Disabilities Act Accessibility Guidelines (ADAAG) in 1991, the County has ensured that all new or reconstructed pedestrian facilities meet or exceed the most up-to-date standards and best practices. The most recent standards for pedestrian facilities, which went into effect as of March 15, 2012, are included in the U.S. Department of Justice's 2010 ADA Standards for Accessible Design (2010 Standards).

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This document represents a significant step toward ensuring that all sidewalks, curb ramps, and crossings within the Study Area meet the 2010 Standards. This document contains four sections:

**Chapter 1** provides an overview of the specific design criteria that must be met to ensure compliance with the new standards. It will serve as a reference to County officials responsible for planning and constructing new or altered pedestrian facilities.

**Chapter 2** discusses the methodology used to assess pedestrian facilities within the Study Area. This chapter showcases the results of the assessment by individually categorizing curb ramps, pathways, and intersections into tiers based on their level of compliance with the standards discussed in Chapter 1. This tiered system will aid Arlington County in prioritizing improvements to the existing pedestrian facilities within the Study Area.

**Chapter 3** provides the recommended prioritization strategies for implementing accessibility improvements and addresses compliance issues documented in Chapter 2 and throughout the County. This section will assist Arlington County in establishing a “game plan” to repair and reconstruct pedestrian facilities in an efficient, systematic, and resource-sensitive manner.

**Chapter 4** provides a framework to assist Arlington County in the development of an ADA Transition Plan.

## STANDARDS AND GUIDELINES

### History

The first version of the ADAAG was published in 1991 to set accessibility guidelines to places of public accommodation and commercial facilities. However, this version of the ADAAG did not address requirements for public rights-of-way, with the exception of curb ramps and pedestrian refuge islands.<sup>1</sup>

In 1992, the U.S. Access Board proposed supplements to the ADAAG to address public right-of-way accessibility requirements. However, concerns were raised about how to fund and manage the reconstruction of significant portions of the existing right-of-way, thus stalling the effort. Finally, in 1999, a U.S. Access Board Committee revisited the ADAAG and proposed additional standards for public sidewalks, protruding objects, street fixtures and furniture, sidewalk-street transitions, pedestrian crossings, and vehicular ways and facilities. Based on the Committee recommendations regarding these specifications, the U.S. Access Board published an updated version of the ADAAG in 2004. In July 2011, the Access Board

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<sup>1</sup> [http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/20-07\(249\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/20-07(249)_FR.pdf), pgs. 2-5.

published *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way*. As of July 2012, these guidelines have not been finalized.

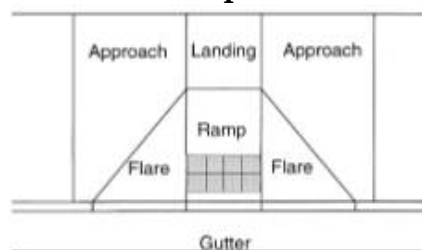
As an ongoing effort to enforce implementation of ADA requirements, the United States Department of Justice (DOJ) published the 2010 Standards. This document sets minimum accessibility requirements for newly designed or altered state and local government facilities, public accommodations, and commercial facilities. Chapter 4 of the 2010 Standards document includes the 2004 ADAAG that dictate accessibility standards for public services and accommodations, including public rights-of-way. According to the DOJ, all new or altered state and local government facilities beginning construction on or after March 15, 2012 must follow the requirements of the 2010 Standards.

The following section will describe accessibility standards and guidelines in greater depth, focusing on the specific components of curb ramps, pathways, and intersections. It pulls information from guidance documents produced by the Federal Highway Administration (FHWA), the DOJ, and the U.S. Access Board.

## Curb Ramps

Curb ramps provide transitions at points of elevation change between the sidewalk and street, as shown in Figure 1-1. These transitions help people with mobility and vision disabilities maneuver and navigate between the sidewalk level and the street level when curbs are present. There are generally six types of curb ramps. These include perpendicular, diagonal, parallel, combination, built-up, and depressed corners. Each type of curb ramp has advantages and disadvantages and the appropriate use of any one type will largely depend on the context of the area.

**Figure 1-1: Basic Components of Curb Ramp**



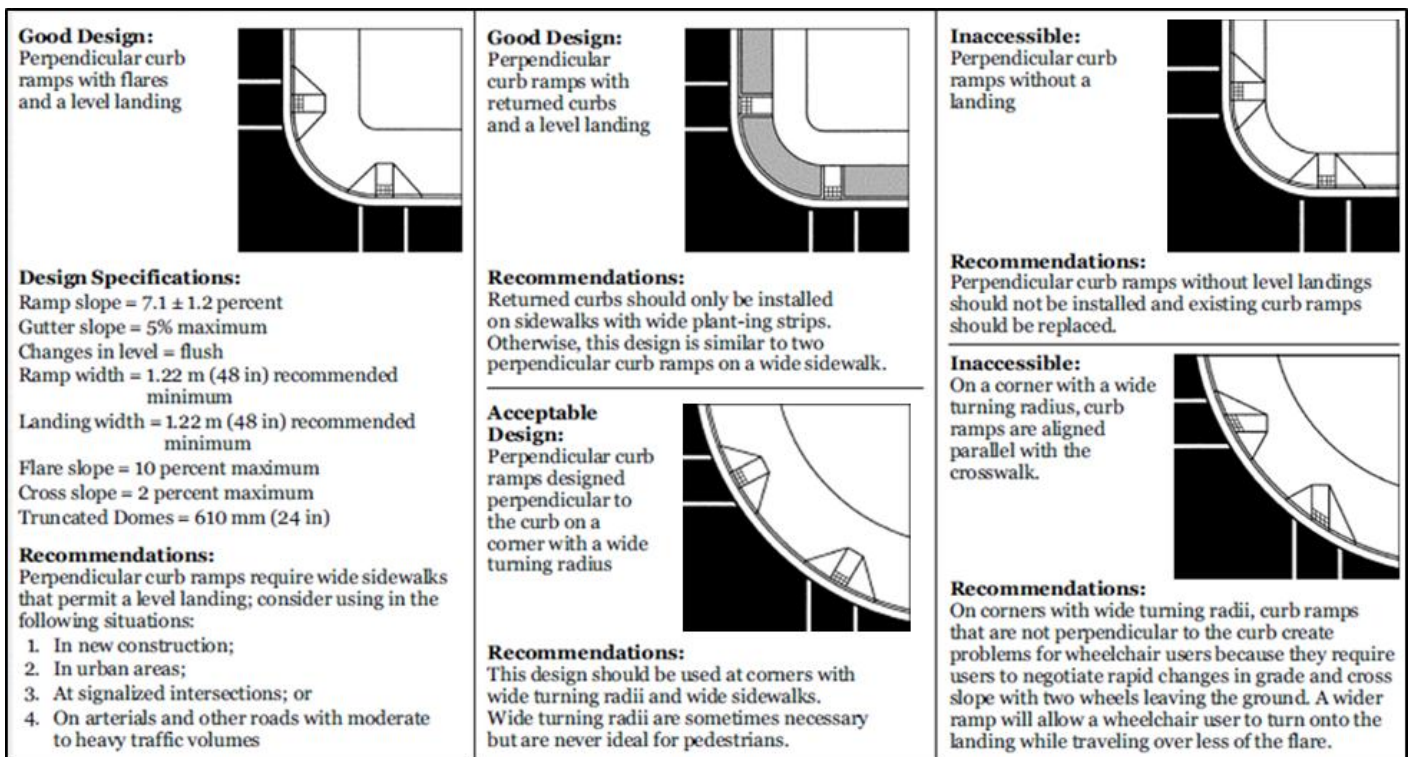
Source: FHWA.

As shown in Figure 1-1, the basic components of a curb ramp include the ramp itself, a level landing at the top of the ramp, an approach to the landing (flanking the landing from both sides of the connecting sidewalk), and a flare (flanking both sides of the ramp) that provides a graded transition from the ramp to the approach.

*Types of Ramps*

**Perpendicular Curb Ramps:** These ramps are generally perpendicular to the curb and lead pedestrians to travel perpendicular to vehicular traffic when entering the street. Perpendicular ramps should be installed with level landings at the top of the ramp to provide adequate space for users with limited mobility to move off the ramp before turning to proceed along the sidewalk (as shown in Figure 1-2). Figure 1-3 provides an example of a perpendicular ramp in Arlington.

**Figure 1-2: Perpendicular Curb Ramps**



Source: FHWA.

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**Figure 1-3: Perpendicular Curb Ramps in Arlington, VA**

Source: KFH Group.

### Advantages

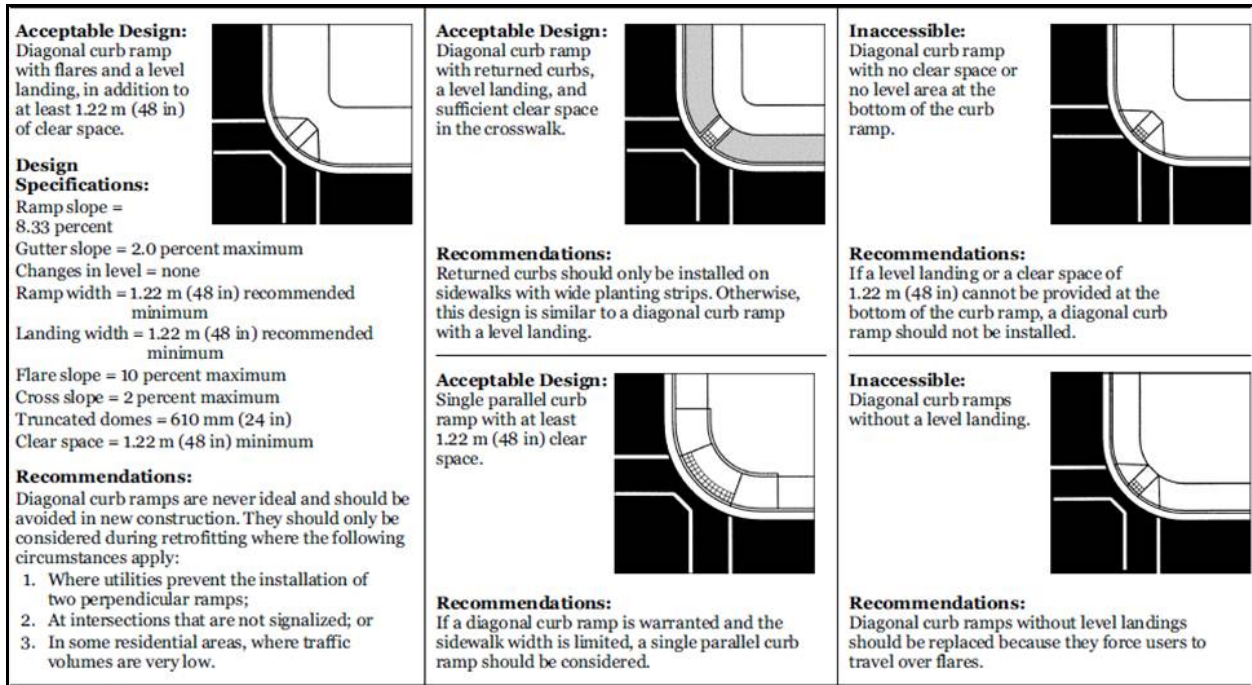
- Aligns perpendicular to vehicular traffic
- Provides a straight path of travel on tight radius corners
- Aligns with the crossing direction on tight radius corners
- Usually positioned with the crosswalk
- At the expected crossing location for all pedestrians

### Disadvantages

- More expensive than a single diagonal ramp
- Does not provide a straight path on large radius corners
- Requires a wide sidewalk corridor or curb extension to accommodate curb ramp and level landing

**Diagonal Curb Ramps:** A diagonal curb ramp is a single ramp located at the apex of the corner of an intersection. The alignment of these ramps leads diagonally into the center of the intersection. These ramps are only appropriate if a level landing or maneuvering space is provided at the top *and bottom* of the ramp. Figure 1-4 provides an example of a diagonal curb ramp that provides a bottom landing within the crosswalk. This design allows individuals in wheelchairs to maneuver within the crosswalk, ideally outside of the path of traffic moving parallel to the desired crossing. Figure 1-5 provides an example of a diagonal curb ramp.

Figure 1-4: Diagonal Curb Ramps



Source: FHWA.

Figure 1-5: Diagonal Curb Ramp with Room to Maneuver Within the Crosswalk in Arlington, VA



Source: KFH Group.

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### Advantages

- Requires less space because there is only one ramp per corner
- Less expensive for alterations
- Normal path of travel intersects a curb rather than a ramp, thus enhancing detectability of transition into the street for people with vision impairments

### Disadvantages

- Pedestrians may be in an area of conflict with motorists traveling straight and/or turning
- Requires directional change at the top and bottom of the ramp
- Provides no alignment with proper crossing direction
- Makes the essential level maneuvering area difficult to achieve at bottom of ramp
- May cause visually impaired person to unintentionally travel into the middle of the intersection

**Parallel Curb Ramps:** A parallel curb ramp has two ramps leading down toward a level landing at the bottom between the ramps and level landings at the top of each ramp. These ramps are oriented so that the path of pedestrian travel on the ramp is parallel to vehicular traffic on the adjacent street. These ramps are frequently installed on narrow sidewalks where additional right-of-way is not available for landings. The landing at the bottom of parallel ramps is at street level, but must be sloped to prevent accumulation of water. Figure 1-6 provides an example of a parallel curb ramp.

**Figure 1-6: A Parallel Curb Ramp at an Intersection in Arlington, VA**



Source: KFH Group.

**Advantages**

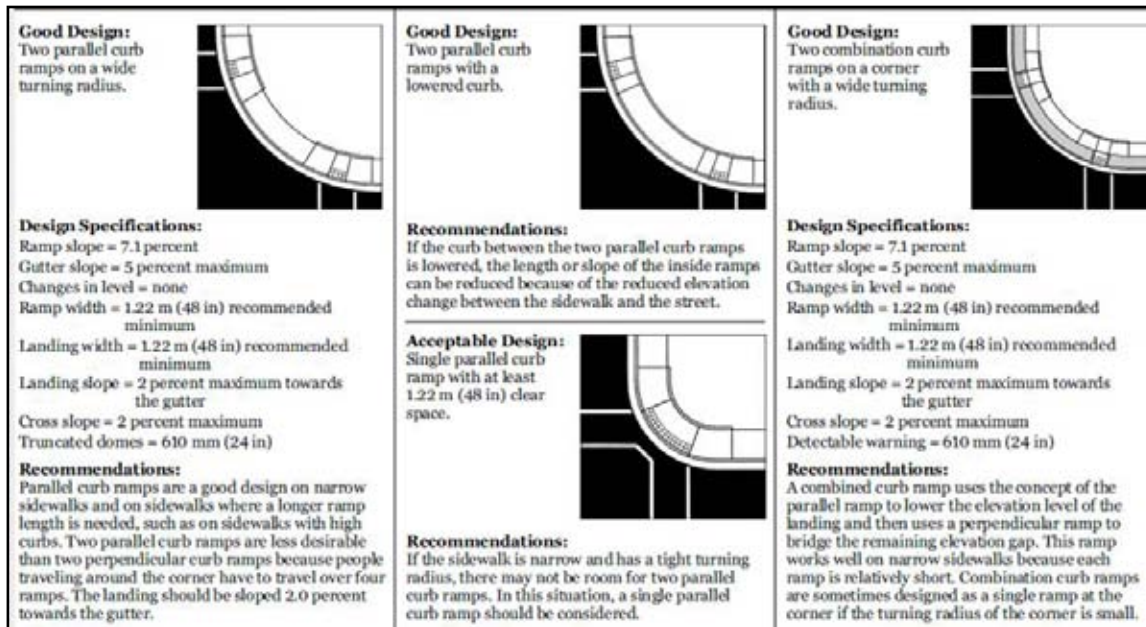
- Requires minimal right-of-way
- Enhances detectability of boundary between ramp and roadway because ramp ends at a landing not in the street
- Allow ramps to be extended to reduce ramp grades
- Provides level turning and maneuvering area at top and bottom of ramp
- Provides clearly defined edges on sides of ramp for people with visual impairments

**Disadvantages**

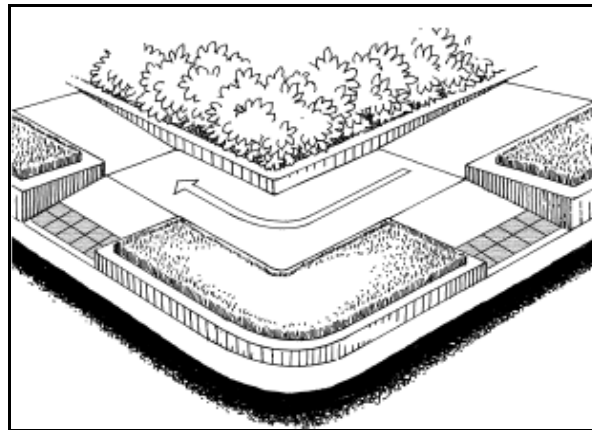
- Requires users continuing along sidewalk to negotiate two ramp grades
- Requires careful attention to the construction of the landing at the bottom of ramp to limit accumulation of water and/or debris

**Combined Parallel and Perpendicular Curb Ramps:** A combined ramp utilizes characteristics of both parallel and perpendicular ramps. These ramps use the concept of a parallel ramp to lower the elevation level of the landing, and then use a perpendicular ramp to bridge the remaining elevation gap down to the street. Combination curb ramps are useful in situations where the sidewalk is narrow, has a steep grade, or a high curb. Specifications of combination and parallel ramps are provided in Figure 1-7. A graphic picture of a combination curb ramp is shown in Figure 1-8.

**Figure 1-7: Parallel and Combination Curb Ramps**



Source: FHWA.

**Figure 1-8: Graphic of Combination Curb Ramp**

Source: FHWA.

### Advantages

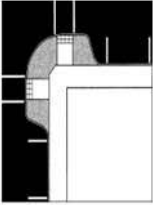
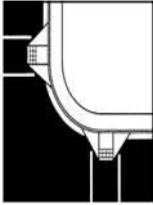
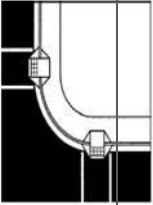
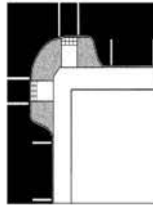
- Provides level of maneuvering areas at top and bottom of the ramps
- Provides connection to the street within the marked crosswalk
- Aligns with proper crossing direction
- Provides adequate drainage to limit the accumulation of water or debris

### Disadvantages

- Generally requires more space than a parallel curb ramp
- Requires more extensive alterations for installation in retrofit situations
- Requires users continuing along the sidewalk to negotiate the parallel ramps

**Built-up Curb Ramps and Curb Extensions:** Built-up ramps project from the curb into the street or parking lot. There are numerous pedestrian safety problems associated with built-up curb ramps when they are installed independently of curb extensions. They are not commonly installed at intersections, but are frequently installed in parking lots. It is typically not desired to have built-up curb ramps extend into the roadway unless they are associated with a curb extension (see graphics in Figure 1-9). In this instance, curb extensions provide space for curb ramps, shorten crossing distances, and the slow speed of turning vehicles.

Figure 1-9: Built-up Curb Ramps and Curb Extensions

<p><b>Good Design:</b> A curb extension with two perpendicular curb ramps with returned curbs and level landings.</p>  <p><b>Design Specifications:</b> Ramp slope = <math>7.1 \pm 1.2</math> percent Gutter slope = 5 percent maximum Changes in level = flush Ramp width = 1.22 m (48 in) recommended minimum Landing width = 1.22 m (48 in) recommended minimum Flare slope = 10 percent maximum Cross slope = <math>2 \pm 0.9</math> percent maximum Detectable warning = 610 mm (24 in)</p> <p><b>Recommendations:</b> Two perpendicular curb ramps built on a curb extension should be installed whenever possible. The curb extension provides additional room for a level landing, increases pedestrian visibility, and reduces motorist turning speeds. Curb extensions also prevent parked cars from blocking the curb ramp.</p>	<p><b>Acceptable Design:</b> Two built-up curb ramps.</p>  <p><b>Design Specifications:</b> Ramp slope and roadway = 8.33 percent Gutter slope = 2 percent maximum Changes in level = flush Ramp width = 1.22 m (48 in) recommended minimum Landing width = 1.22 m (48 in) recommended minimum Flare slope = 10 percent maximum Cross slope = 2 percent maximum Detectable warning = 610 mm (24 in)</p> <p><b>Recommendations:</b> Two built-up curb ramps work well on narrow sidewalks when parallel ramps and curb extensions will not work. However, the pedestrian is more exposed and less visible to motorists. If built-up curb ramps are used, they should only be installed on streets with a parking lane and must not interfere with bicycle travel. More designing and retrofitting of this curb ramp style may be required, such as dropping the sidewalk, building up the crosswalk area, and blending the flares into the gutter area.</p>	<p><b>Acceptable Design:</b> Partially built-up curb ramps.</p>  <p><b>Design Specifications:</b> Ramp slope and roadway = 8.33 percent Gutter slope = 2 percent maximum Changes in level = flush Ramp width = 1.22 m (48 in) recommended minimum Landing width = 1.22 m (48 in) recommended minimum Flare slope = 10 percent maximum Cross slope = 2 percent maximum Detectable warning = 610 mm (24 in)</p> <p><b>Recommendations:</b> Partial built-up curb ramps are similar to built-up curb ramps, but the ramp is installed partially on the sidewalk and partially in the gutter. This type of ramp is primarily recommended for use on sidewalks where available space is lacking and a slightly longer ramp is needed.</p>	<p><b>Good Design:</b> A curb extension with two perpendicular curb ramps with returned curbs and level landings.</p>  <p><b>Design Specifications:</b> Ramp slope = 7.1 percent Gutter slope = 5 percent maximum Changes in level = none Ramp width = 1.22 m (48 in) recommended minimum Landing width = 1.22 m (48 in) recommended minimum Flare slope = 10 percent maximum Cross slope = 2 percent maximum Detectable warning = 610 mm (24 in)</p> <p><b>Recommendations:</b> Two perpendicular curb ramps built on a curb extension should be installed whenever possible. The curb extension provides additional room for a level landing. The bottom of the ramp is often in a more level landing area, increases pedestrian visibility, and reduces motorist turning speeds. Curb extensions also prevent parked cars from blocking the curb ramp.</p>
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Source: FHWA.

### Advantages (when installed with curb extensions)

- Shorten distance of pedestrian crossing
- Slow speeds of turning vehicles

### Disadvantages

- Users are exposed to motorists in the roadway
- No clear boundary exists between the ramp and the street
- Adequate drainage may be difficult or may require extensive alteration to the gutter or street
- Must be protected by a parking lane (bollards and concrete curbing should be placed around the curb ramp flares)
- If flares are built-up, they can require more maintenance, especially if driven over by cars
- May intrude on space for cyclists

**Depressed Corners:** Depressed corners gradually lower the level of the sidewalk to meet the grade of the street. They are often designed as an expanded diagonal curb ramp that extends around the entire corner of the intersection as shown in Figure 1-10.

Figure 1-10: Example of Depressed Corner



Source: KFH Group.

### Advantages

- Give the illusion that the sidewalk and street are a unified pedestrian space

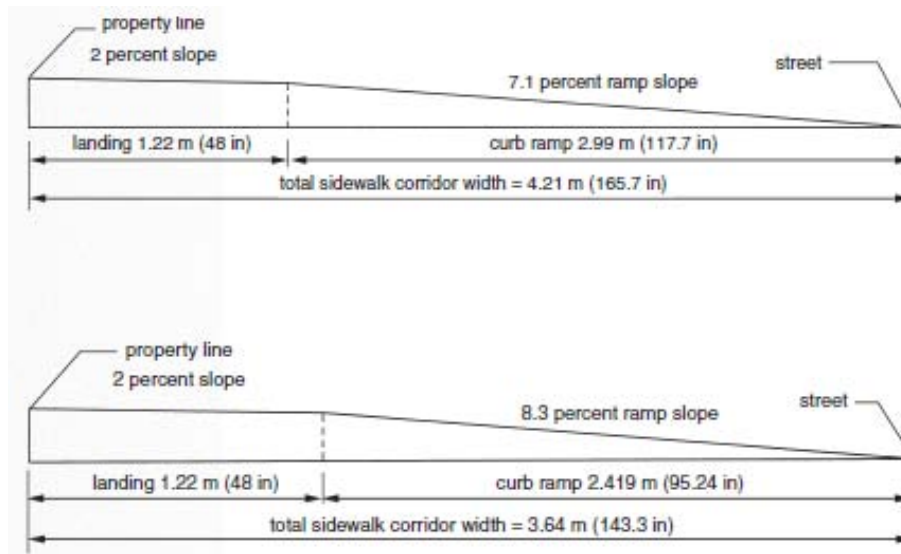
### Disadvantages

- Enable large trucks to travel onto the sidewalk to make tight turns
- Make it more difficult to detect the boundary between the sidewalk and the street
- Guide animals may not distinguish the boundary and continue walking
- May encourage motorists to drive on the sidewalk or make turns at higher speeds

### *Specifications of Ramps*

**Ramp Grade:** For new construction, the 2010 Standards permit a maximum curb ramp slope of 8.3%. In practice, 8.3% is frequently used as the design standard and does not allow for construction tolerances. Therefore, the FHWA recommends a grade of 7.1% to allow a construction tolerance. Figure 1-11 provides profiles of ramps with 7.1% and 8.3% slopes, respectively.

Figure 1-11: Ramp Profiles for Slopes of 7.1% and 8.3%



Source: FHWA.

In *retrofitting* situations, when it is not possible to design a curb ramp with a slope of 8.3% or less, the 2010 Standards specifies the following slopes are acceptable for the given distances:

- A slope greater than 8.3%, but not steeper than 10% is permitted for a maximum of six inches;
- A slope greater than 10%, but not steeper than 12.5% is permitted for a maximum of three inches;
- Slopes steeper than 12.5% are prohibited.

**Ramp Cross Slope:** The design specification of curb ramp cross slopes should not exceed 2%.

**Ramp Width:** The recommended minimum curb ramp width is 48 inches. When 48 inches is not possible, the width of the ramp may be reduced to 36 inches. Curb ramps with a width less than 36 inches do not provide enough space for people with wheelchairs or other assistive devices.

**Ramp-Street Interface:** A sudden change in grade could cause those traveling in wheelchairs to fall forward or backward. In order to avoid hazardous conditions caused by abrupt changes in grade, curb ramps should be designed with gradual slope changes whenever possible. According to the 2010 Standards, counter slopes of adjoining gutters and road surfaces adjacent to the curb ramp shall not exceed 5%. Figure 1-12 displays the ramp-street interface with an adjoining surface slope of 1:20.

**Figure 1-12: Counter Slopes at Ramp-Street Interface**



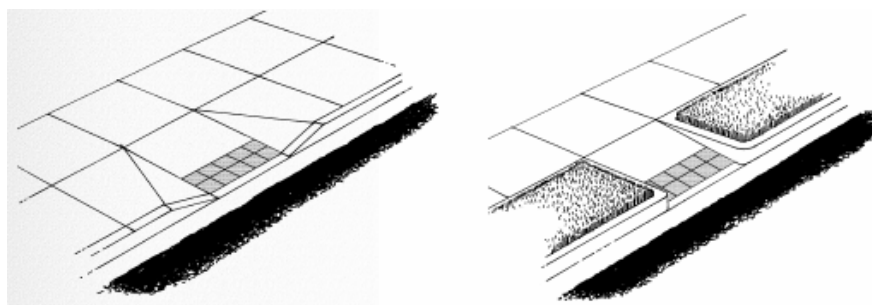
Source: 2010 Standards.

**Flares:** Flares are the sloped sides of a curb ramp that provide transition between the sidewalk and ramp. They provide a gradual transition between the curb ramp and sidewalk. They are most common on diagonal and perpendicular curb ramps. When present, curb ramp flares should not exceed a slope of 10%. When landings are less than 48 inches, the maximum slope of flares should be 8.3% (12:1).

**Returned Curbs:** A returned curb is the vertical transition area between the curb ramp and the sidewalk or buffer area. Whereas flares provide a gradual transition, returned curbs provide an abrupt change.

Figure 1-13 displays the difference between flares and returned curbs. Returned curbs have several advantages over flares for the following reasons:

**Figure 1-13: Flares (left) and Returned Curbs Provide Transitions Between Sidewalks and Curb Ramps**



Source: FHWA.

### Advantages of Returned Curbs over Flares

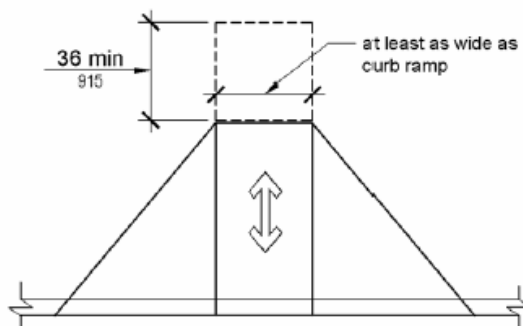
- The edges of the curb ramp are more clearly defined and easier to detect by people with visual impairments

- Posts for pedestrian signals can be positioned closer to the curb ramp
- Returned curbs channel water and debris to the bottom of the ramp more effectively
- A returned curb is less expensive to construct

Returned curbs present a tripping hazard when pedestrians walk across the ramp. For this reason, returned curbs are only preferred when the curb ramp is located in a planting strip or the clear path of travel is not adjacent to the side of the ramp.

**Landings:** Landings should be provided at the top of diagonal and perpendicular curb ramps to provide a flat area to maneuver before proceeding along a sidewalk. Landings should also be provided at the bottom of diagonal curb ramps within marked crosswalks. According to the 2010 Standards, the landing clear width shall be at least as wide as the curb ramp and the landing clear length shall be a *minimum* of 36 inches with a preferred length of at least 48 inches. When possible, the slope of a landing should not exceed 2% in any direction. Figure 1-14 provides the minimum specifications for landings at the top of curb ramps.

**Figure 1-14: Minimum Specifications for Landings**



Source: 2010 Standards.

**Transition Detection:** Truncated domes assist people with visual impairments in detecting the transition between the sidewalk and the street. These detectable warning devices should be placed at the bottom of the curb ramp to give warning of the street edge.

### Pedestrian Crossings/Intersections

Pedestrian crossings are any location where a pedestrian may leave the sidewalk and cross a vehicular path of travel. These include street intersections and midblock crossings. The proper design of pedestrian crossings involves the correct layout of many elements including:

- Signs, signals, and markings
- Turning radius
- Crosswalks

- Crossing times
- Medians and pedestrian refuge islands
- Curb ramps
- Sight lines
- Traffic patterns

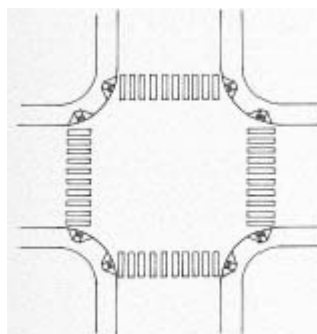
Because of the limited scope of the study, not all of the elements listed above were surveyed and assessed. The elements that were surveyed and assessed are pedestrian signals, crosswalks and medians, and pedestrian refuge islands. Below is a brief description of the specifications of these three elements.

### *Specifications of Selected Pedestrian Crossing Elements*

**Pedestrian Signals:** Pedestrian signals provide information that assist pedestrians in determining when it is safe to cross an intersection or midblock crossing. Pedestrian signals may be automatic or user activated. When signals are user activated, the activation button shall be accessible from a level space connected to the path of travel with dimensions of 30 inches by 48 inches. According to the Manual of Uniform Traffic Control Devices (MUTCD) Section 4E.08, user activated buttons should be mounted at a height of approximately 42 inches above the sidewalk. Audible pedestrian crossings improve safety for those with visual impairments by emitting a series of tones or verbal commands based on the various pedestrian intervals.

**Crosswalk Markings:** Crosswalk markings define the pedestrian path of travel across an intersection or midblock crossing. Marked crosswalks should be designed in accordance with the MUTCD. Continental (ladder) markings are recommended because research indicates they are most visible to motorists (Knoblauch et al. 1988). This design is created using white lines at a 90 degree angle to the line of the crosswalk. A diagram of continental markings is shown in Figure 1-15.

**Figure 1-15: Continental (ladder) Markings at an Intersection**



Source: FHWA.

The markings should be between 12 and 24 inches wide and spaced 12 to 24 inches apart (USDOT, 1988).

**Medians and Pedestrian Refuge Islands:** Medians are the portion of a divided roadway that separates vehicle traffic heading in opposite directions. Refuge islands are installed between the independent right turn lane (slip lane) and the normal intersection through lanes. Medians and refuge islands assist pedestrians by reducing crossing distance, providing a place of relative safety, and allowing pedestrians to focus on one direction of vehicle traffic at a time. Where applicable, medians and refuge islands should include ramps that do not exceed a slope of 8.3% (12:1). In addition, a level area with a width of 36 inches and length of 48 inches is required. The median should be at least 72 inches to provide adequate refuge for those in wheelchairs or those travelling with strollers or bicycles. Truncated domes should be placed to help identify the edge of the median for those with visual impairments. Figure 1-16 provides an example of a wide median with truncated domes.

**Figure 1-16: Wide Median with Truncated Domes**



Source: KFH Group.

## Pathways

Pathway specifications are largely governed by Chapter 3 of the 2010 Standards. According to the 2010 Standards, pathways should follow technical requirements pertaining to sidewalk width, cross slopes, vertical changes, surface gaps, obstructions, and protrusions.

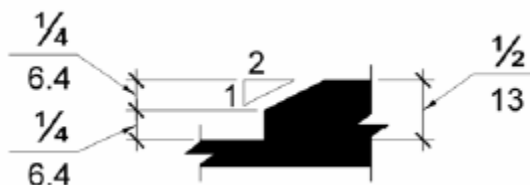
## Specifications

**Sidewalk Width:** According to the U.S. Access Board's *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way*, the continuous clear width of pedestrian access routes shall be a minimum of four feet, exclusive of the width of the curb.<sup>2</sup>

**Cross Slope:** A cross slope is the slope of the pathway perpendicular to the direction of travel. According to the 2010 Standards, cross slopes should be 2% or less.

**Vertical Change:** This feature defines the vertical elevation change at a given point. The 2010 Standards permit vertical changes up to one-quarter inch. Changes one-quarter inch and up to one-half inch should be beveled with a slope no greater than 50% (1:2). Figure 1-17 demonstrates a beveled change in level.

**Figure 1-17: Beveled Change in Level**



Source: 2010 Standards.

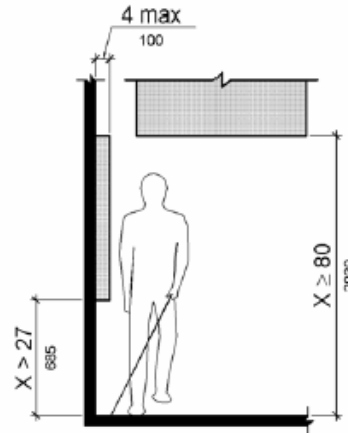
**Surface Gaps:** Surface gaps in the pathway surface can hinder travel by those with mobility limitations by catching the tips of crutches, walkers, or narrow wheels of a wheelchair. The 2010 Standards require a maximum opening of one-half inch in one direction for metal grates within pathways. The elongated opening in grates also must be placed so that the long dimension is perpendicular to the dominant direction of travel. The 2010 Standards do not specifically address openings or gaps other than gratings, such as those between concrete pavers, but it recommends that gaps or openings wider than one-half inch should be avoided, particularly when they run parallel to the normal direction of travel.

**Obstructions:** Obstructions are objects that impede pedestrian travel. When obstructions reduce the effective walk path to less than 36 inches, individuals travelling in wheelchairs may be unable to proceed. Common obstructions include sign posts, utility poles, traffic signal poles, fire hydrants, and raised or broken sidewalk panels.

<sup>2</sup> United States Access Board Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way, R302.3 Released July 26, 2011.

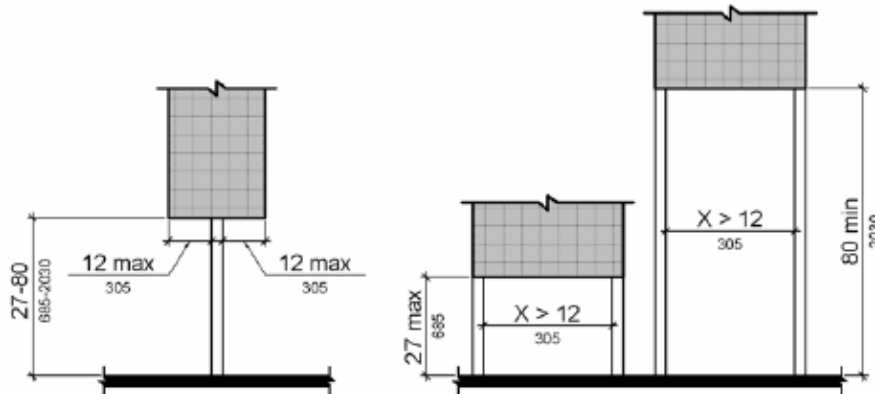
**Protruding Objects:** Objects attached to buildings with leading edges between 27 and 80 inches above the ground should not protrude more than four inches horizontally into the path of travel. Figure 1-18 provides a visual graphic of protrusion specifications that are attached to buildings. Handrails are permitted to protrude four and one-half inches. Free-standing objects mounted on posts may overhang the pathway no more than 12 inches with edges at or above 27 inches and up to 80 inches above the ground. The images in Figure 1-19 display technical specifications for signs along pathways.

**Figure 1-18: Protrusion Specifications**



Source: 2010 Standards.

**Figure 1-19: Specifications for Signs along a Pathway**



Source: 2010 Standards.

**Driveways:** Driveway crossings should be designed for pedestrian safety. When the ramp for the vehicle crosses the pedestrian’s path of travel, the person with limited mobility may have difficulty navigating the cross slope. Figure 1-20 shows an example of an inaccessible driveway with a severe cross slope. According to the 2010 Standards, a driveway crossing should maintain a level surface for pedestrians. Where possible, a driveway crossing should be raised to be level with the pathway. Figures 1-21a and 1-21b provide examples of

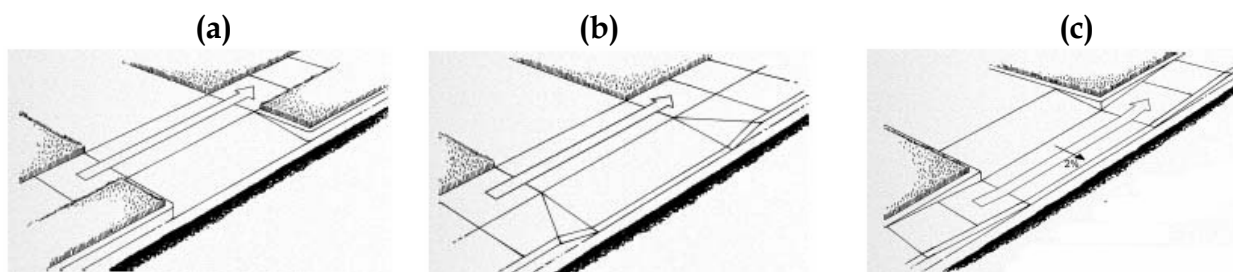
driveway designs that maintain a level surface for pedestrians. If space does not permit a level surface, parallel ramped driveway crossings may be used. Figure 1-21c provides an example of a parallel ramped driveway crossing. In all cases, cross slopes should not exceed 2% and when necessary, flares leading to the driveway crossing should not exceed 8.3%.

**Figure 1-20: Inaccessible Driveway Crossing with Severe Cross Slope**



Source: KFH Group.

**Figure 1-21: Preferred Designs for Driveway Crossings**



Source: FHWA.

The preceding chapter provided a brief history of the origin of the 2010 Standards and an overview of the technical specifications that are required for curb ramps, pathways, and pedestrian crossings. The following chapter explains the methodology undertaken to assess and prioritize improvements to these elements within the Arlington County Study Area.



## Chapter 2

# Existing Conditions

### METHODOLOGY

KFH Group surveyed and evaluated all curb ramps, sidewalks, and intersections in the Rosslyn-Buckingham corridor for compliance with ADA requirements. Figure 2-1 provides an overview of the study area. A total of 1,661 curb ramps, 1,052 sidewalk segments (69 miles), and 890 intersection segments were assessed. The evaluation included the following phases: 1) data collection; 2) database analysis; and 3) categorization and classification.

### DATA COLLECTION

The data collection phase spanned February to April, 2012. Teams of surveyors were equipped with inclinometers, measuring tapes, digital cameras, personal digital assistants, and Trimble GPS units. Evaluation of the curb ramps, pathways, and intersections was based on the technical standards provided within the DOJ's *2010 ADA Standards for Accessible Design* (2010 Standards), the Access Board's *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way* (2011), and the guidelines within Chapter 7 of the FHWA's *Designing Sidewalks and Trails for Access: Best Practices Design Guide*. Photos were also taken to further document compliance issues and assist in the evaluation process.

### DATABASE ANALYSIS

The database of curb ramps, sidewalks, and intersections was maintained and updated daily during the course of the data collection phase. Post processing was necessary to correct GPS data and perform quality checks. Analysis was undertaken following the completion of data collection. Results for curb ramps, sidewalks, and intersections were separated into individual database tables and analyzed separately based upon the 2010 Standards.

Figure 2-1: Study Area Overview



## CATEGORIZATION AND CLASSIFICATION

The categorization and classification phase took place following a thorough review of the data including a quality assurance and quality control period. A tiered categorization system, based on the most recent standards and guidelines for public rights-of-way, was developed individually for each component of a pedestrian facility (i.e. curb ramps, sidewalks, and intersections). The tiers can range from Tier 1 to Tiers 4 or 5 with Tier 1 being the least accessible and Tiers 4 or 5 being the most accessible. Each tier describes whether the pedestrian facility is classified as Non-Compliant and Non-Functional, Non-Compliant but Functional, and Compliant. The classification Non-Compliant and Non-Functional describes a completely inaccessible pedestrian facility. For example, an obstruction or a curb ramp that was less than 36 inches wide would be considered non-compliant and non-functional. The classification Non-Compliant but Functional describes a pedestrian facility that while it does not comply with current accessibility standards and guidelines it may still be functional. For example, sidewalk or curb ramp cross slope issue would be considered non-compliant but functional. Table 2-1 below provides an outline of the tiered categories along with its associated classification for each type of pedestrian facility surveyed.

**Table 2-1: Tiered Categorization and Classification System**

Curb Ramp		Sidewalk		Intersection	
Tier	Curb Ramp Classification	Tier	Sidewalk Classification	Tier	Intersection Classification
Tier 1	Non-Compliant/ Non-Functional	Tier 1	Non-Compliant/ Non-Functional (many issues)	Tier 1	Non-Compliant/ Non-Functional (many issues)
Tier 2	Non-Compliant/ Functional (many issues)	Tier 2	Non-Compliant/ Non-Functional (fewer issues)	Tier 2	Non-Compliant/ Non-Functional (fewer issues)
Tier 3	Non-Compliant/ Functional (fewer issues)	Tier 3	Non-Compliant/ Functional (many issues)	Tier 3	Non-Compliant/ Functional (many issues)
Tier 4	Compliant	Tier 4	Non-Compliant/ Functional (fewer issues)	Tier 4	Non-Compliant/ Functional (fewer issues)
-	-	Tier 5	Compliant	Tier 5	Compliant

Curb ramps were categorized into four tiers with Tiers 2 and 3 both classified as non-compliant but functional. This was done to provide further insight on curb ramps that had many (Tier 2) of its elements that were non-compliant and ones that only had a few (Tier 3) elements that were non-compliant. Sidewalks and intersections were categorized into five tiers with Tiers 1 and 2 both being classified as Non-Compliant and Non-Functional, and Tiers 3 and 4 classified as Non-Compliant but Functional. Within each classification grouping, the smaller numbered tier indicates a location where there are many issues while the larger numbered tier indicates a location where there are fewer issues pertaining to that classification. More information is provided below in the curb ramp, sidewalk, and intersection sections. This categorization and classification system will assist the County in prioritizing improvements that are necessary to comply with the 2010 Standards and other recommended guidelines found in the sources mentioned in Chapter 1.

## **CURB RAMPS**

The following section provides the results of the curb ramp survey. Extensive fieldwork was undertaken to document the conditions of all curb ramps within the study area. This included assessment of curb ramps at intersection crossings, mid-block crossings, and curb ramps at driveway crossings. The following attributes of curb ramps were surveyed and recorded:

- Type of curb ramp
- Ramp width
- Running slope
- Cross slope
- Flare slope
- Presence of landing
- Landing running slope
- Landing cross slope
- Presence and placement of bottom landing
- Presence of truncated domes

### **Curb Ramp Categorization System**

For the purpose of this report, the study team developed a four-tier system for categorizing curb ramps within the study area. This tiered system demonstrates the level of compliance with 2010 Standards as well as the functionality for a majority of users with limited mobility. Every curb ramp within the study area was designated as one of the following:

- Tier 1: Non-Compliant and Non-Functional
- Tier 2: Non-Compliant but Functional (many issues)
- Tier 3: Non-Compliant but Functional (fewer issues)
- Tier 4: Compliant and Functional

Figure 2-2 is a visual representation of the 1,655 curb ramps in the study area categorized by tier. Curb ramps that received a categorization of Tier 1 are dark red while curb ramps receiving a categorization of Tier 4 are green. This system is meant to clearly demonstrate the level of improvements necessary to become compliant with 2010 Standards.

### *Tier 1: Non-Compliant and Non-Functional*

The classification Non-Compliant and Non-Functional represents the curb ramps that are not compliant with 2010 Standards and are not functional for a user with disabilities. These are the curb ramps that will require the most improvements to meet 2010 Standards. Given that they are non-functional for most limited-mobility users, they are recommended as a top priority for repair. Contributing attributes include obstructions that block access to the ramp or a ramp with a width less than 36 inches. Figure 2-3 shows a Tier 1 curb ramp that is obstructed by the pole of a street sign. From a total of 1,655 curb ramps within the study area, 40 are both Non-Compliant and Non-Functional. This represents 2.4% of all curb ramps surveyed.

- Tier 1: Curb Ramp Breakdown by TOD
  - Ballston (9/290) = 3.1%
  - Buckingham (7/248) = 2.8%
  - Clarendon (7/335) = 2.1%
  - Court House (7/306) = 2.2%
  - Rosslyn (5/246) = 2%
  - Virginia Square (5/236) = 2.1%



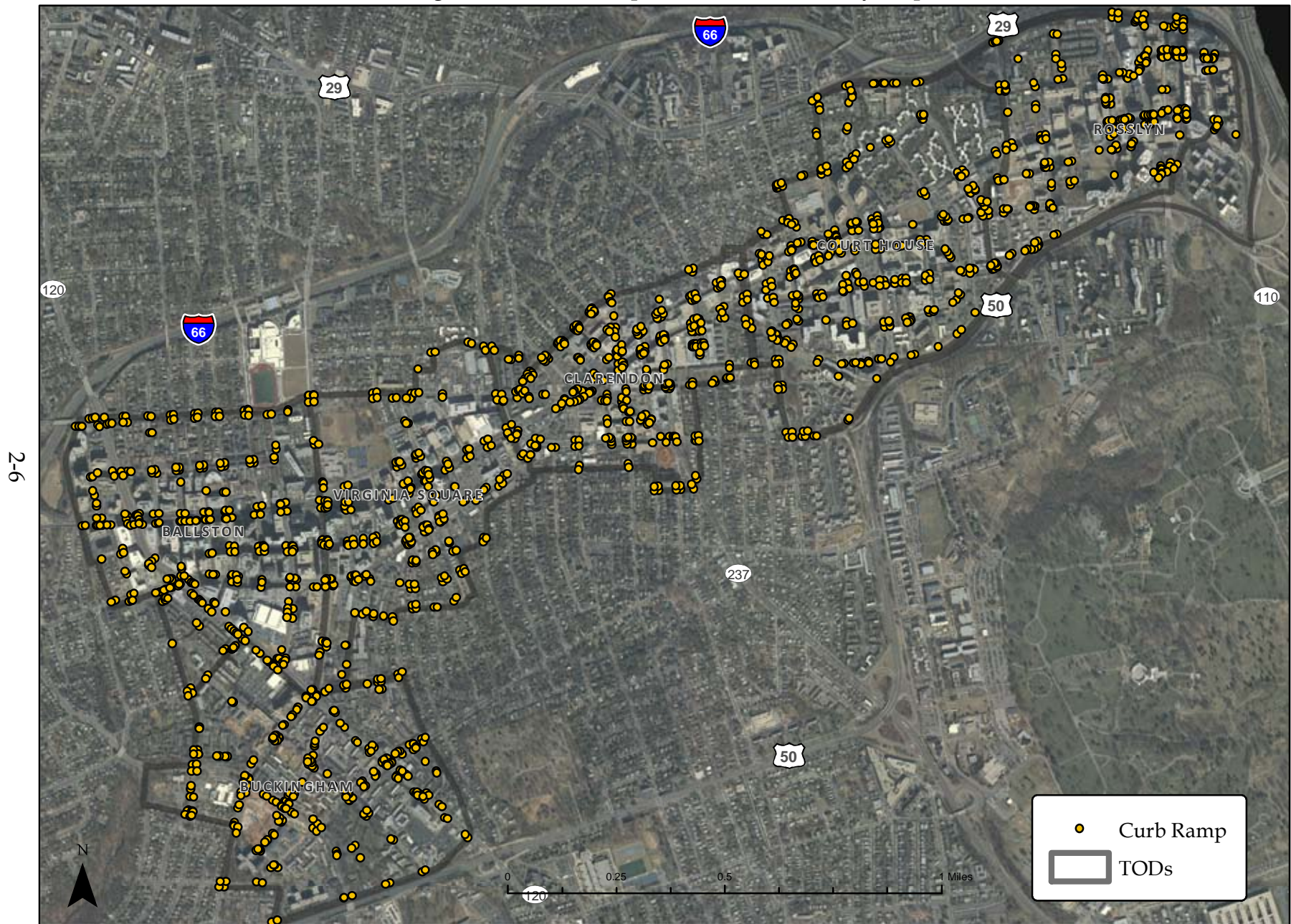
**Figure 2-3: Tier 1 Curb Ramp**

**Curb Ramp Obstructions:** Obstructions block access to a ramp making it difficult or impossible to use. Possible obstructions include bollards, fire hydrants, newspaper boxes, utility covers, utility poles, street signs, vehicles, and poor or deteriorating physical conditions of the curb ramp. A total of 32 curb ramps representing 1.9% of all ramps were found with obstructions. A vehicle is seen obstructing a curb ramp in Figure 2-4.



**Figure 2-4: Obstructed Curb Ramp**

Figure 2-2: Curb Ramp Assessment Summary Map



- Curb Ramp Obstructions by TOD
  - Ballston (9/290) = 3.1%
  - Buckingham (5/248) = 2.0%
  - Buckingham Clarendon (7/335) = 2.1%
  - Buckingham Court House (4/306) = 1.3%
  - Buckingham Rosslyn (3/246) = 1.2%
  - Virginia Square (4/236) = 1.7%

**Ramp Width is Less than 36 Inches:** A curb ramp with a width less than 36 inches is non-compliant under ADA guidelines and inaccessible for wheelchair users. Eight out of a total of 1,661 curb ramps (0.5%) were found to have widths less than 36 inches. Figure 2-5 shows a curb ramp with a width below 36 inches.



**Figure 2-5: Ramp is Obstructed and Below 36 Inches**

- Ramps with Widths Less than 36 Inches by TOD
  - Ballston (0/290) = 0%
  - Buckingham (2/248) = 0.8%
  - Clarendon (0/335) = 0%
  - Court House (3/306) = 1%
  - Rosslyn (2/246) = 0.8%
  - Virginia Square (1/236) = 0.4%

**Tier 2: Non-Compliant but Functional (many issues)**

Tier 2 represents curb ramps that do not meet several of the Access Board's guidelines but generally remain functional. This category includes curb ramps that do not meet slope requirements, lack truncated domes, and/or lie outside of an existing crosswalk.

Given the large number of non-compliant but functional curb ramps, 1,442 out of 1,661 or 86.8%, and the diversity of conditions within this group, a rating system was used to separate these curb ramps into Tier 2 (many issues) and Tier 3 (fewer issues). Tier 2 contains curb ramps that netted an above average number of compliance issues in the rating system. Figure 2-6 pictures a Tier 2 curb ramp that does not meet slope requirements, lacks a landing and does not have 36 inches of bottom maneuvering space within the crosswalk. Tier 2 includes 742 out of 1,661 curb ramps or 44.7% of the curb ramps surveyed.



**Figure 2-6: Tier 2 Curb Ramp**

- Tier 2: Curb Ramp Breakdown by TOD
  - Ballston (80/290) = 27.6%
  - Buckingham (106/248) = 42.7%
  - Clarendon (129/335) = 38.5%
  - Court House (182/306) = 59.4%
  - Rosslyn (167/246) = 67.9%
  - Virginia Square (78/236) = 33.1%

### ***Tier 3: Non-Compliant but Functional (fewer issues)***

Tier 3 contains curb ramps with a below average number of compliance issues. While still non-compliant with 2010 Standards, these curb ramps have fewer issues than Tier 2 and are still considered functional for a majority of users. This tier represents 700 out of 1,661 curb ramps or 42.1% of the curb ramps surveyed. A Tier 3 curb ramp with some slope issues is shown in Figure 2-7.

- Tier 3 Curb Ramp Breakdown by TOD
  - Ballston (160/290) = 55.2%
  - Buckingham (105/248) = 42.3%
  - Clarendon (148/335) = 41.7%
  - Court House (95/306) = 31%
  - Rosslyn (62/246) = 25.2%
  - Virginia Square (130/236) = 55.1%



**Figure 2-7: Tier 3 Curb Ramp**

### ***Tier 4: Compliant and Functional***

This tier represents curb ramps that meet all of the 2010 Standards (Figure 2-8). In addition, some exceptions are included where non-compliant or missing components do not hinder safe use of the curb ramp. For instance, if non-compliant flares do not impact the maneuvering space of people with disabilities, the slope of the flares is irrelevant. These exceptions are broken down into three different scenarios below. A total of 173 curb ramps, or 10.4% of all curb ramps, fell within the Tier 4 categorization.

- Tier 4 Curb Ramp Breakdown by TOD
  - Ballston (41/290) = 14.5%
  - Buckingham (30/248) = 12.1%
  - Clarendon (51/335) = 15.2%
  - Court House (22/306) = 7.2%
  - Rosslyn (6/246) = 2.4%
  - Virginia Square (23/236) = 9.7%



**Figure 2-8: Tier 4 Curb Ramp**

**Flare Exception:** When all other curb ramp components are compliant with 2010 Standards and the flares are not a functional component of the pathway. This exception was found at 140 curb ramps, or 8.4% of all ramps. Figure 2-9 pictures non-compliant, but irrelevant flares.

- Flare Exception Ramps by TOD
  - Ballston (38/290) = 13.1%
  - Buckingham (20/248) = 8.1%
  - Clarendon (42/335) = 12.5%
  - Court House (17/306) = 5.6%
  - Rosslyn (5/246) = 2%
  - Virginia Square (18/236) = 7.6%



Figure 2-9: Non-Functional Flares

**Landing Exception:** When all other curb ramp components are compliant with 2010 Standards and no landing is necessary for wheelchair users to safely maneuver off of or past the curb ramp. In total, 23 curb ramps, or 1.4% of all ramps, were found with this exception. Figure 2-10 pictures a leveled crosswalk without a need for a landing.

- Landing Exception Ramps by TOD
  - Ballston (0/290) = 0%
  - Buckingham (10/248) = 4%
  - Clarendon (4/335) = 1.2%
  - Court House (5/306) = 1.6%
  - Rosslyn (1/246) = 0.4%
  - Virginia Square (3/236) = 1.3%



Figure 2-10: No Landing Needed

**Flare and Landing Exception:** Typically found on parallel curb ramps, when all other curb ramp components are compliant with 2010 Standards and no flares or landing is necessary to allow maneuverability. Eleven out of 1,661 curb ramps (0.1%) matched this exception. Figure 2-11 pictures a parallel curb ramp that does not have a need for flares or a landing to be functional.

- Flare and Landing Exception Ramps by TOD
  - Ballston (4/290) = 1.4%
  - Buckingham (0/248) = 0%
  - Clarendon (5/335) = 1.5%
  - Court House (0/306) = 0%
  - Rosslyn (0/246) = 0%
  - Virginia Square (2/236) = 0.1%

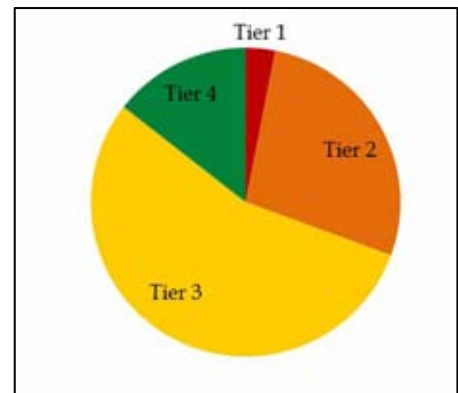


Figure 2-11: No Flares or Landing Needed

## Curb Ramp Tier Categorization by TOD

### *Ballston TOD Assessment*

The Ballston TOD is located in the westernmost region of the study area. Ballston is home to a number of high-rise office and residential towers. As seen in Figure 2-12, the majority of curb ramps within this TOD are above average condition, with 69.7% of curb ramps ranked in Tier 3 and Tier 4. Figure 2-13 is a map displaying the location of curb ramps within the Ballston TOD and the curb ramp tiered rating.



**Figure 2-12: Ballston Curb Ramp Tiers**

- Ballston Curb Ramp Overview
  - Tier 1 (9/290) = 3.1%
  - Tier 2 (80/290) = 27.6%
  - Tier 3 (160/290) = 55.2%
  - Tier 4 (41/290) = 14.5%

The Ballston TOD has the largest percentage of Tier 1 curb ramps within the study area with 3.1%. While these instances are fairly dispersed, some clusters exist in the southern portion of Ballston between Glebe Road and Vermont Street.

Tier 2 curb ramps are dispersed throughout Ballston. Some areas of heavy concentration include the southern portion of the TOD and areas west of Glebe Road and north of Fairfax Drive.

Tier 3 curb ramps make up the largest portion of curb ramps within the TOD. Tier 3 curb ramps are dispersed to every corner of the TOD. Corridors with a high prevalence include Glebe Road, Wilson Boulevard, Fairfax Drive, and 11<sup>th</sup> Street North.

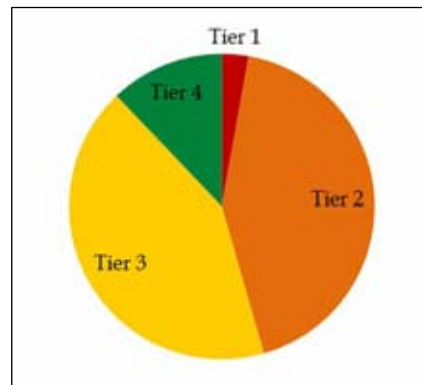
The heaviest concentration of Tier 4 curb ramps is close to the Ballston Commons Mall and the Ballston Metro Station. This area is framed by Fairfax Drive to the north, Randolph Street to the east, Wilson Boulevard to the south, and Glebe Road to the west.

Figure 2-13: Ballston Curb Ramp Assessment Summary Map



### *Buckingham TOD Assessment*

Located in the southernmost section of the study area, Buckingham is predominately a residential area with a mix of residential towers and garden style residences. Glebe Road features the major commercial corridor for the TOD and is the heaviest pedestrian trafficked area. The overall distribution of curb ramps by tier is displayed in Figure 2-14. The Tier 2 rating is the most prevalent in the area at almost 43%, followed closely by Tier 3 at 42%. Figure 2-15 is a map displaying the location and tiered rating of curb ramps within the Buckingham TOD.



**Figure 2-14: Buckingham Curb Ramp Tiers**

- Buckingham Curb Ramp Overview
  - Tier 1 (7/248) = 2.8%
  - Tier 2 (106/248) = 42.7%
  - Tier 3 (105/248) = 42.3%
  - Tier 4 (30/248) = 12.1%

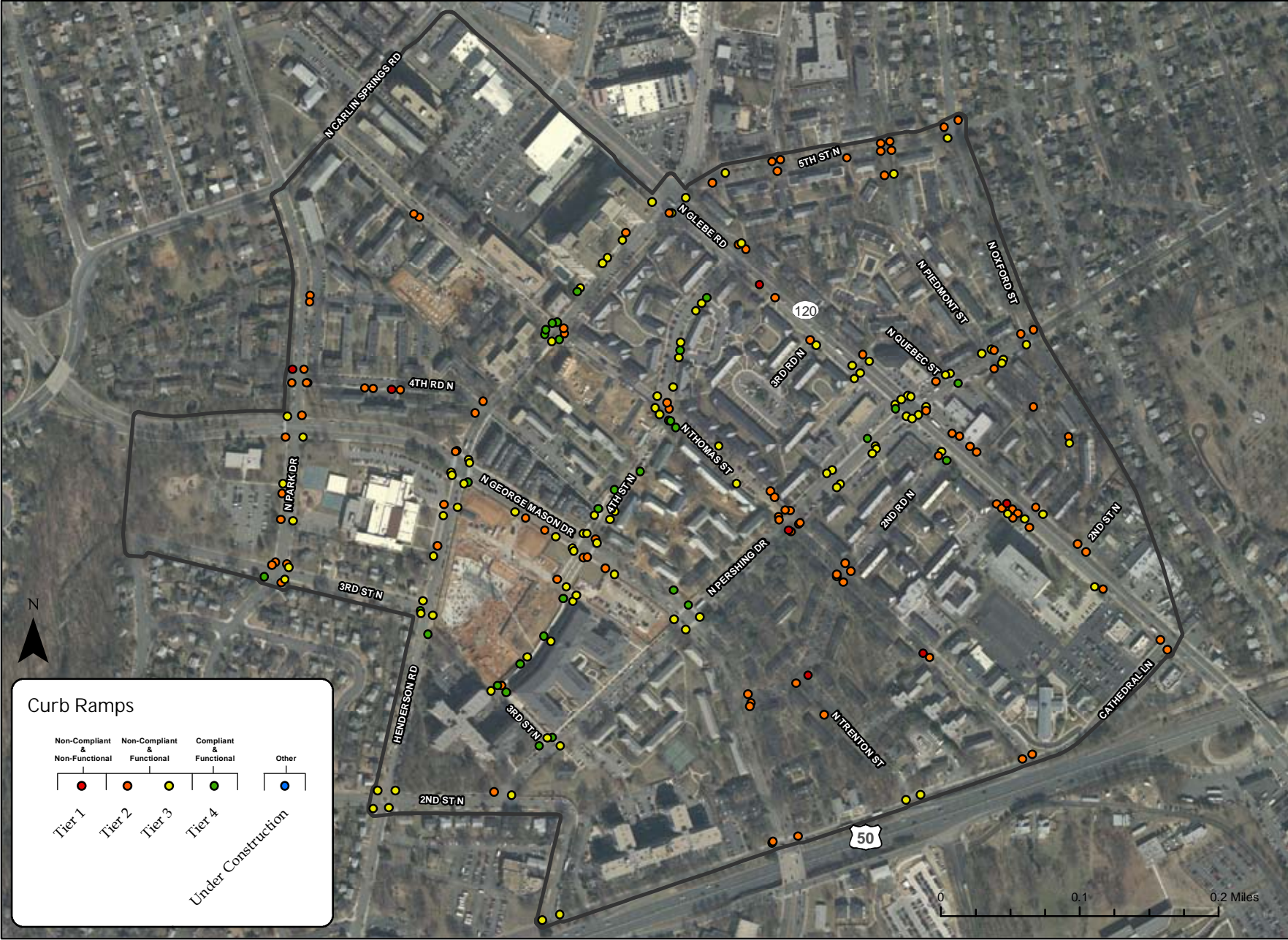
Buckingham contains the second highest percentage of Tier 1 curb ramps among the TODs, following Ballston, with 2.8%. Clusters exist within the southern and western portions of the TOD along 4<sup>th</sup> Road North, Thomas Street, and Glebe Road.

As noted above, Tier 2 curb ramps are the most common in the Buckingham TOD. The corridors with the highest number include Park Drive to the west, 5<sup>th</sup> Street to the north, and Thomas Street which runs north and south directly through the TOD.

Tier 3 curb ramps are mostly located within the geographic core of Buckingham. This includes the major east/west corridors of Henderson Road, 4<sup>th</sup> Street North, and Pershing Drive.

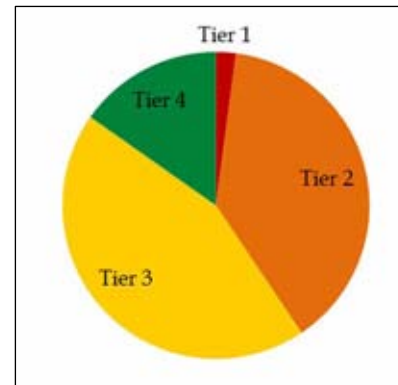
Tier 4 curb ramps are prevalent in Buckingham primarily due to new construction and sidewalks. Areas along 3<sup>rd</sup> Street North and 4<sup>th</sup> Street North that are adjacent to construction projects feature clusters of Tier 4 curb ramps. Henderson Road also features a number of Tier 4 curb ramps.

Figure 2-15: Buckingham Curb Ramp Assessment Summary Map



### Clarendon TOD Assessment

Located in the central portion of the study area, Clarendon is a heavily trafficked area with upscale restaurants and shopping. The major corridors through the TOD are Clarendon Boulevard, Wilson Boulevard, and Washington Boulevard. Clarendon features the largest proportion of Tier 4 curbside ramps among the TODs. As seen in Figure 2-16, the majority of curbside ramps within Clarendon are above average condition, with 56.9% of the curbside ramp inventory falling in the bottom tiers. Figure 2-17 is a map displaying the location of curbside ramps within the Clarendon TOD and the curbside ramp tiered rating.



**Figure 2-16: Clarendon Curbside Ramp Ratings**

- Clarendon Curbside Ramp Overview
  - Tier 1 (7/335) = 2.1%
  - Tier 2 (129/335) = 38.5%
  - Tier 3 (148/335) = 41.7%
  - Tier 4 (51/335) = 15.2%

Tier 1 curbside ramps make up a small portion of Clarendon's inventory. They are mainly located in the western section of Clarendon, west of the Clarendon Circle.

Tier 2 curbside ramps are dispersed along the major street corridors of Clarendon including Washington Boulevard and Wilson Boulevard. Other major clusters include Edgewood Street and Cleveland Street.

Tier 3 curbside ramps are the most dispersed tier within the TOD. The largest single concentration is along 13<sup>th</sup> Street North.

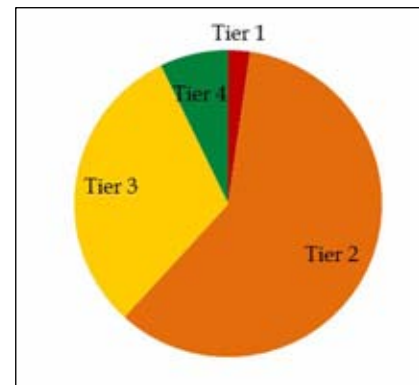
Clarendon boasts the highest number and percentage of Tier 4 curbside ramps. The major groups include Clarendon Boulevard and areas close to the Clarendon Metro Station. The southern area of Clarendon also features a large number of Tier 4 curbside ramps.

Figure 2-17: Clarendon Curb Ramp Assessment Summary Map



### Court House TOD Assessment

Court House is a pedestrian-dominated TOD area with multiple high rise office buildings and residential towers. Clarendon Boulevard and Wilson Boulevard provide the main street corridors through the TOD. Arlington County Government Offices are also located within Court House. As seen in Figure 2-18, the majority of curb ramps in Court House are below average condition for the study area, with over 61% of curb ramps falling in the upper two tiers. Figure 2-19 is a map displaying the location of curb ramps within the Court House TOD and the curb ramp tiered rating.



**Figure 2-18: Court House Curb Ramp Tiers**

- Court House Curb Ramp Overview
  - Tier 1 (7/306) = 2.2%
  - Tier 2 (182/306) = 59.4%
  - Tier 3 (95/306) = 31%
  - Tier 4 (22/306) = 7.2%

The number of Tier 1 curb ramps within the Court House TOD is relatively low when compared to the study area as a whole. The clusters of Tier 1 curb ramps lay in the north section of Court House between Lee Highway and 19<sup>th</sup> Street North, the southern portion of Adams Street, and to the south of the TOD along 10<sup>th</sup> Street North.

Tier 2 curb ramps make up the largest proportion of curb ramps within the Court House TOD and account for the second highest proportion among the TODs after the Rosslyn TOD. Tier 2 curb ramps are largely dispersed throughout the area. Lee Highway, Barton Street, and Key Boulevard have a larger proportion than most streets.

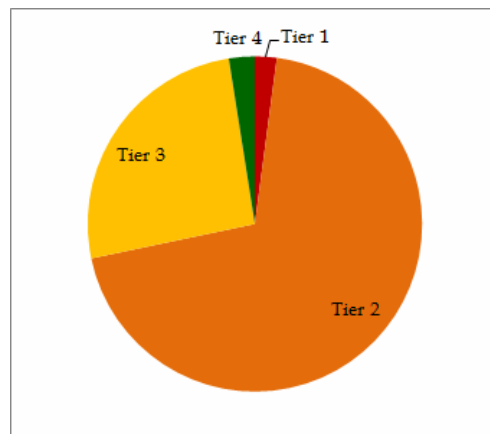
Tier 3 curb ramps are mostly located throughout the central core of Court House, along Wilson Boulevard and Clarendon Boulevard.

Tier 4 curb ramps are clustered along Clarendon Boulevard between Adams Street and Wayne Street. They are also dispersed through the southern section of the TOD.



### Rosslyn TOD Assessment

The easternmost section of the study area is the Rosslyn TOD. Rosslyn is dominated by high-rise towers and surrounded by Interstate 66 and US-50. Rosslyn is a heavily trafficked area with multiple large corridors crisscrossing the TOD. Major arteries include Fort Meyer Drive, Lynn Street, Clarendon Boulevard, and Wilson Boulevard. The overall distribution of condition of curb ramps in Rosslyn is shown in Figure 2-20. The TOD is below average when compared to the study area with over 70% falling into the two highest tiers. Figure 2-21 is a map displaying the location of curb ramps within the Rosslyn TOD and the curb ramp tiered categorization.



**Figure 2-20: Rosslyn Curb Ramp Tiers**

- Rosslyn Curb Ramp Overview
  - Tier 1 (5/240) = 2.1%
  - Tier 2 (167/240) = 69.6%
  - Tier 3 (62/240) = 25.8%
  - Tier 4 (6/240) = 2.5%

Rosslyn has the lowest proportion of Tier 1 curb ramps across the TODs with only 2%. Two pairs exist at the intersections of 14<sup>th</sup> Street North and Rhodes Street and Fairfax Drive and Lynn Street.

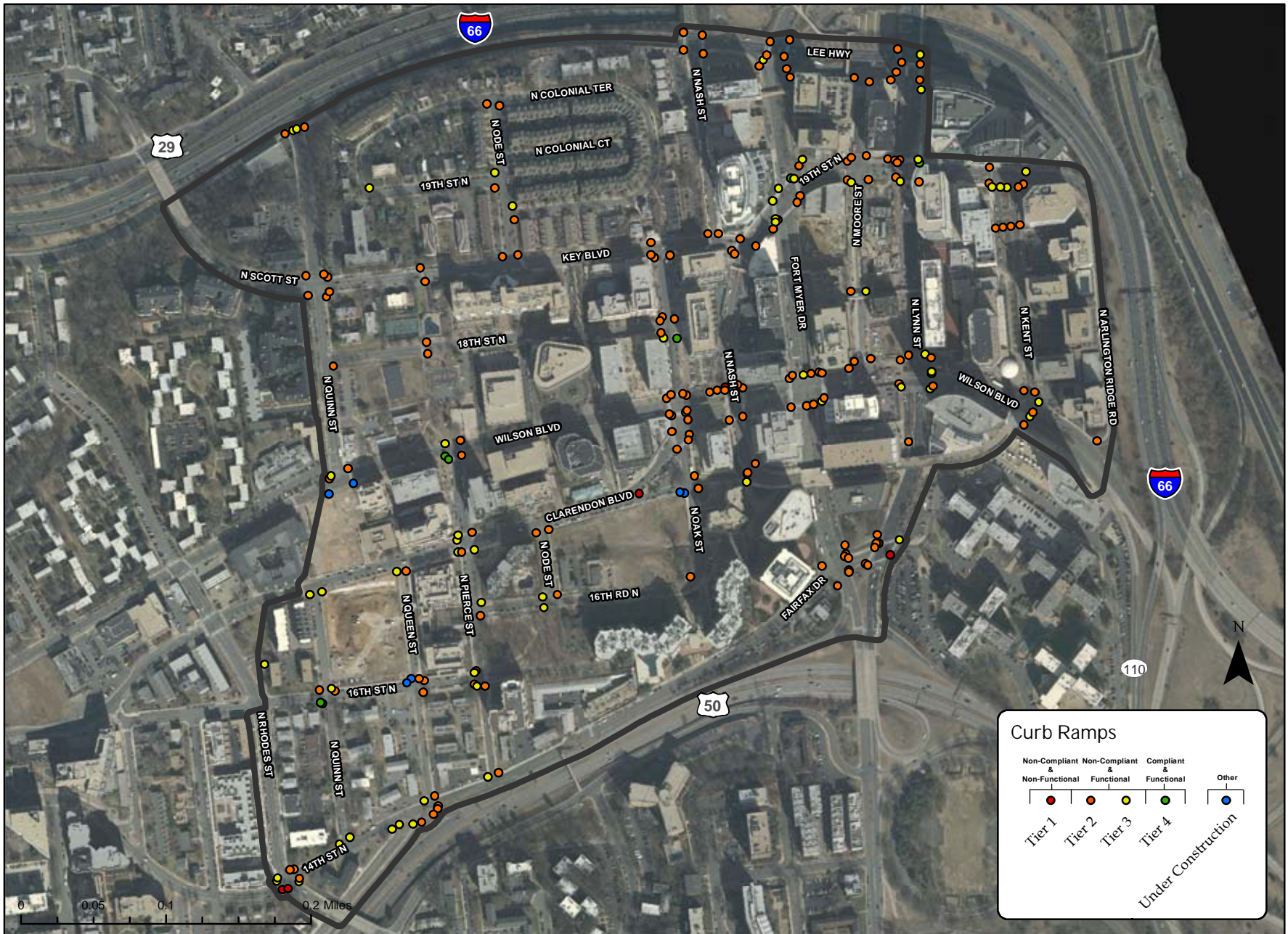
Tier 2 curb ramps make up the bulk of curb ramps in Rosslyn at nearly 70%. One explanation for this may be the elevation or street grading in Rosslyn that is not present throughout the rest of the study area. Large concentrations of Tier 2 curb ramps exist, particularly along Wilson Boulevard.

Tier 3 curb ramps make up approximately 25% of the curb ramps in Rosslyn. Large concentrations exist along 19<sup>th</sup> Street North and to the south on 14<sup>th</sup> Street North.

The Rosslyn TOD features the smallest proportion (2.4%) of Tier 4 curb ramps among the TODs. Only six Tier 4 curb ramps are dispersed across Rosslyn, with a pair located at the intersection of Wilson Boulevard and Pierce Street.

Construction zones dominate the western portion of Rosslyn. The six (2.4%) curb ramps observed within construction zones are framed by Wilson Boulevard to the north, Oak Street to the east, 16<sup>th</sup> Street to the south, and Quinn Street to the west.

Figure 2-21: Rosslyn Curb Ramp Assessment Summary Map



### Virginia Square TOD Assessment

Bordered by Ballston and Clarendon, Virginia Square is located in the west-central portion of the study area. The TOD features a number of high-rise residential towers and a number of large office buildings including the Federal Deposit Insurance Corporation. As seen in Figure 2-22, the majority of curb ramps in Virginia Square are above average, with the bottom two tiers making up over 64% of the TOD's inventory. Figure 2-23 displays the location of curb ramps within the Virginia Square TOD and the curb ramp tiered rating.

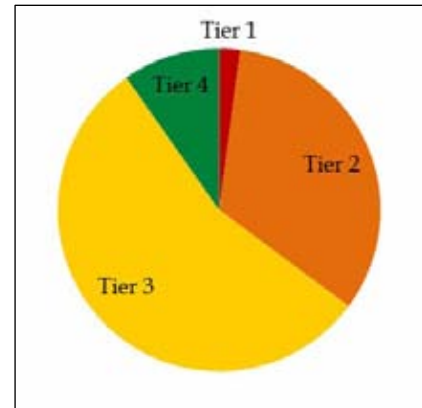


Figure 2-22: Virginia Square Curb Ramp Tiers

- Virginia Square Curb Ramp Overview
  - Tier 1 (5/236) = 2.1%
  - Tier 2 (78/236) = 33.1%
  - Tier 3 (130/236) = 55.1%
  - Tier 4 (23/236) = 9.7%

The largest cluster of Tier 1 curb ramps within the Virginia Square TOD is close to the intersection of Fairfax Drive and Monroe Street. Other Tier 1 curb ramps are scattered to the south.

Tier 2 curb ramps are fairly dispersed with concentrations to the south of Wilson Boulevard, along Quincy Street and Fairfax Drive.

The largest portion of curb ramps within the TOD (over 55%) fall within Tier 3 categorization. Large clusters exist along 9<sup>th</sup> Street North and Wilson Boulevard.

Tier 4 curb ramps are focused around a few intersections throughout Virginia Square. Some of these intersections include 5<sup>th</sup> Road North and Quincy Street, Wilson Boulevard and Oakland Street, and Fairfax Drive and Monroe Street.

## SIDEWALKS

The following section describes the results of the sidewalk analysis. Sidewalks within the study area were broken into segments separated by intersections and occasionally midblock crossings. A total of 1,077 sidewalk segments were surveyed. Of the 1,077 sidewalk segments surveyed, 25 were under construction at the time of the survey. The following sidewalk attributes were surveyed and recorded for the 1,052 sidewalk (68.21 miles) segments:



- Sidewalk surface type
- Sidewalk width
- Continuity of sidewalk
- Running slope
- Cross slope
- Number of driveways crossed
- Running slope of driveway flares
- Cross slope of driveway
- Presence of surface gaps
- Number of vertical changes
- Presence of obstructions
- Presence of protrusions

### Sidewalk Categorization System

For the purpose of categorizing sidewalk segments for repair or reconstruction, the study team developed a five-tier system. This tiered system reflects the level of compliance with 2010 Standards as well as sidewalk segment functionality for a majority of disabled or limited-mobility users. Each segment within the study area was classified as one of the following:

- Tier 1: Non-Compliant and Non-Functional
- Tier 2: Non-Compliant and Non-Functional
- Tier 3: Non-Compliant but Functional (many issues)
- Tier 4: Non-Compliant but Functional (fewer issues)
- Tier 5: Compliant and Functional

Figure 2-24 is a map displaying the pathway segments in the Arlington County Study Area using the 5-tier categorization system described above. Segments that received a categorization of Tier 1 are deep red while segments that received a categorization of Tier 5 are green.

#### *Tier 1: Non-Compliant and Non-Functional*

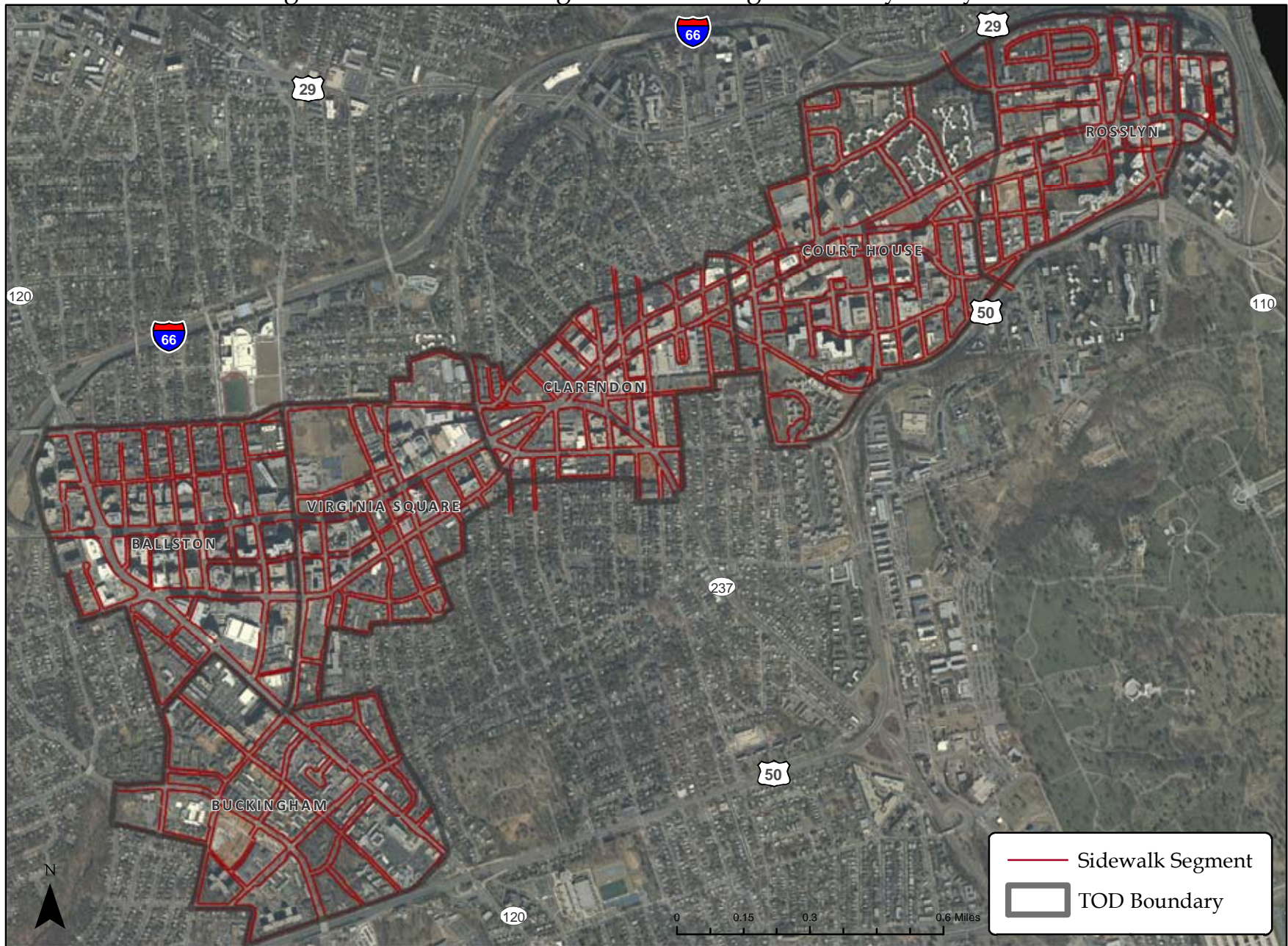
The Tier 1 categorization, Non-Compliant and Non-Functional, represents sidewalk segments that are most in need of improvements. They are not compliant with 2010 Standards and not functional for persons with mobility or visual impairments. This tier indicates a segment with a sidewalk that is less than 36 inches wide, doesn't continue for the entire length of the segment, or contains three or more obstructions (Figure 2-25). Out of



**Figure 2-25: Tier 1 Sidewalk Segment**

Figure 2-24: Sidewalk Segments in Arlington County Study Area

2-23



a total of 1,052 sidewalk segments that was surveyed in the study area, 105 of these segments are classified as Tier 1, which represents 10% of all pathway segments surveyed.

- Tier 1: Sidewalk Segment Breakdown by TOD
  - Ballston (16/171) - 9.3%
  - Buckingham (9/125) - 7.2%
  - Clarendon (24/210) - 11.4%
  - Court house (27/227) - 11.95%
  - Rosslyn (12/162) - 7.4%
  - Virginia Square (17/157) = 10.8%

**Sidewalk Segment Width Less than 36 Inches:** A sidewalk segment with a width less than 36 inches, as shown in Figure 2-26, is not only non-compliant, but also non-functional for persons who use wheelchairs. Only 15 sidewalk segments out of a total of 1,052 (1.4%) were found to have widths less than 36 inches.

- Sidewalk Segments Less than 36 Inches Wide by TOD
  - Ballston (2/171) = 1.2%
  - Buckingham (0/125) = 0%
  - Clarendon (4/210) = 1.9%
  - Court House (4/227) = 1.8%
  - Rosslyn (3/162) = 1.9%
  - Virginia Square (2/157) = 1.3%



**Figure 2-26: Sidewalk Less Than 36\"**

**Sidewalk Not Continuous:** A sidewalk segment that is not continuous, as seen in Figure 2-27, is non-compliant and non-functional for persons with disabilities. The study area contained 54 pathways segments (5.1%) that were not continuous.

- Non-Continuous Sidewalk Segments by TOD
  - Ballston (9/171) = 5.3%
  - Buckingham (5/125) = 4.0%
  - Clarendon (10/210) = 4.8%
  - Court House (16/227) = 7.0%
  - Rosslyn (4/162) = 4.5%
  - Virginia Square (10/157) = 6.4%



**Figure 2-27: Sidewalk Not Continuous**

### ***Tier 2: Non-Compliant and Non-Functional***

Sidewalk segments in Tier 2 are also non-compliant and non-functional, but have fewer compliance issues than Tier 1 sidewalks. Tier 2 (Figure 2-28) indicates a sidewalk segment that is at least 36 inches wide and continues for the entire length of the segment, but has one or two obstructions that render the segment non-compliant and non-functional for most limited-mobility users. A total of 160 sidewalk segments (15.2% of total) are categorized as Tier 2.

- Tier 2: Sidewalk Segment Breakdown by TOD
  - Ballston (28/171) = 16.3%
  - Buckingham (24/125) = 19.2%
  - Clarendon (29/210) = 13.8%
  - Court House (32/227) = 14.1%
  - Rosslyn (14/162) = 8.6%
  - Virginia Square (33/157) = 21.0%



**Figure 2-28: Tier 2 Sidewalk Segment**

**Sidewalk Obstructions:** Obstructions are objects that reduce the sidewalk to less than 36 inches, rendering the sidewalk unusable for those with mobility impairments. In the Arlington County study area, fixed obstructions include utility poles (Figure 2-29), street lights (Figure 2-30), traffic light poles, traffic sign poles, and fire hydrants (Figure 2-31). Severely uneven sidewalks or severe vertical elevation changes (Figure 2-32) are also considered fixed obstructions because they also impede accessibility. Moveable obstructions include trash cans and vehicles (Figure 2-33). Finally, landscaping (Figure 2-34) can also become an obstruction if it is not maintained. More than one out of five sidewalk segments (21.8%) were found to have two or less obstructions.



**Figure 2-29: Utility Pole as Obstruction**



**Figure 2-30: Street Light as Obstruction**



**Figure 2-31: Fire Hydrant as Obstruction**



**Figure 2-32: Severe Vertical Elevation as Obstruction**



**Figure 2-33: Vehicles as Obstruction**



**Figure 2-34: Landscaping as Obstruction**

- Obstructions by TOD (Segments with two or less obstructions)
  - Ballston (38/171) = 22.2%
  - Buckingham (30/125) = 24.0%
  - Clarendon (49/210) = 23.3%
  - Court House (47/227) = 20.7%
  - Rosslyn (21/162) = 13.0%
  - Virginia Square (44/157) = 28.0%

***Tier 3: Non-Compliant but Functional (many issues)***

The Tier 3 categorization represents sidewalk segments that fall short of several 2010 Standards, but remain functional for most persons with limited mobility. This category includes sidewalk segments that contain cross-slope issues, running-slope issues, driveway slope issues, surface gaps, vertical changes, and protrusions. Tier 3 contains sidewalk segments that were found to have an above average number of these compliance issues. An example of a Tier 3 sidewalk segment is shown in Figure 2-35. A total of 217 sidewalk segments are classified as Tier 3, representing 20.6% of all sidewalk segments surveyed.

- Tier 3: Sidewalk Segment Breakdown by TOD
  - Ballston (37/171) = 21.6%
  - Buckingham (24/125) = 19.2%
  - Clarendon (34/210) = 16.2%
  - Court House (50/227) = 22.0%
  - Rosslyn (42/162) = 26%
  - Virginia Square (30/157) = 19.1%



**Figure 2-35: Tier 3 Sidewalk Segment**

#### ***Tier 4: Non-Compliant but Functional (fewer issues)***

Sidewalk segments classified as Tier 4 are still non-compliant, but have fewer compliance issues (i.e., below average) than Tier 3 sidewalk segments. Hence, these segments are assumed to be generally more functional than Tier 3 segments for most users and are a slightly lower priority for repair or reconstruction. This category also includes sidewalk segments that contain cross-slope issues, running-slope issues, driveway slope issues, surface gaps, vertical changes, and/or protrusions. Figure 2-36 displays an example of a Tier 4 sidewalk with a cross slope issue. A total of 428 sidewalk segments are classified as Tier 4, representing 40.6% of all sidewalk segments surveyed within the study area.



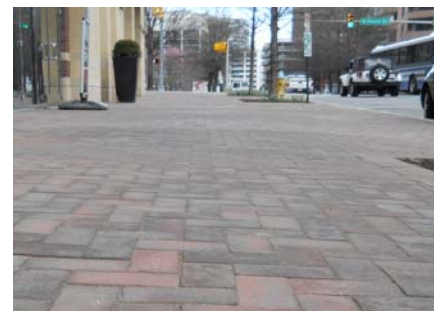
**Figure 2-36: Tier 4 Sidewalk Segment**

- Tier 4: Sidewalk Segment Breakdown by TOD
  - Ballston (64/171) = 37.4%
  - Buckingham (55/125) = 44%
  - Clarendon (90/210) = 42.8%
  - Court House (90/227) = 39.6%
  - Rosslyn (66/162) = 40.7%
  - Virginia Square (63/157) = 40.1%

#### ***Tier 5: Compliant and Functional***

The category Compliant represents sidewalk segments that are completely compliant with the 2010 Standards. These sidewalk segments do not require any repair or reconstruction. Figure 2-37 shows an example of a compliant sidewalk segment. A total of 142 out of the 1,052 sidewalk segments (13.5%) in the study area are categorized as Tier 5.

- Tier 5: Sidewalk Segment Breakdown by TOD
  - Ballston (26/171) = 15.2%
  - Buckingham (13/125) = 10.4%
  - Clarendon (33/210) = 15.7%
  - Court House (28/227) = 12.3%
  - Rosslyn (28/162) = 17.3%
  - Virginia Square (14/157) = 8.9%



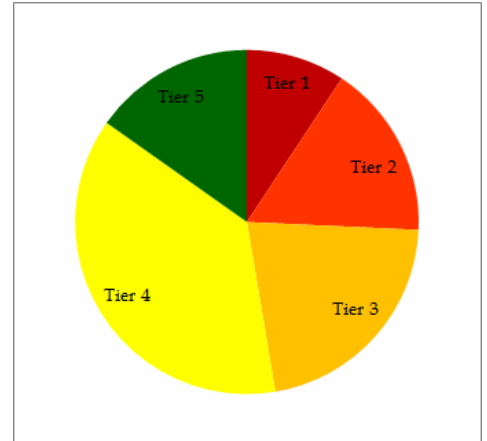
**Figure 2-37: Tier 5 Sidewalk Segment**

## Sidewalk Segment Tier Categorization by TOD

### *Ballston TOD Assessment*

Figure 2-38 is a pie chart displaying the breakdown of the 171 sidewalk segments in Ballston by categorization

- Ballston Sidewalk Segment Overview:
  - Tier 1 (16/171) = 9.3%
  - Tier 2 (28/171) = 16.4%
  - Tier 3 (37/171) = 21.6%
  - Tier 4 (64/171) = 37.4%
  - Tier 5 (26/171) = 15.2%



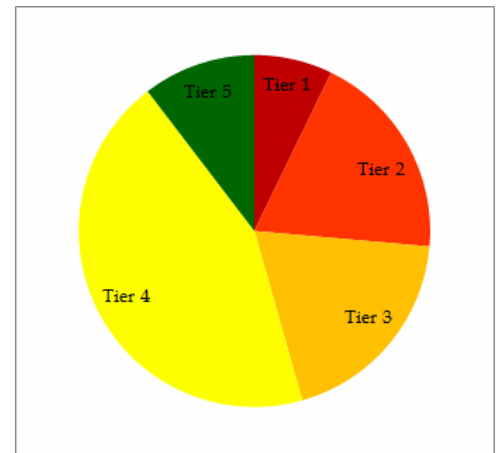
**Figure 2-38: Ballston TOD Sidewalk Segment Tiers**

A map of sidewalk segment tiers for the Ballston TOD is displayed in Figure 2-39. Overall, the centrally located sidewalk segments have fewer compliance issues than those located on the outer edges of the TOD. With the exception of the sidewalk segments adjacent to Washington and Lee High School, the northern portion of the TOD contained segments that were classified as Tier 1, Tier 2, and Tier 3, with approximately half falling within the non-Compliant and non-Functional category. The southwest corner of Ballston is similarly lacking compliant and functional segments, with Tazewell Street, Vermont Street, and Carlin Springs Drive containing mostly sidewalk segments categorized as Tier 1 and Tier 2.

### *Buckingham TOD Assessment*

Figure 2-40 is a pie chart showing the breakdown of the 125 sidewalk segments in Buckingham by categorization.

- Buckingham Sidewalk Segment Overview:
  - Tier 1 (9/125) = 7.2%
  - Tier 2 (24/125) = 19.2%
  - Tier 3 (24/125) = 19.2%
  - Tier 4 (55/125) = 44.0%
  - Tier 5 (13/125) = 10.4%



**Figure 2-40: Buckingham TOD Sidewalk Segment Tiers**

Figure 2-39: Ballston Sidewalk Assessment Summary Map

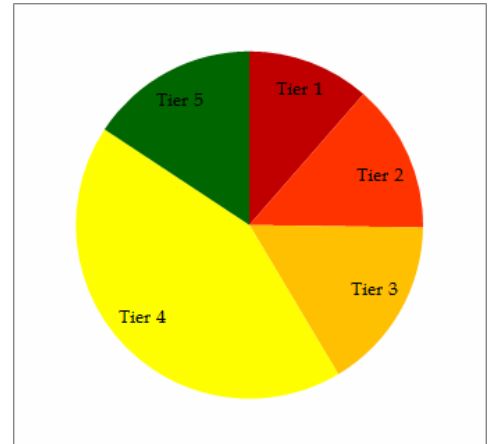


Figure 2-41 is a map displaying the sidewalk segments in Buckingham according to the five-tier system. The majority of the Tier 5 or Compliant and Functional pathway segments are located along or intersecting with Pershing Drive. The northwestern, northeastern, and southeastern portions of Buckingham contain a high number of sidewalk segments categorized as Tier 1 or Tier 2, meaning these areas need repair to become usable for persons with mobility impairments.

**Clarendon TOD Assessment**

Figure 2-42 is a pie chart displaying the breakdown of the 210 pathway segments in Clarendon by categorization.

- Clarendon sidewalk Segment Overview:
  - Tier 1 (24/210) = 11.4%
  - Tier 2 (29/210) = 13.8%
  - Tier 3 (34/210) = 16.2%
  - Tier 4 (90/210) = 42.8%
  - Tier 5 (33/210) = 15.7%



**Figure 2-42: Clarendon TOD Sidewalk Segment Tiers**

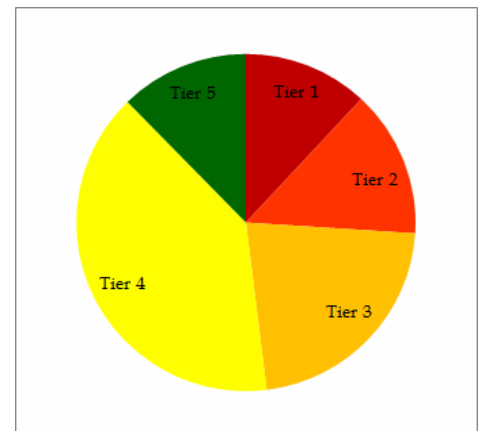
A map of the sidewalk segment tiers for the Clarendon TOD is displayed in Figure 2-43. Most of the streets in the central and eastern portions of Clarendon are Tier 5, Compliant and Functional, or Tier 4, Non-Compliant but Functional.

Segments along Clarendon Boulevard and 11<sup>th</sup> Street generally have a low need for sidewalk repair. On the other hand, the west side of Clarendon contains many segments classified as Tier 1 or Tier 2, meaning they are Non-Compliant and Non-Functional.

**Court House TOD Assessment**

Figure 2-44 is a pie chart showing the breakdown of the 227 sidewalk segments in Court House by category.

- Court House Sidewalk Segment Overview:
  - Tier 1 (27/227) = 11.9%
  - Tier 2 (32/227) = 14.1%
  - Tier 3 (50/227) = 22.0%
  - Tier 4 (90/227) = 39.6%
  - Tier 5 (28/227) = 12.3%



**Figure 2-44: Court House TOD Sidewalk Segment Tiers**

Figure 2-41: Buckingham Sidewalk Assessment Summary Map

2-31

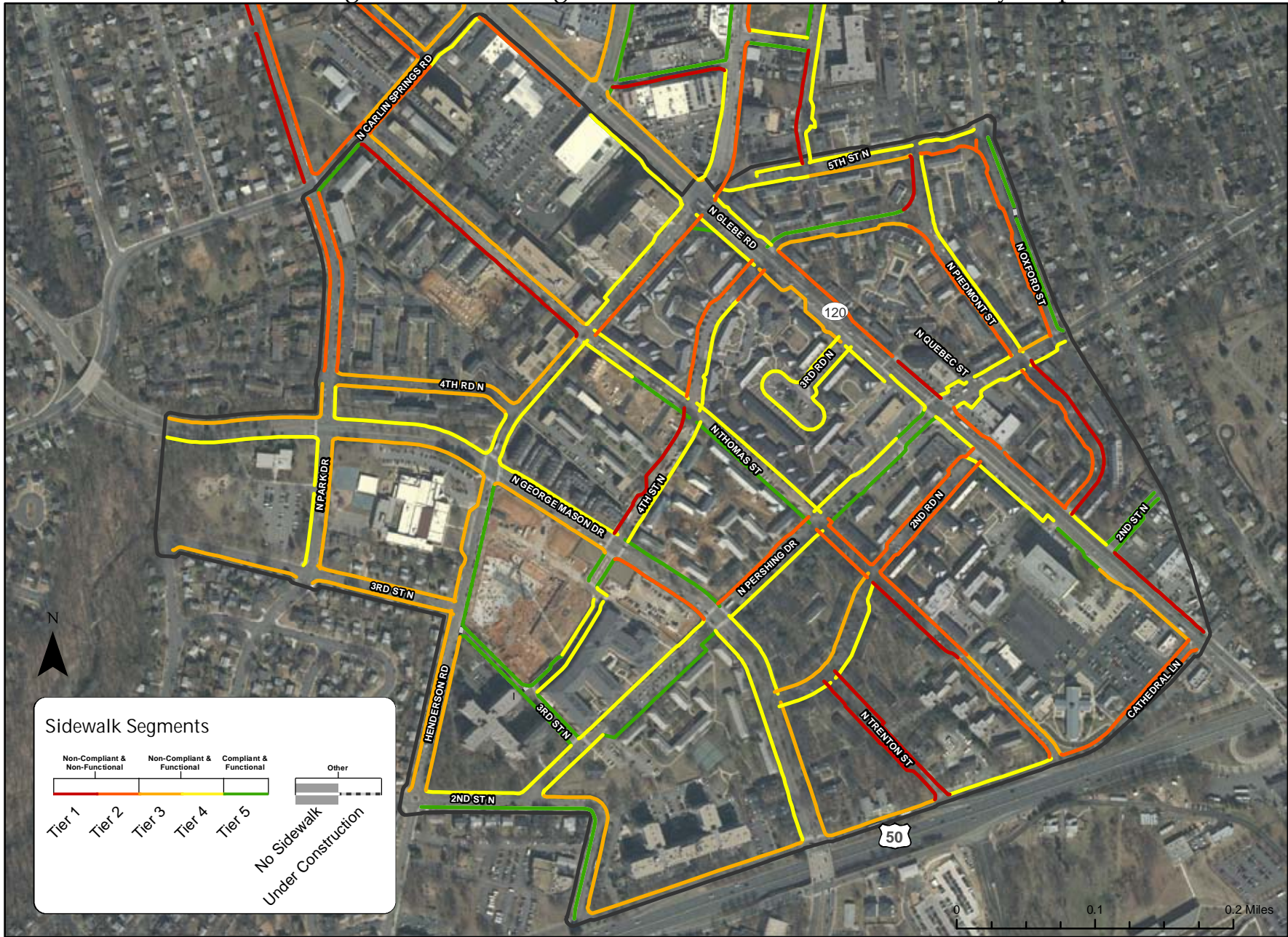


Figure 2-43: Clarendon Sidewalk Assessment Summary Map

2-32



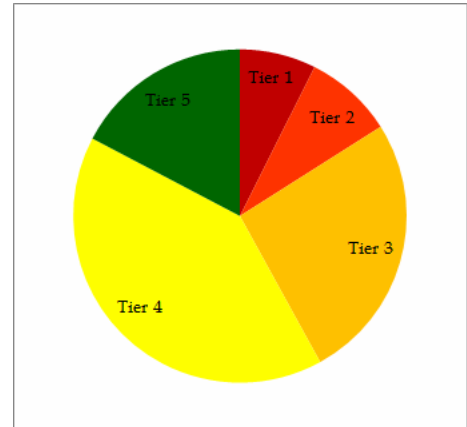
Figure 2-45 is a map displaying the sidewalk segments in the Court House TOD according to the five-tier system. The northern part of Court House contains mostly segments categorized as Tiers 1, 2, and 3. Throughout the remainder of the TOD, segments of all five tiers are widely dispersed.

**Rosslyn TOD Assessment**

Figure 2-46 is a pie chart showing the breakdown of the 162 sidewalk segments in Rosslyn by category.

- Rosslyn Sidewalk Segment Overview:
  - Tier 1 (12/162) = 7.4%
  - Tier 2 (14/162) = 8.6%
  - Tier 3 (42/162) = 26.0%
  - Tier 4 (66/162) = 40.7%
  - Tier 5 (28/162) = 17.3%

A map of the segments by tier for Rosslyn is displayed in Figure 2-47. The majority of the sidewalk segments within the northwestern quarter of the TOD fall into Tiers 1, 2, and 3.



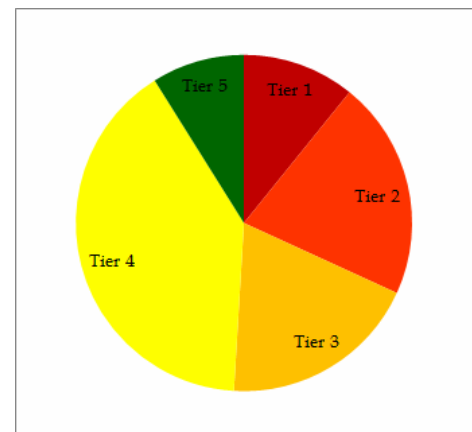
**Figure 2-46: Rosslyn TOD Sidewalk Segment Tiers**

Sidewalk segments along 16<sup>th</sup> Road and Fairfax Drive in Rosslyn are also primarily Tiers 1, 2, and 3. Segments along Lynn Street in the eastern part of Rosslyn are mainly Tier 4 and Tier 5, meaning these segments are ADA-compliant or have one or two issues, but remain functional for a majority of those with mobility impairments. It is also worth noting that due to the landscape of Rosslyn, there are a number of segments with a severe running slope that would be difficult for those with a mobility impairment to use; however, since the slope of these segments matches that of the street, these segments were not flagged.

**Virginia Square TOD Assessment**

Figure 2-48 is a pie chart displaying the breakdown of the 157 sidewalk segments in Virginia Square by category.

- Virginia Square Sidewalk Segment Overview:
  - Tier 1 (17/157) = 10.8%
  - Tier 2 (33/157) = 21.0%
  - Tier 3 (30/157) = 19.1%
  - Tier 4 (63/157) = 40.1%
  - Tier 5 (14/157) = 8.9%



**Figure 2-48: Virginia Square TOD Sidewalk Segment Tiers**

Figure 2-45: Court House Sidewalk Assessment Summary Map

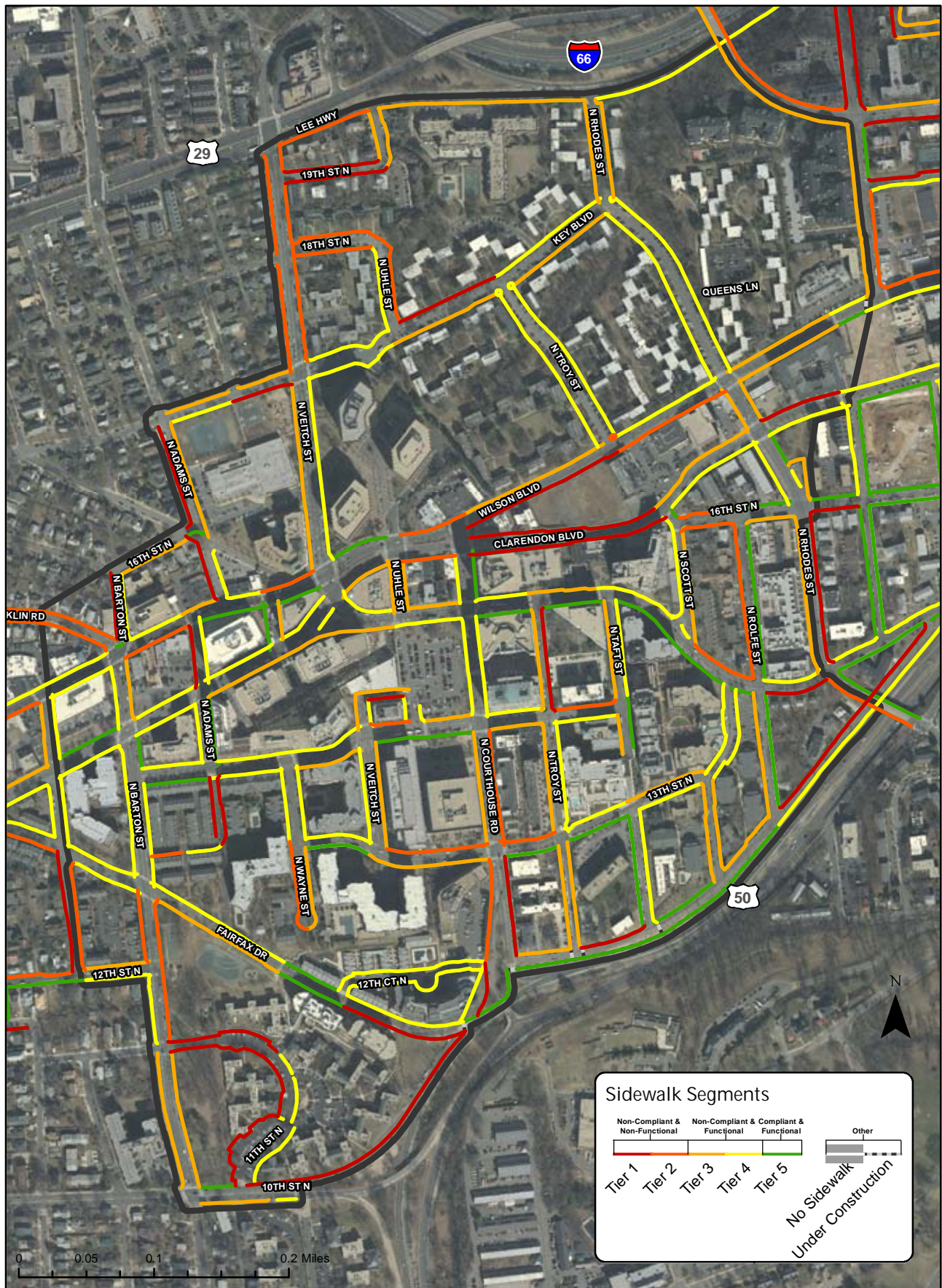


Figure 2-47: Rosslyn Sidewalk Assessment Summary Map

2-35



Figure 2-49 is a map of the sidewalk segments in Virginia Square according to the five-tier system. The segments in the eastern part of the TOD, particularly Lincoln Street, Kansas Street, and Kenmore Street, are Tier 1 or Tier 2, meaning these segments are both non-functional and non-compliant and require repair to become usable for those with mobility impairments. Most of the sidewalk segments in the central part of Virginia Square are Tier 4 and Tier 5.

## **INTERSECTIONS**

The following section describes the results of the intersection segment analysis. An intersection segment is defined as a single crossing on one side of an intersection. For example, a four way intersection will consist of four intersection segments; a “T” intersection will consist of three intersection segments. Every intersection segment within the study area was assessed based on attributes related to pedestrian crossings. There is a total of 901 intersection segments in the study area, 11 of which were under construction at the time of the survey. Each of the 890 intersection segments were evaluated independently in order to maintain a high degree of precision within the data. The following attributes of intersection segments were surveyed and recorded:

- Number of missing curb ramps
- Presence of surface gaps
- Number of vertical changes
- Presence of obstructions
- Pedestrian signal type
- Presence of audible queues on pedestrian signal
- Presence of pedestrian signal countdown
- Pedestrian button type
- Height of pedestrian button
- Presence of pedestrian refuge island
- Presence of pedestrian refuge island curb ramps
- Presence of pedestrian refuge island truncated domes
- Presence of marked crosswalk

### **Intersection Categorization System**

For this report, the study team developed a five-tier system for categorizing the intersection segments within the study area. Tiers were determined based on the assessment of the specific attributes listed above for each segment. Every intersection segment was assigned one of the following tiers:

Figure 2-49: Virginia Square Sidewalk Assessment Summary Map

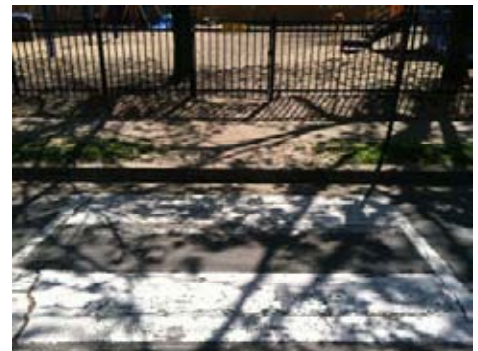


- Tier 1: Non-Compliant and Non-Functional (many issues)
- Tier 2: Non-Compliant and Non-Functional (fewer issues)
- Tier 3: Non-Compliant but Functional (many issues)
- Tier 4: Non-Compliant but Functional (fewer issues)
- Tier 5: Compliant and Functional

Figure 2-50 is a map displaying the intersection segments in the study area using the five-tier system. Intersection segments that are Tier 1 are deep red while intersection segments that are Tier 5 are green.

### ***Tier 1: Non-Compliant and Non-Functional (many issues)***

Like curb ramps and the sidewalk segments, the Tier 1 intersection segments are those most in need of repair or reconstruction. Intersection segments in this tier present major barriers to those with limited mobility. Tier 1 intersection segments have multiple missing curb ramps and/or at least one obstruction. Obstructions impede travel by reducing the width of the walk path to less than 36 inches. Similarly, curbs without curb ramps are in effect obstructions, as persons with disabilities are unable to traverse the elevation change between the street and sidewalk. Figure 2-51 is an example of a Tier 1 intersection segment with an obstruction. From a total of 890 surveyed intersection segments within the study area, 33 (3.7%) are Tier 1.

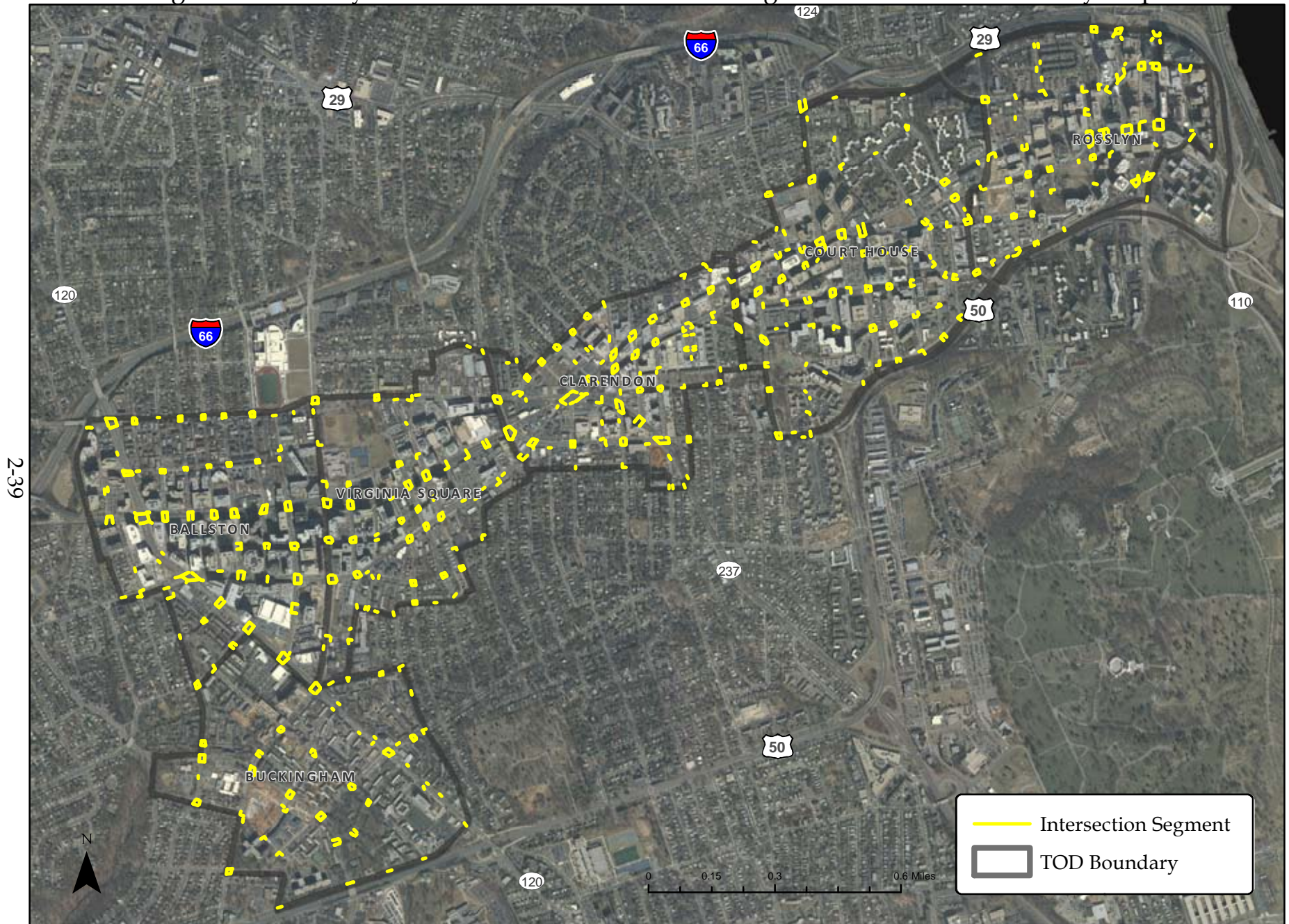


**Figure 2-51: Tier 1 Intersection Segment**

- Tier 1: Intersection Segment Breakdown by TOD
  - Ballston (3/150) = 2.0%
  - Buckingham (7/100) = 7.0%
  - Clarendon (8/185) = 4.3%
  - Court House (4/179) = 2.2%
  - Rosslyn (6/140) = 4.3%
  - Virginia Square (5/136) = 3.7%

**Intersection Segment Obstructed:** Intersection obstructions present major barriers to persons in wheelchairs and those with limited mobility. Obstructions include medians, traffic light poles, traffic sign poles, and landscaping. Two percent of intersection segments (20 of 890, not including 11 under construction) have an obstruction, primarily occurring in Clarendon. No segments have multiple obstructions. Figures 2-52 and 2-53 provide examples of obstructions located in Court House on 10<sup>th</sup> street and Barton Street, respectively.

Figure 2-50: Rosslyn-Ballston Corridor Intersection Segment Assessment Summary Map



2-39



**Figure 2-52: Obstruction  
Example 1**



**Figure 2-53:  
Obstruction Example 2**

**Intersection Segment with Missing Curb Ramps:** An intersection segment that lacks one or more curb ramps is not only non-compliant under ADA guidelines, but also non-functional for persons in wheelchairs. The curb acts as both an extreme example of a vertical elevation change and as an obstruction to a continuous 36 inch minimum walk path. A total of 102 intersection segments out of 890 (11.5%) are missing at least one curb ramp. Figure 2-54 displays an example of this located along Glebe Road in Buckingham.

- Intersections with Missing Curb Ramps by TOD
  - Ballston (18/150) = 12.0%
  - Buckingham (9/100) = 9.0%
  - Clarendon (14/185) = 7.6%
  - Court House (20/179) = 11.2 %
  - Rosslyn (29/140) = 20.7%
  - Virginia Square (12/136) = 8.8%



**Figure 2-54: Missing Curb  
Ramp Example**

### ***Tier 2: Non-Compliant and Non-Functional***

Tier 2 includes intersection segments with one missing curb ramp, yet the intersection design allows individuals to navigate from one point to another, although not along the most direct route. Figure 2-55 is an example of a Tier 2 intersection leading to a missing curb ramp. In the Study Area, 86 intersections are classified as Tier 2, or about 10% of all intersection segments surveyed.

- Tier 2 Intersection Segment Breakdown by TOD
  - Ballston (17/150) = 11.3%
  - Buckingham (4/100) = 4.0%
  - Clarendon (12/185) = 6.5%
  - Court House (19/179) = 10.6%
  - Rosslyn (25/140) = 17.8%
  - Virginia Square (9/136) = 6.6%



Figure 2-55: Tier 2 Intersection

### *Tier 3: Non-Compliant but Functional (more issues)*

Tier 3 represents intersection segments that do not meet one or more of the Access Board's or MUTCD guidelines but remain functional, or accessible, for a majority of persons with disabilities. This category includes intersection segments that contain an above average number of compliance issues, and do not fall within Tiers 1, 2, or 5. Compliance issues within this tier include surface gaps and vertical changes. Figure 2-56 displays a Tier 3 intersection segment with a vertical change that may be difficult to navigate for persons in wheelchairs or those with walkers. In instances of manual pedestrian signals, it also includes segments in which the pedestrian button(s) is not accessible from a level 30 by 48 inch space, or is mounted six inches or more below or above 42 inches. Figure 2-57 is an example of a pedestrian push button that is located on a steep slope. When a pedestrian refuge island (either a median or a side island) is present in the intersection, the category includes segments that lack refuge island curb ramps, where needed, or lack refuge island truncated domes. Tier 3 contains 54 out of 890 intersection segments surveyed (6.1%).



Figure 2-56: Tier 3 Intersection with a vertical change

- Tier 3 Intersection Segment Breakdown by TOD
  - Ballston (20/150) = 13.3%
  - Buckingham (6/100) = 6.0%
  - Clarendon (8/185) = 4.3%
  - Court House (8/179) = 4.4%
  - Rosslyn (6/140) = 4.3%
  - Virginia Square (6/136) = 4.4%

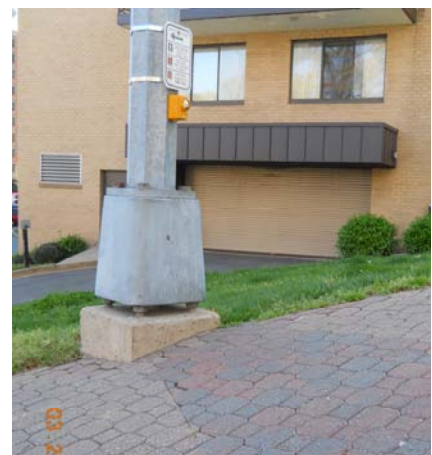


Figure 2-57: Tier 3 Intersection with a difficult-to-access pedestrian button due to slope of sidewalk

#### ***Tier 4: Non-Compliant but Functional (fewer issues)***

Tier 4 contains intersection segments that contain a below average number of compliance issues as discussed in Tier 3, and do not fall within Tiers 1, 2, or 5. Figure 2-58 shows an example of a Tier 4 intersection with a small surface gap. Tier 4 represents 125 out of 890 intersection segments surveyed (14.0%).

- Tier 4: Intersection Segment Breakdown by TOD
  - Ballston (27/150) = 18.0%
  - Buckingham (8/100) = 8.0%
  - Clarendon (25/185) = 13.5%
  - Court House (28/179) = 15.6%
  - Rosslyn (22/140) = 15.7%
  - Virginia Square (15/136) = 11.0%



**Figure 2-58: Tier 4 Intersection segment with a gap along the crossing**

#### ***Tier 5: Compliant and Functional***

The category Compliant (Tier 5) represents intersection segments that do not have any compliance issues with 2010 Standards. Figure 2-59 shows an example of a Tier 5 intersection segment with an accessible median. The majority of intersection segments in the study area fall in this category (592 of 890 segments, or 66.5%).

- Tier 5: Intersection Segment Breakdown by TOD
  - Ballston (83/150) = 55.3%
  - Buckingham (75/100) = 75.0%
  - Clarendon (132/185) = 71.0%
  - Court House (120/179) = 67.0%
  - Rosslyn (81/140) = 57.8%
  - Virginia Square (101/136) = 74.3%

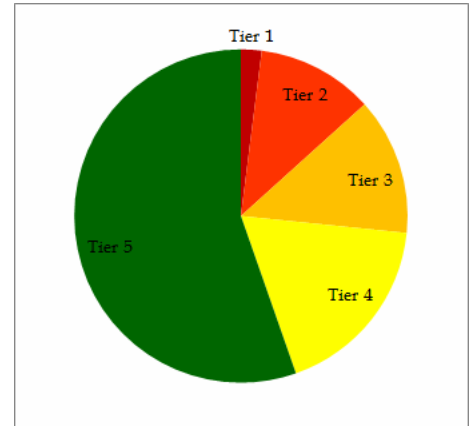


**Figure 2-59: Tier 5 Intersection Segment**

**Ballston TOD Assessment**

As seen in Figure 2-60, almost three-quarters of the intersection segments within the Ballston TOD are either Tier 4 or Tier 5. Ballston has the lowest percentage of segments that is Tier 1 among all TODs, but it also has the lowest percentage of segments without any deficiencies (55% Tier 5). Compliance issues are most prevalent along and to the southwest of Glebe Road. Figure 2-61 displays the locations of the intersection segments within the TOD.

- Ballston Intersection Segment Overview
  - Tier 1 (3/150) = 2.0%
  - Tier 2 (17/150) = 11.3%
  - Tier 3 (20/150) = 13.3%
  - Tier 4 (27/150) = 18.0%
  - Tier 5 (83/150) = 55.3%

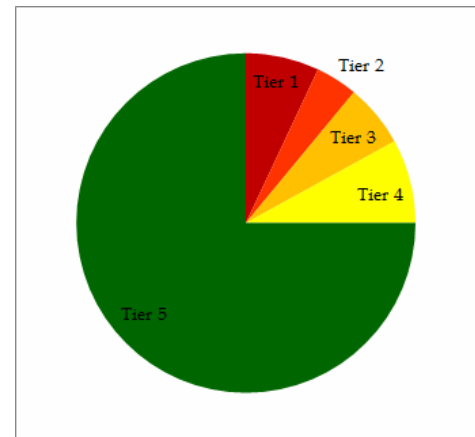


**Figure 2-60: Ballston Intersection Segment Tiers**

**Buckingham TOD Assessment**

Buckingham contains the second highest percentage of Tier 5 intersection segments as shown in Figure 2-62. However, it also has the greatest percentage of intersection segments in Tier 1. These Tier 1 intersection segments are dispersed, but several are concentrated in the southern section near Arlington Boulevard. Figure 2-63 displays the locations of the intersection segments within this TOD.

- Buckingham Intersection Segment Overview
  - Tier 1 (7/100) = 7.0%
  - Tier 2 (4/100) = 4.0%
  - Tier 3 (6/100) = 6.0%
  - Tier 4 (8/100) = 8.0%
  - Tier 5 (75/100) = 75.0%



**Figure 2-62: Buckingham Intersection Segment Tiers**

Figure 2-61: Ballston Intersection Segment Assessment Summary Map



Figure 2-63: Buckingham Intersection Segment Assessment Summary Map



2-45

### Clarendon TOD Assessment

Clarendon features the second highest proportion of Tier 5 intersection segments (71%), as shown in Figure 2-64. These are most notably found along Wilson and Clarendon Boulevards. It also has the smallest percentage of segments with missing curb ramps. Figure 2-65 is a map displaying the location of the intersection segments within Clarendon.

- Clarendon Intersection Segment Overview
  - Tier 1 (8/185) = 4.3%
  - Tier 2 (12/185) = 6.5%
  - Tier 3 (8/185) = 4.3%
  - Tier 4 (25/185) = 13.5%
  - Tier 5 (132/185) = 71.3%

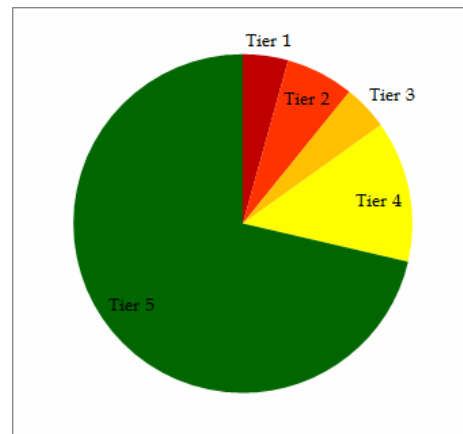


Figure 2-64: Buckingham Intersection Segment Tiers

### Court House TOD Assessment

Figure 2-66 shows the condition of intersection segments in Court House. Along with Ballston, Court House also had the lowest percentage of Tier 1 segments. Figure 2-67 is a map displaying segment locations within the Court House TOD.

- Court House Intersection Segment Overview
  - Tier 1 (4/179) = 2.2%
  - Tier 2 (19/179) = 10.6%
  - Tier 3 (8/179) = 4.4%
  - Tier 4 (28/179) = 15.6%
  - Tier 5 (120/179) = 67.0%

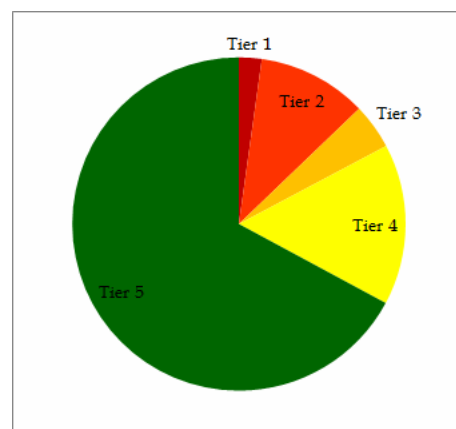


Figure 2-66: Court House Intersection Segment Tiers

Figure 2-65: Clarendon Intersection Segment Assessment Summary Map

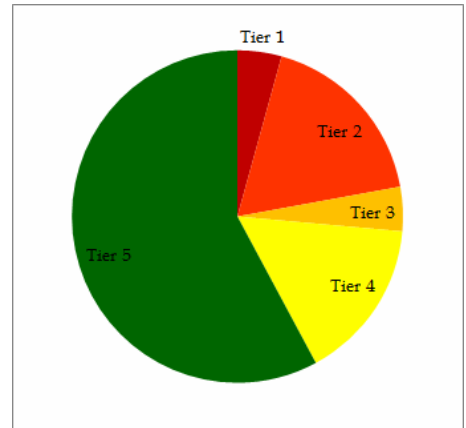




**Rosslyn TOD Assessment**

Rosslyn contains the greatest percentage of Tier 2 intersection segments, as well as the greatest percentage of missing curb ramps (20.7%), as shown in Figure 2-68. With the exception of Ballston, it also had the lowest percentage of Tier 5 intersection segments. Figure 2-69 displays segment locations within the Rosslyn TOD.

- Rosslyn Intersection Segment Overview
  - Tier 1 (6/140) = 4.3%
  - Tier 2 (25/140) = 17.8%
  - Tier 3 (6/140) = 4.3%
  - Tier 4 (22/140) = 15.7%
  - Tier 5 (81/140) = 57.8%

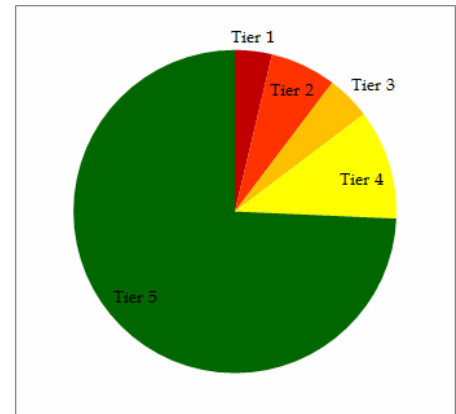


**Figure 2-68: Rosslyn Intersection Segment Tiers**

**Virginia Square TOD Assessment**

Figure 2-70 displays the condition by tier of intersection segments in Virginia Square. Notably, it has the greatest percentage of Tier 5 segments. Figure 2-71 is a map displaying segment locations within the Virginia Square TOD.

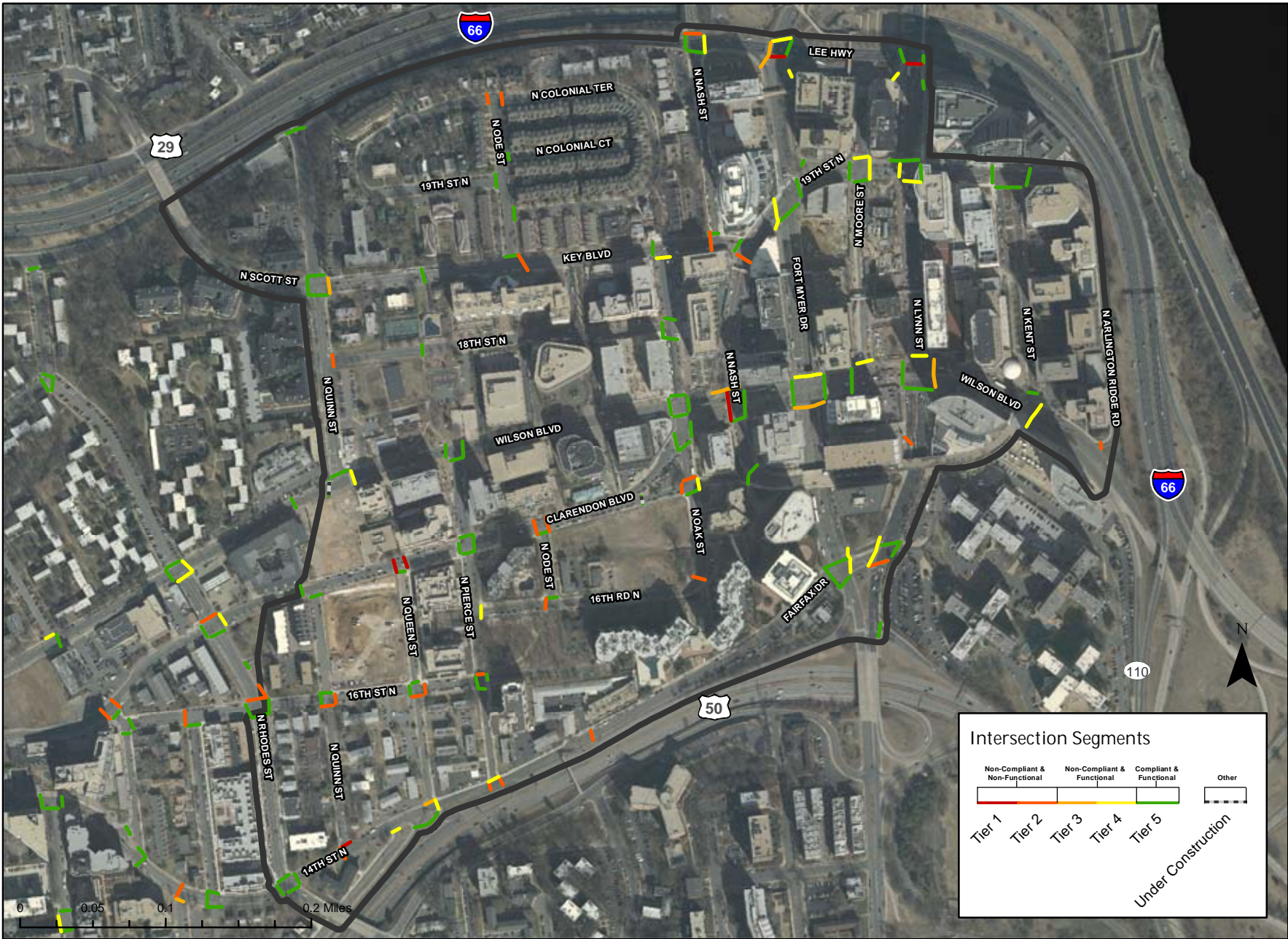
- Virginia Square Intersection Segment Overview
  - Tier 1 (5/136) = 3.7%
  - Tier 2 (9/136) = 6.6%
  - Tier 3 (6/136) = 4.4%
  - Tier 4 (15/136) = 11.0%
  - Tier 5 (101/136) = 74.3%



**Figure 2-70: Virginia Square Intersection Segment Tiers**

Figure 2-69: Rosslyn Intersection Segment Assessment Summary Map

2-50







## Chapter 3

# Prioritization Strategies

This chapter provides the recommended prioritization strategies to upgrade Arlington County's sidewalks, curb ramps, and intersections to meet the 2010 ADA Accessibility Guidelines.

### REVIEW OF PRIORITIZATION STRATEGIES USED IN OTHER AREAS

As part of developing the prioritization strategies to upgrade the County's pedestrian infrastructure, a literature review was conducted to identify how other jurisdictions/agencies are prioritizing their pedestrian walk path improvements, and input was obtained from County staff and Arlington County's Disabilities Advisory Commission. The literature review identified the following locations and agencies that have developed strategies for improving their sidewalks and curb ramps:

- City of Bellevue, Washington
  - Strategy:
    - Activity score based on proximity to specific land uses
    - Impedance score based on sidewalk and curb ramp deficiencies
    - Combination of Activity and Impedance score provides overall Barrier Ranking
  
- Michigan Area Council of Governments (Elkhart and Goshen Counties, Indiana)
  - Strategy:
    - Prioritization based on point value from 1 - 4
      - Sidewalk - 4 points = no sidewalk to continue an accessible route
      - Curb Ramp - 4 points = curb ramp running slope greater than 12%
      - Crosswalk - 4 points = no crosswalk connecting 2 sidewalks across a street

- Clark County, Washington (part of Portland, Oregon metropolitan area)
  - Strategy:
    - Ongoing Sidewalk Program
      - Proximity to pedestrian generators
      - Technical Factors – pedestrian accidents, vehicle speed, terrain, amount of vehicular traffic
      - Construction factors – available right-of-way, development applications, environmental impacts
    - ADA Program Criteria
      - Focused primarily on curb ramps
      - Priority
        - High volume roadways or locations with significant pedestrian generators
        - Specific public request
- Sacramento Regional Transit District, California
  - Strategy:
    - Location Priorities – proximity to specific land uses
      - 3 Priority Levels
        - Public/government facilities
        - Employment sites, retail, high density housing, medical
        - Lower density residential
    - Quality Priorities
      - Focuses primarily on curb ramps
    - Ranking System
      - Unsafe condition that may impede travel
      - Missing curb ramps
      - Obstructed curb ramps
      - Not meeting accessibility standards
- Contra Cost County, California
  - Strategy:
    - Curb Ramp Priority
      - Proximity to major land uses
        - Government
        - Schools
        - Hospitals
        - Transit

- Type of designated areas
  - Commercial
  - Recreational
  - Residential
  - Industrial
  
- Alameda County, California
  - Strategy:
    - Connection to designated activity centers
    - Safety
    - Accessibility
    - Project support
  
- PEDSAFE – Recommended Guidelines/Priorities for Sidewalks and Walkways
  - Strategy:
    - Select three or more criteria (i.e. speed, street classification, crash data, school walking zones, transit routes, neighborhood with low vehicle ownership, urban centers/neighborhood commercial areas, other pedestrian generators, missing links, and neighborhood priorities)
    - Use GIS to identify overlapping priorities
    - Develop a points method
    - Produce prioritized list

For a more detailed description of each of the six jurisdictions/agencies refer to Appendix A.

## **RECOMMENDED PRIORITIZATION STRATEGY**

The recommended prioritization strategy will serve as a general guide for Arlington County to plan and implement pedestrian access improvements that will improve mobility, particularly for persons who use wheelchairs or other mobility aids. The goal of this strategy is to make improvements on sidewalks, curb ramps, and intersections to meet current ADA accessibility guidelines at locations which will benefit the greatest number of users. The prioritization strategy is based on three main categories:

- Geography
- Deficiency
- Overlapping Priorities

## Geography

The Geography category identifies locations that are likely to attract the highest numbers of persons with disabilities as well as having generally high overall pedestrian activity where improvements will have the greatest impact. Areas that should be top priority for improving sidewalks, curb ramps, and intersections are within TOD corridors, since these locations tend to have the highest resident population and employment concentrations, as well as in close proximity to major pedestrian/transit trip generators, including transit stations, public facilities, essential retail, and bus stops along primary transit routes. High activity bus stops can be determined by using ART and Metro's most recent stop-level boarding and alighting data to determine high activity stops.

The TOD Development Corridors include:

- Rosslyn to Ballston Corridor, and
- Pentagon City to Crystal City Corridor

Pedestrian facilities that are in close proximity to major pedestrian/transit trip generators, but which fall outside of the TOD corridors will be the next highest priority, followed by other facilities within the TOD corridors. Specifically, the recommended prioritization based on geography is as follows:

- Highest Priority:
  - Pedestrian facilities within TOD corridors that are close to:
    - transit stations
    - public facilities (i.e. libraries, schools, and community centers)
    - grocery stores and pharmacies
    - bus stops along primary transit routes
- High Priority:
  - Pedestrian facilities outside of TOD corridors that are close to:
    - transit stations
    - public facilities (i.e. libraries, schools, and community centers)
    - grocery stores and pharmacies
    - bus stops along primary transit routes
- Medium Priority:
  - Other pedestrian facilities within TOD corridors

- Lower Priority:
  - Other pedestrian facilities outside of TOD corridors

New construction by the County and developers should render any deficiencies within the work boundaries fully ADA-compliant, so pedestrian facility segments (i.e. adjacent sidewalks and curb ramps) currently under or planned for construction are assumed to be addressed through the construction project.

## Deficiency

The Deficiency category takes into account the severity of the problem at each location. Severe deficiencies that render a block or place completely inaccessible (Tier 1 and sometimes Tier 2) should have higher priority over other problems (Tier 3 and higher) which render a location non-compliant without making it non-functional.

- High priority:
  - Locations with temporary obstructions (i.e. vendor boxes, trash receptacles, bike racks) and readily-corrected issues (i.e. trimming bushes and shrubs in public right-of-way)
  - Locations that are non-functional and non-compliant.
- Medium priority:
  - Medians, side islands, and pedestrian refuge islands - locations with no adjacent private property are the least likely to be corrected by private redevelopment efforts and therefore should be prioritized for public improvements
- Lower priority:
  - Locations that are non-compliant but functional

## Overlapping Priorities

Identifying locations that meet multiple criteria will ensure that improvements will benefit the greatest number of people. One way this can be accomplished is through the use of a Geographic Information System or GIS. Using GIS buffers can be created around major transit destinations as identified in the Geography priorities listed above. After creating these different buffers, thematic maps can then be created to depict the Deficiency priorities in relation to the Geography priorities. This will allow for the generation of a preliminary list of prioritized projects. Improvement projects stemming from this prioritized list should be further reviewed and coordinated with any existing or planned sidewalk and/or roadway resurfacing, rehabilitation, or replacement efforts.

## Title VI and Environmental Justice

Projects funded with DOT and FTA funds should take into consideration Title VI and Environment Justice (EJ) Policies. Title VI of the Civil Rights Act of 1964 (42 U.S.C. Section 2000d), requires that all federal grantees ensure that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participating in, or denied the benefits of, or be subject to discrimination under any program, or activity receiving federal financial assistance. The grantee must ensure that federally-supported transit services and related benefits are distributed in an equitable manner. Planned changes in services, facilities, and policy must not result in discrimination against any segment of the community. Service and facilities planning must take into consideration the potential impact on minority populations. Minority communities and non-minority communities should be served with relative equity. Any service cuts should not result in a relatively higher loss of service for minority communities, while service expansions should serve minority communities as well as non-minority communities.

There are also EJ requirements for new FTA-funded construction. Executive Order 12898, Federal Actions to Address Environment Justice in Minority Populations and Low-Income Populations, requires identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of federally funded programs, policies, and activities on minority populations and/or low-income populations. The guiding EJ principles are as follows:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

More information on Environment Justice can be found at [http://www.fta.dot.gov/documents/FTA\\_EJ\\_Circular\\_7.14-12\\_FINAL.pdf](http://www.fta.dot.gov/documents/FTA_EJ_Circular_7.14-12_FINAL.pdf).

## Chapter 4

# Developing an ADA Transition Plan

This chapter is intended to assist Arlington County in developing and maintaining an ADA Transition Plan for making access improvements to pedestrian facilities. The following provides a framework based upon the NCHRP Project Number 20-07 (232), *ADA Transition Plans: A Guide to Best Management Practice*. The main points of the document are summarized in the following section.

### BACKGROUND

Under Title II of the ADA, as specified in 28 CFR Section 35.150, state and local governments must perform self-evaluations of their current facilities and those that that employ 50 or more persons must develop a Transition Plan to address deficiencies. The Transition Plan is intended to achieve the following:

- Identify physical obstacles that limit the accessibility of facilities to individuals with disabilities.
- Describe the methods to be used to make the facilities accessible.
- Provide a schedule for making the access modifications.
- Identify the public officials responsible for implementation of the Transition Plan.

The Plan is required to be updated periodically until all accessibility barriers are removed.

## STEPS TOWARDS ACHIEVING COMPLIANCE

In addition to the creation of a Transition Plan, there are other steps to help ensure that Arlington County is working effectively to meet ADA accessibility requirements for pedestrian facilities in the public right-of-way. Several of these steps have already been completed or are currently underway by Arlington County. The following section describes these steps and provides a status update with regard to Arlington County's actions.

### **Step 1: Designating an ADA Coordinator**

An ADA Coordinator fields questions and concerns regarding accessibility for people with disabilities and facilitates activities for implementing compliance plans. The ADA Coordinator should be familiar with the operation of the Department, trained in ADA requirements and regulations, and able to communicate effectively with local government officials and the public.

Arlington County currently has an ADA Coordinator which is located within the Office of the County Manager, Division of Human Rights, and EEO. The ADA coordinator is tasked with coordinating the administrative requirements of ADA compliance and responding to complaints filed by the public.<sup>1</sup>

### **Step 2: Providing Notice about the ADA Requirements**

Providing notice is a continuing responsibility. Public transit riders and advocacy organizations are common groups that should be kept informed regarding ADA requirements. The DOJ has provided a model for posting ADA requirements on Department websites. More information regarding providing notice can be found at <http://www.ada.gov/pcatoolkit/chap2toolkit.htm>.

The people with disabilities and other interested members of the community should have ample opportunity to participate in the development of the Transition Plan. Special events, newsletters, and websites provide opportunities for dissemination of information and public input.

The Arlington County Department of Planning currently provides public notice about the rights of the public under the ADA and the responsibilities of the Department under the ADA as is required.

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<sup>1</sup> <http://www.arlingtonva.us/web/accessibility.aspx>.

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### Step 3: Establish a Grievance Procedure

Departments are required to publish procedures for resolving grievances regarding accessibility in the public right-of-way. Procedures should establish a system for efficiently and fairly resolving complaints of disability. The DOJ provides a model for Departments to follow which can be found at <http://www.ada.gov/pcatoolkit/noticetoolkit.pdf>.

Arlington County currently has a grievance procedure in place. Any individual who wants to file an ADA Grievance in Arlington County must fill out an ADA Grievance Form and submit it to the Office of the County Manager in the Office for Persons with Physical Disabilities within the Division of Human Rights and EEO.<sup>2</sup> A link to the Grievance Form can be found at [www.arlingtonva.us/web/accessibility.aspx](http://www.arlingtonva.us/web/accessibility.aspx).

### Step 4: Development of Internal Standards, Specifications, and Design Details

The U.S. Access Board has developed accessibility guidelines for pedestrian facilities. A Department can adopt these guidelines into their own local system of standards, specifications, and design details. This procedure ensures consistency and compliance in the implementation of new pedestrian facilities.

Arlington County currently has design standards that allow for consistency in the application of ADA requirements for new facilities and infrastructure.<sup>3</sup> Design standards and policies regarding compliance with ADA requirements are located within the Arlington County Master Transportation Plan, found at [www.arlingtonva.us/departments/EnvironmentalServices/dot/planning/mplan/mtp/images/file65402.pdf](http://www.arlingtonva.us/departments/EnvironmentalServices/dot/planning/mplan/mtp/images/file65402.pdf).

### Step 5: The ADA Transition Plan

The Transition Plan should consist of the following elements:<sup>3</sup>

1. A list of physical barriers that limit accessibility of individuals with disabilities (the self-evaluation). A comprehensive list of physical barriers along sidewalks, curb ramps, and intersections has recently been completed along the Rosslyn-Buckingham transit corridor as described in Chapter 2. The Crystal City and Pentagon City transit oriented corridors, and areas

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<sup>2</sup> <http://www.arlingtonva.us/departments/CountyManager/HumanRights/page59205.aspx>

<sup>3</sup> The National Academies, *ADA Transition Plans: A Guide to Best Management Practices*.

outside the Rosslyn-Buckingham transit corridor still needs a self-evaluation to be conducted.

2. A detailed description of the methods to remove these barriers and make the facilities accessible.
3. A schedule for taking the necessary steps.
4. The name of the official responsible for implementation.
5. A schedule for providing curb ramps.
6. A record of the opportunity given to the disability community and other interested parties to participate in the development of the plan.

Table 4-1 gives a more detailed description of the elements to be included in the ADA Transition Plan. Periodic updates to the ADA Transition Plan will be required to ensure ongoing compliance.

**Table 4-1: Transition Plan Elements**

Section	Contents
I. Self-Evaluation	A list of physical barriers in the department's facilities that limit accessibility of individuals with disabilities. This may take the form of an excel spreadsheet or GIS files incorporated by reference, or can be worked into a narrative list to be embed
II. Corrective Program	A detailed description of the methods to remove these barriers and make the facilities accessible.
III. Implementation Schedule	A schedule for taking the necessary steps.
IV. Program Responsibility	The name of the official responsible for implementation. This should include the name of the department ADA Coordinator, as well as a transition plan team (if there is one), or the regional coordinators, if the inventory and transition plan's area is divi
V. Curb Ramp Correction Program	A schedule for providing curb ramps.
VI. Public Involvement Record	Record of the opportunity given to the disability community and other interested parties to participate in the development of the plan.

### **Step 6: Schedule and Budget for Improvements**

The Transition Plan should include a schedule of repairs and reconstructions necessary to meet accessibility requirements in each year following the Transition Plan. Arlington County should maintain a list of potential funding sources to provide accessibility improvements. The work of KFH Group will assist Arlington County in prioritizing accessibility improvements within the Study Area.

### **Step 7: Monitoring the Progress**

The Transition Plan needs to be utilized in yearly planning of projects and funding decisions in order to be effective. The Plan should also be reviewed periodically for compliance and validity. It should be viewed as a “living document” and updated regularly to reflect changes in real world conditions and to address any possible new areas of non-compliance.



## **APPENDIX A**

### **Best Practice Strategies for Prioritizing Walk Path Improvements**



## Appendix A

### BEST PRACTICE STRATEGIES FOR PRIORITIZING WALK PATH IMPROVEMENTS

The following are examples of pedestrian improvement prioritization strategies in other areas across the country. These examples were derived from national publications and ADA plans in:

- City of Bellevue, Washington
- Michiana Area Council of Governments - Elkhart and Goshen Counties, Indiana
- Clark County, Washington (part of Portland, Oregon metro area)
- Sacramento Regional Transit District, California
- Alameda County, California
- City of Bellevue, Washington
- PEDSAFE - Recommended Guidelines/Priorities for Sidewalks and Walkways

#### CITY OF BELLEVUE, WASHINGTON

The City used a GIS-based barrier ranking analysis combines an activity and impedance score for every sidewalk and curb ramp in Bellevue. A high activity score is representative of areas where pedestrian activity (especially among persons with disabilities) is likely to be greatest, based on demographic, land use, and transportation conditions. A high impedance score is representative of areas where the quality of existing pedestrian infrastructure is poor for persons with disabilities, based on barriers documented in the sidewalk and curb ramp inventory. The key principle is to assign a high ranking on a needs basis, not necessarily to the sidewalks and curb ramps in the worst condition but rather to those that would provide the most benefits to people with disabilities.

$$\underline{\text{ACTIVITY SCORE}} + \underline{\text{IMPEDANCE SCORE}} = \underline{\text{BARRIER RANKING}}$$

#### Activity Score

The closer that needed accessibility improvements are located to various important trip generators and transportation facilities, the higher their score. Activity

factors that describe the likelihood of disability community usage of an area's pedestrian facilities are based on the following ten activity score categories (summing to a possible 100 points).

1. Locations with higher concentrations of persons with disabilities - This activity score category is informed by the proximity (expressed in linear feet) to home address locations of Metro Accessible services clients. (weight = 25)
2. Higher volume streets - This activity score category is informed by Bellevue's roadway arterial classifications. (weight = 25)
3. Places of public accommodation - This activity score category is informed by the proximity (expressed in linear feet) to these destinations. (weight = 10)
4. Housing density - This activity score category is informed by Comprehensive Land Use Plan densities (expressed as units/acre). (weight 10)
5. Seniors - This activity score category is informed by zones identified in the Census 2000 database as having 6+ percent of the population aged 65 or older. (weight 10)
6. Transit - This activity score category is informed by King County Metro's 2008 stop-level boarding activity data. (weight = 10)
7. Employment center - This activity score category is informed by whether a pedestrian facility is within a major employment center identified in the Bellevue Comprehensive Plan. (weight = 10)
8. Park Facilities - This activity score category is informed by the proximity (expressed in linear feet) to these destinations. (weight = 10)
9. Schools - This activity score category is informed by the proximity (expressed in linear feet) to these destinations. (weight = 10)
10. Retail - This activity score category is informed by the proximity (expressed in linear feet) to these destinations. (weight = 10)

### **Impedance Score**

Activity scores generated from the barrier ranking analysis are then merged with sidewalk and curb ramp impedance scores representing constraints on mobility in the public rights-of-way. The impedance score calculations are informed by design

guidance found in the ADA Accessibility Guidelines (ADAAG) on dimensions and details for new construction and alterations of both sidewalks and curb ramps.

### **Sidewalk Impedance Score**

Focuses on sidewalk characteristics that directly affect the usability of a sidewalk and determines whether the facility's features represent a low, medium, or high barrier to accessibility. The score is based on the number and severity of incidents of each of the following barriers over a given block face: fixed obstructions, changes in level, cross-slope, and running slope. Scores are further adjusted by the ratio of non-standard features relative to the total length of the block face (a possible 100 points).

1. Fixed Obstructions (weight 25)
2. Changes in Level (weight 25)
3. Cross Slope (weight 25)
4. Running Slope (weight 25)

### **Curb Ramp Impedance Score**

Focuses on curb ramp characteristics that directly affect the usability of a ramp and determines whether the facility's features represent a low, medium, or high barrier to accessibility. The curb ramp impedance score is determined by two levels of consideration – locations where curb ramps are warranted but missing (priority 1); or, locations where curb ramps exist but have non-standard features (priority 2).

1. Ramp Surface Obstruction (weight 10)
2. Alignment with Marked Crosswalks (weight 10)
3. Detectable Warning Surface (weight 10)
4. Smooth Gutter/Ramp Transition (weight 10)
5. Landing Panel Size (weight = 10)
6. Landing Panel Slope (weight = 5)
7. Ramp Width (weight = 10)
8. Ramp Flare Slope (weight = 5)
9. Ramp Panel Running Slope (weight = 10)
10. Ramp Panel Cross Slope (weight = 10)
11. Gutter Running Slope (weight 5)

# MICHIANA AREA COUNCIL OF GOVERNMENTS - ELKHART & GOSHEN COUNTIES, INDIANA

## Sidewalk Analysis

1. Is there a sidewalk at each corner?
2. Is there at least 4' of continuous and unobstructed clear width of a sidewalk (excluding the curb width)?
3. If the continuous width is less than 5', are the passing spaces at least every 200' that are 5' wide or greater?
4. Is the cross slope of the sidewalk less than 2%?
5. Where the sidewalk is adjacent to the street, does the grade of the sidewalk not exceed the general grade of the street?
6. Is the surface of the sidewalk firm, stable, and slip resistant?
7. Are any gaps in the surface less than 0.50"?
8. Is the sidewalk clear of grates or if there is a grate, are the openings no more than 0.5" wide and elongated openings running perpendicular to the direction of travel?
9. Is the sidewalk clear of protruding objects? If there is a protruding object does:
  - a. the leading edge of that object less than 27" and more than 80" above the ground, or
  - b. protrudes less than 4" into the travel path of the sidewalk, or
  - c. a barrier is provided no more than 27" from the ground where the vertical clearance is less than 80".

Sidewalk Priority Matrix		
Priority	Point Value	Identified Issue
1	4	No sidewalk to continue an accessible route across a curb.
2A	3	An existing sidewalk's running slope is greater than the general grade of the street.
2B	3	An existing sidewalk with a continuous clear width less than 4'.
2C	3	An existing sidewalk with obstructions in the clear path.
3B	2	An existing sidewalk without a 5' passing zones at least every 200'.
3C	2	An existing sidewalk with a cross slope greater than 2%.
4A	1	An existing sidewalk with vertical or horizontal gaps.
4B	1	An existing sidewalk with grate openings in the direction of travel and greater than 0.5" wide.
4C	1	An existing sidewalk without stable, firm and slip resistant surfaces.

## Curb Ramp Analysis

1. Is there a curb ramp?
2. Is there a curb ramp where a sidewalk crosses a street?
3. What type of curb ramp?
  - a. Perpendicular curb ramp
  - b. Parallel curb ramp
  - c. Blended transitions
4. Is the width of the curb ramp at least 4' width (excluding flares)?
5. Is there a detectable warnings complying with regulations provided where a curb ramp or blended transition connects to a street?
6. Is the running slope greater than 5% but less than 8.3%?
  - a. Blended transition 5% maximum
7. Is the cross slope less than 2%?
8. Is the landing a minimum of 4' x 4'?
9. Is the surface of the curb ramp or blended transition firm, stable and slip resistant and clear of gratings, access covers, and other appurtenances?
10. Is the grade break at the top and bottom of the ramp flush and is not located on the surface of the curb ramp, landing or gutter areas?
11. Is the counter slope of the gutter or street at the foot of the curb ramp less than 5%?
12. Is the clear space beyond the curb face at least 4' x 4'?
13. If the curb ramp is a perpendicular curb ramp, is the flared sides slope less than 10% where a pedestrian path crosses the curb ramp or if the sides are returned, are they protected from cross travel?

<b>Curb Ramp Priority Matrix</b>		
<b>Priority</b>	<b>Point Value</b>	<b>Identified Issue</b>
1A	4	An existing curb ramp's running slope is greater than 12%.
1B	4	No curb ramp where a sidewalk or pedestrian path exists and crosses a curb.
2A	3	An existing curb ramp's running slope is greater than 8.33% or less than 5%.
2B	3	An existing curb ramp with a width less than 4'.
3A	2	An existing curb ramp with a landing is less than 4'x4' or a clear space at the bottom of the ramp that is less than 4'x4'.
3B	2	An existing curb ramp with a cross slope greater than 2% or a gutter slope greater than 5%.
4A	1	An existing curb ramp with grade breaks that are not flush or do not have properly installed detectable warnings.
4B	1	An existing curb ramp with sides that do not meet standards or without a stable, firm and slip resistant surface or with an obstacle in the path.

## Crosswalk Analysis

1. Is there crosswalk that connects two sidewalks across a street?
2. Is the width of the marked crosswalk at least 6'?
3. Does the cross slope of the crosswalk meet the guidelines?
  - a.
4. Is the running slope of the crosswalk less than 5%?
5. If the crosswalk crosses a median, is the length of the median at least 6' and has detectable warnings located at curb line or edge of the roadway?
6. If the crosswalk is crossing a street with a stop control, is the cross slope less than 2%?
  - a. If the crosswalk is crossing a street without a stop control, is the cross slope less than 5%?the intersection signalized, if so, does it have a pedestrian signal, if so, is the pedestrian signal phase allow enough time for a walking speed of 3.5 ft/sec?

Crosswalk Priority Matrix		
Priority	Point Value	Identified Issue
1	4	No crosswalk to connect two sidewalks across a street.
2A	3	An existing crosswalk with a cross slope greater than standard.
2B	3	An existing crosswalk with a running slope greater than 5%.
3A	2	An existing crosswalk with a width less than 6'.
3B	2	If an existing crosswalk crosses a median and the median is less than 6' long or does not have detectable warnings.
4	1	If an existing crosswalk has a pedestrian signal and the pedestrian signal phase does not allow enough time for a walking speed of 3.5 ft/sec, or is signalized and does not have a pedestrian signal.

## CLARK COUNTY, WASHINGTON (part of Portland, Oregon Metro Area)

### Sidewalk Program Prioritization

The goal of the Sidewalk Ongoing Program is to address small-scale projects, usually filling gaps of 500 feet or less in existing sidewalks and walkways within the community. The Sidewalk Ongoing Program uses a ranked list to select projects funded by this program. Higher ranking equates to a higher probability of construction. County staff visit proposed sites to evaluate and rank projects based on factors including:

- Nearby pedestrian generators including household density, schools, parks, shopping, and medical offices.

- Technical factors including pedestrian accident rate, roadway speed, terrain and amount of vehicle traffic.
- Construction factors including availability of right-of-way, adjacent development applications and environmental or storm water impacts to be mitigated.

### **ADA Program Criteria**

Where needed, ADA ramps are constructed as part of each capital road construction or re-construction project. Therefore, the goal of the ADA Ongoing program is to provide a consistent source of funds to address small-scale 'spot' improvements along existing walkways within the community. General priority for the ADA Ongoing Program is:

- Locations lacking any ramps along high volume arterial or collector roads, in response to a specific public request.
- Locations lacking any ramps along lower volume roads, responding to a specific public request.
- Replacing or upgrading ramps that met code at the time of construction and remain generally safe and useable, even though the ramps are not up to current design standards. Higher volume roadways or locations with significant pedestrian generators are a higher priority for these ramp upgrades.

## **SACRAMENTO REGIONAL TRANSIT DISTRICT, CALIFORNIA**

Current priorities are generally divided into two separate elements: location and quality. "Location Priorities" are generally based upon the proximity to specific land uses. "Quality Priorities" are generally based upon the nature of the existing improvement and the extent to which it may create a barrier.

### **Location Priorities**

#### **Priority Level 1:**

1. State, county, and local government buildings located within County of Sacramento;

2. Public hospitals, health clinics/offices, medical clinics/offices, mental health clinics/offices and therapy centers;
3. Public housing projects and public homeless shelters;
4. Police and/or Sheriff neighborhood service centers;
5. CalWorks offices, Sacramento Employment Training Agency facilities;
6. County parks;
7. Public schools, including in the following order, but not limited to: community colleges, high school, junior high and elementary school programs with magnet programs for children with disabilities; and all other schools;
8. State and local government offices with high public traffic, beginning with, but not limited to: transportation hubs and major corridors and routes; Department of Motor Vehicles offices; state parks, and prisons.

### **Priority Level 2**

Areas of public accommodation, which are privately owned, including but not limited to:

1. Hospitals, health clinics/offices, medical clinics/offices, mental health clinics/offices, therapy centers, private doctors' offices
2. Senior facilities
3. Major shopping malls
4. Large housing complexes
5. Major employment sites
6. Supermarkets
7. Retail strip centers
8. Small apartment facilities, duplexes
9. Service sites of disability organizations
10. Rehabilitation facilities

### **Priority Level 3**

1. Residential areas
2. Intersections that are not included in any of the above groups

### **Quality Priorities**

The following priority list is also based upon current County policy. This policy currently focuses primarily on curb ramps. County policy also includes a numerical ranking system that evaluates the various factors described below, but for simplicity, that system is not described herein. The current ranking system could also be used to evaluate potential improvements.

1. Reconstructing curb ramps at locations where existing curb ramps have an unsafe condition that may impede a path of travel, such as vertical displacement of the curb ramp, broken or cracked concrete, deteriorated conditions, etc.
2. Installing new curb ramp(s) at locations where there is no curb ramp(s) to provide accessibility.
3. Where only one curb ramp exists at a corner, constructing an additional curb ramp at the same return, provided that conditions allow it and traffic controls allow for a safe path of travel.
4. Constructing or reconstructing a curb ramp at a location with difficult physical conditions, such as major utility conflicts, physical barriers, or other constraints.
5. Reconstructing an existing curb ramp when it does not meet current federal and state accessibility standards (i.e. color contrast, scoring lines, detectable warnings, slope, etc.).

## **CONTRA COSTA COUNTY, CALIFORNIA**

### **Facility Inventory**

In order to assess the necessary improvements to remove any barriers for individuals with physical disabilities according to ADA standards, the County conducted an inventory assessment of the following:

- Locations of existing curb ramps that do not meet current ADA standards
- Locations without curb ramps where curb ramps are required
- Locations of existing curb ramps that meet current ADA standards
- Location with sidewalks
- Locations of obstructions within sidewalks that do not meet current ADA standards
- Location of traffic signals

### **Government Facilities**

As the initial step toward generating an inventory of pedestrian facilities, the County generated a list of government facilities located within unincorporated Contra Costa County to assess the need for sidewalk upgrades or repairs, curb ramps, and signal upgrades to meet current ADA standards.

## **Sidewalks and Curb Ramps**

Several methods for data collection were used. During collection of traffic data, staff collected data regarding the location of existing sidewalk. Also, during pavement condition assessment, staff collecting data on sidewalk locations. Where possible, aerial maps and subdivision maps were used to collect sidewalk and curb ramp information. Curb ramps will be installed in the order as described in the prioritization.

## **Traffic Signals**

Traffic signals also contain pedestrian features that must meet current ADA standards. An inventory of all traffic signals the County owns and operates. The County upgraded all of its pedestrian pushbuttons to meet ADA standards for pushbuttons. The County is the only jurisdiction in all of Contra Costa County to have achieved 100% conversion of their push buttons to ADA compliant devices.

## **Prioritization**

To ensure that the most needed curb ramps will be installed first the County will prioritize the curb ramps based on the following factors:

1. Install curb ramps at the intersections around the block containing the following facilities(listed in priority order):
  - o Government Service Buildings
  - o Schools
  - o Hospitals
  - o Mass Transit Access points
2. Install curb ramps in the following areas (listed in priority order):
  - a. Commercial Areas
  - b. Recreational Areas
  - c. Residential Areas
  - d. Industrial Areas

In addition, the Department will install curb ramps at locations where members of the community have requested them. The Department also coordinates its efforts with other government agencies and private entities to achieve ADA accessibility.

## **ALAMEDA COUNTY, CALIFORNIA**

The recommended bikeway and pedestrian projects were evaluated by a total of 100 points reflecting the potential of a project to satisfy County goals and policies. Based

upon the resulting priority score, each project was further classified with a High, Medium, and Low priority rating.

These ratings are defined as:

- **High Priority:** Projects that have the highest priority for implementation and targeted for completion within five years.
- **Medium Priority:** Projects that have moderate priority for implementation and targeted for completion within ten years.
- **Low Priority:** Projects that have the lowest relative priority and targeted for completion within 10 to 15 years.

The prioritization methodology used is described below.

### **Pedestrian Project Prioritization**

The pedestrian criteria were divided into four categories. Points were assigned based upon the project's relative ability to meet the criteria within each category.

1. **Connection to Activity Centers** (total of 45 points): Projects which provide access to activity centers within and adjacent to the Unincorporated Areas such as schools, retail and employment centers, libraries, parks, community/senior centers, and transit stops/stations. Because of the County's focus on connecting neighborhoods to the destinations most frequently accessed and a concern for the safety of school children, this category was heavily weighted, particularly for connections to schools and retail and employment centers.
  - *How will the project improve connectivity to key destinations? The project will provide access, particularly within 1/4 mile to:*
    - Schools/colleges: 15 points
    - Major retail/employment: 10 points
    - Libraries/parks/recreational facilities/community and senior centers: 5 points
    - The project is located within 1/2 mile of a BART station: 10 points
    - The project connects to and is within 1/2 mile of a bus stop: 5 points

2. **Safety** (total of 25 points): Projects which address a safety concern such as a high number of pedestrian-involved collisions and roadway crossings. Because of the County's and community's interest in improving safety, this category was weighted to provide additional points for projects meeting the safety criteria.
  - o *How does the project improve pedestrian safety?*
    - o The project includes a street with a history of pedestrian collisions: 15 points
    - o The project improves a pedestrian crossing: 10 points
  
3. **Accessibility** (total of 10 points): Projects that provide access for persons with mobility limitations or communities that have been under-served by previous transportation investments.
  - o Does the project provide access to all parts of the county as well as provide access for all users, including those with disabilities?
  - o Project enhances access and/or removes barriers for seniors or persons with disabilities: 5 points
  - o Project is located in a community that has been under-served by previous transportation investments or has health disparities when compared to the rest of the County: 5 points
  
4. **Project Support** (total of 20 points): Projects which do not require significant additional planning, study, or modifications to implement; projects which are part of a recognized current or future development or redevelopment project or can be implemented without coordination with agencies outside the County; projects that would be competitive for available funding sources; or projects that have community support.
  - a. *Does this project have the support of the public, and implementing and funding agencies?*
  - b. The project can be implemented without extensive additional planning or study, extensive modifications, or as part of a defined current or future development or redevelopment project: 4 points
  3. The project can be implemented without coordination with agencies outside the County: 2 points
  4. The project would be competitive for County, State or Federal funding sources such as Safe-Routes-to-School or Safe-Routes-to-Transit programs: 4 points
  5. The project has community support (i.e. is already included in community, county, or regional adopted planning documents or has been identified or initiated by community input or request.): 10 points

# PEDSAFE - RECOMMENDED GUIDELINES/PRIORITIES FOR SIDEWALKS AND WALKWAYS

## Suggested Criteria

The following were suggested criteria for establishing priorities. Select three or more of them when developing your own set of criteria. The key is to select criteria that produce the outcomes desired for your community.

1. **Speed** - There is a direct relationship between speed and the number and severity of crashes; high-speed facilities may rank higher if speed is a criterion.
2. **Street Classification** - Arterial streets should take precedence because they generally have higher pedestrian use (due to more commercial uses), have a greater need to separate pedestrians from motor vehicles (due to higher traffic volumes and speeds), and are the main links in a community.
3. **Crash Data** - Pedestrian crashes seldom occur with high frequency at one location, but there are clearly locations where crashes occur due to a lack of sidewalks. Usually, there is a pattern of pedestrian crashes up and down a corridor, indicating a need to provide sidewalks throughout, not just at crash locations.
4. **School Walking Zones** - School walking zones typically extend from residential areas to an elementary school. Children are especially vulnerable, making streets (especially arterials) in these zones prime candidates for sidewalk retrofitting.
5. **Transit Routes** - Transit riders need sidewalks to access transit stops. Arterials used by transit are prime candidates for sidewalk retrofitting.
6. **Neighborhoods With Low Vehicle Ownership** - Twenty percent of the U.S. population has a disability and 30 percent of our population does not drive. Walking is the primary mode of transportation for many of the people in this country. People with disabilities live throughout the community. If they are not seen in the community, it may be due to the fact that adequate facilities are not provided. In addition, car ownership is lower and crash rates are often higher in low- and moderate-income neighborhoods with lots of children. Therefore, some locations with high pedestrian use (neighborhoods with more children and elderly persons and where vehicle ownership is low) should be given special consideration for sidewalks.

7. **Urban Centers/Neighborhood Commercial Areas** - Areas of high commercial activity generate high pedestrian use, even if they are primarily motorists who have parked their car. Sidewalks are needed to improve safety and enhance the economic viability of these areas.
8. **Other Pedestrian Generators** - Hospitals, community centers, libraries, sports arenas, and other public places are natural pedestrian generators where sidewalks should be given priority.
9. **Missing Links** - Installing sidewalks to connect pedestrian areas to each other creates continuous walking systems.
10. **Neighborhood Priorities** - Local residents may have a sense of where the most desirable walking routes exist. Neighborhood groups or homeowners associations can provide a prioritized list of locations where they see a need for sidewalks. Agencies should be cautious about using this criterion, as it is not desirable to let neighborhood pressure override addressing a key safety concern. However, it may be useful to monitor requests from pedestrians with disabilities.

## **Approach**

1. **Overlapping Priorities Method** - The easiest and cheapest way to identify overlapping priorities is through graphical representation; the intent is to identify locations that meet multiple criteria. This methodology is especially useful in cases where there is not a lot of staff time and funding for detailed analysis. It can be accomplished using a GIS system or it can be done by hand.

The best way to describe this methodology is by example. Assume that priorities are going to be developed based on transit routes, proximity to schools, people with disabilities, and neighborhood commercial areas. Start with a map of your jurisdiction. Using a color pen, identify those arterials that have high transit use; draw a half-mile circle around every elementary school and around locations that attract people with disabilities; and color in the neighborhood commercial areas. This visual approach will make areas of overlapping priorities become immediately clear. The streets without sidewalks within the overlapping areas are the highest priority for retrofitting sidewalks.

2. **Points Method** - A weighted points system can be used where staff time and funding are available for more detailed analysis, or if there is a large amount of capital available for sidewalk construction. If there are a lot of competing

projects, a more sophisticated point system can be used to explain to the public why certain projects were funded and others were not.

A point system can be developed in many ways; the system should be simple and produce desired outcomes. Any and all of the criteria listed above can be assigned a range of numbers and then be used to analyze the need for improvement at given locations. For example, a corridor could be assigned points based on the number of "walking along roadway" crashes over a 5-year period, the number of buses that travel the corridor during peak times, and the proximity to elementary schools. This method is time-consuming because it will be necessary to analyze multiple locations with sidewalk needs to create a list of priority projects.

3. **Prioritized List** – Both the overlapping priorities and the points methods will produce an initial list of prioritized projects. The next step is to refine the list so that it works, using common sense. One important consideration is that when roadways are resurfaced, rehabilitated, or replaced, curb ramps must be added if there are pedestrian walkways. In addition, the U.S. Department of Justice considers bus stops to be pedestrian walkways requiring access for people with disabilities, so areas near transit should be given priority accordingly. Improving pedestrian crossings, particularly on arterial streets, may also be an important part of some projects. Other important questions include: Are priority locations ones that might be expected? Are there many surprises? Are priority locations in line with community priorities and expectations? Are some priorities at locations with very low pedestrian use? If the answer to these questions is "yes," then the criteria or the methodology should be evaluated and possibly revised to create outcomes that better reflect expectations and desires. The methodologies should be used to prioritize known needs, not to create a new set of priorities that don't make sense.

