Sidewalk and Trail Condition Assessment

Report submitted to Fairfax County
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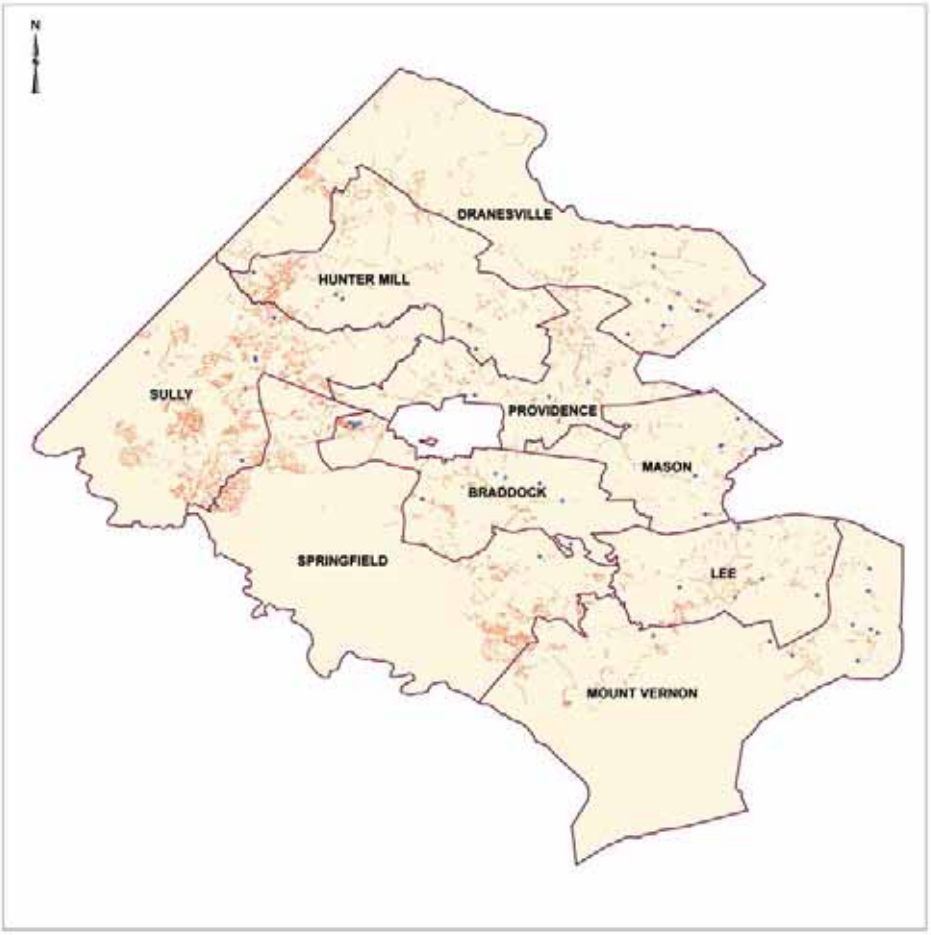
Prepared by:
Rinker Design Associates, P.C. • 9385 Discovery Boulevard, Suite 200 • Manassas, Virginia 20109

Executive Summary



Fairfax County DPWES is currently responsible for the maintenance of approximately 641 miles of trails and walkways the county. There are 209 miles of asphalt trails, 411 miles of concrete sidewalk, and 64 pedestrian bridges throughout the County in its nine Magisterial Districts. In addition, there are 21 miles of other less durable pedestrian facilities that consist of stone dust, wood chips, and dirt. Maintenance service levels on the walkways have fluctuated significantly based on funding constraints. Until now, there has not been a comprehensive condition assessment for pedestrian infrastructure. According to County staff, repairs are currently completed on a complaint basis only, and they are limited to addressing only emergency repairs. In the absence of a thorough evaluation of the condition of the pedestrian facilities, it is not possible to predict a funding level required to address critical needs, nor is it possible to develop a program for performing preventative maintenance that would eliminate the occurrence of emergency repairs. Presented with this problem, the goal is to establish a measurable funding level for routine maintenance and repair.

During the months of October 2012 and November 2012, a comprehensive assessment program was developed and performed in the field. Geospatial data was collected for nearly the entire 641 miles of walkway and the 64 pedestrian bridges. The assessment for each County facility included separate facility type identifiers (Concrete, Asphalt, Bridges, Gravel, Earth, etc), as well as 12 surface

conditions (e.g. faulting, durability cracking, obstructions, etc.). The 12 surface conditions were categorized into three defined conditions. Facility conditions were rated using a scale from 1 to 3 based on visual field inspection. A condition "1" rating indicates a facility in "poor" condition that may be hazardous and is in need of immediate repair. Condition "1" facilities have an obvious need for repair and presents the greatest hazard to pedestrians. The facilities that are rated as being "poor" present significant issues such as a high tripping risk. A condition "2" rating indicates that the facility is in fair condition, and is currently traversable but shows signs of needing repair in the near future. Condition "3" rating is a facility that is in good condition and currently is not in need of repair. Each pedestrian facility was walked, evaluated, and assigned with a condition/severity level.

CONDITION ASSESSMENT EXAMPLES

Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

During the months of April 2013 and May 2013, 20 pedestrian bridges identified by the County, adjacent to roadway facilities, were reassessed for deficiencies. The concerns being that bridges adjacent to roadways would have more rapid deterioration from chemicals and salt. In coordination with Fairfax County staff and understanding the risk associated with a potential pedestrian bridge failure, RDA performed a more thorough and detailed assessment for each of the bridges within 30 feet of any roadway. Concerns associated with structural corrosion of critical bridge components directed our team to carefully examine each element of the bridge. These structures, similar to trails and sidewalks, were categorized as poor, fair or good conditions based on our field observations. This report provides an assessment only for sidewalks, trails, and pedestrian bridges maintained by Fairfax County DPWES.

Facilities maintained by other agencies such as VDOT, Fairfax County Park Authority and others are NOT included in this assessment.

PEDESTRIAN BRIDGE CONDITION ASSESSMENT EXAMPLES

Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

The condition assessment has identified 9.9 miles of sidewalk/trails that are in "poor" condition. The cost of repairing/replacing these facilities is approximately $2.5 Million. In addition, 15.1 miles of walkway that are in "fair" condition have been identified with an estimated repair cost of $4.2 Million. The sidewalks and trails that are in fair condition will need to be repaired / replaced over an estimated period of 10 years. Since these facilities in fair condition are showing signs of deterioration and age, we are assuming that the life-cycle for these trails and walkways are 10 years. Assuming an equal distribution of facilities would deteriorate from "fair" to "poor" over the next 10 years, approximately 10 percent of the "fair" facilities would need to be repaired / replaced annually. The estimated overall cost for maintaining these walkways would be $6.7 Million, not including bridge replacements.

Our pedestrian bridge assessment has identified 5 locations at Canterbury Woods, Old Chesterbrook Road, Fairfax Road, Newington Road, and Shreve Road that are in need of immediate repair or replacement. Additionally, 6 pedestrian bridges have been identified with poor surface components in need of partial repair. The remaining pedestrian bridges inspected were observed to be in good condition. Total estimated repair/replacement costs for pedestrian bridges would require an initial capital cost of approximately $471K, plus an annual budget of $156K for future maintenance.

The derived cost estimate is based on **maintenance repair only**. The repair quantities are minimum spot values and do not consider factors including existing facility removal, site access, or

restorations. Additionally, this study does not include facility design costs. Design costs may include floodplain studies, geotechnical investigation/analysis, wetland investigation/permitting, and utility location/coordination. The estimate does not encompass any improvements associated with enhancements or betterments of any existing facility.

An **initial capital cost of $3.0 Million** would allow for the improvements in the poorest condition to be repaired and/or rebuilt along with current pedestrian needs. An annual budget of $572K would allow for future maintenance of deteriorating facilities currently "Fair" and future bridge maintenance requirements over the next 10 years excluding escalation.

Our field assessment also identified 616.4 miles of trails and walkway that are in good condition. The average life for trails and sidewalks can vary from 20 to 50 years depending on the climatic environment and use. For the purpose of this task, we have assumed the 50 year lifecycle for all the assessed facility in "Good" condition and that it would be 10 years before any "Good" condition facility becomes "Poor". The entire network, including sidewalks, trails, and pedestrian bridges, has an estimated value of **$206 Million** with a lifecycle of 50 years. This would translate to 2% of an increasing network and annual budgetary need greater than $4.1 Million in 10 years based on current unit prices for replacement applied in this report in order to maintain the County's asset.

(See following Summary Tables).

Annual Budget Based on Assessments & Assumptions

Initial Investment	Years 1-10	Years 10-40
$3.0 Million	$572K	$4.1 Million

*Cost includes Sidewalks, Trails, and Pedestrian Bridges.

Poor Condition Assessment Summary

Magisterial District	Length (Feet)	*Repair Cost Est.	**Mobilization 20%	***Contingency 25%	Total Cost
Braddock	1320	$45,103	$9,021	$13,531	$67,654
Dranesville	15480	$443,484	$88,697	$133,045	$665,227
Hunter Mill	2605	$93,507	$18,701	$28,052	$140,261
Lee	4290	$146,562	$29,312	$43,969	$219,843
Mason	5145	$166,708	$33,342	$50,012	$250,062
Mount Vernon	5313	$159,912	$31,982	$47,974	$239,868
Providence	5501	$191,865	$38,373	$57,560	$287,798
Springfield	2378	$62,775	$12,555	$18,833	$94,163
Sully	10087	$361,999	$72,400	$108,600	$542,998
County Wide	52119	$1,671,916	$334,383	$501,575	$2,507,874
Total in Miles	9.9				

Fair Condition Assessment Summary

Magisterial District	Length (Feet)	*Repair Cost Est.	**Mobilization 20%	***Contingency 25%	Total Cost
Braddock	1160	$41,604	$8,321	$12,481	$62,406
Dranesville	19656	$630,072	$126,014	$189,021	$945,107
Hunter Mill	6650	$238,569	$47,714	$71,571	$357,854
Lee	14615	$525,203	$105,041	$157,561	$787,805
Mason	7315	$262,949	$52,590	$78,885	$394,424
Mount Vernon	9565	$338,343	$67,669	$101,503	$507,514
Providence	9245	$329,759	$65,952	$98,928	$494,639
Springfield	4180	$149,882	$29,976	$44,965	$224,823
Sully	7445	$267,189	$53,438	$80,157	$400,784
County Wide	79381	$2,783,570	$556,714	$835,071	$4,175,356
Total in Miles	15.1				

*Repair Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Concrete unit price per square yard = $64.95, Asphalt unit price per square yard = $53.72

**Mobilization cost of 20% of repair cost applied.

***Contingency cost of 25% to include design, inspections, and construction management.

Pedestrian Bridge Assessment Summary

Bridge Location	Length (Feet)	*Repair Cost Est.	**Mobilization 20%	***Contingency 25%	Total Cost
**Canterbury Woods	26	$27,325	$5,465	$6,831	$39,621
Old Chesterbrook Rd	25	$26,274	$5,255	$6,569	$38,098
Fairfax Rd	36	$37,835	$7,567	$9,459	$54,861
Newington Rd	40	$42,039	$8,408	$10,510	$60,957
Shreve Rd	70	$73,568	$14,714	$18,392	$106,674
Telegraph Rd	10	$2,500	$500	$625	$3,625
Old Dominion Dr	52	$13,000	$2,600	$3,250	$18,850
Lawyers Rd	35	$8,750	$1,750	$2,188	$12,688
Georgetown Pike	50	$12,500	$2,500	$3,125	$18,125
Flint Hill ES/Vale Rd	5	$1,250	$250	$313	$1,813
Kirby Rd	30	$7,500	$1,500	$1,875	$10,875
Total		$252,541	$50,509	$63,137	$366,187

*Replacement Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Prefabricated Bridge unit price per linear foot=$1050.97. Repair Costs based on a unit price of $250 per linear foot.

**The Canterbury Woods bridge replacement has been completed since the conclusion of the assessment.

Total Network Value Estimate

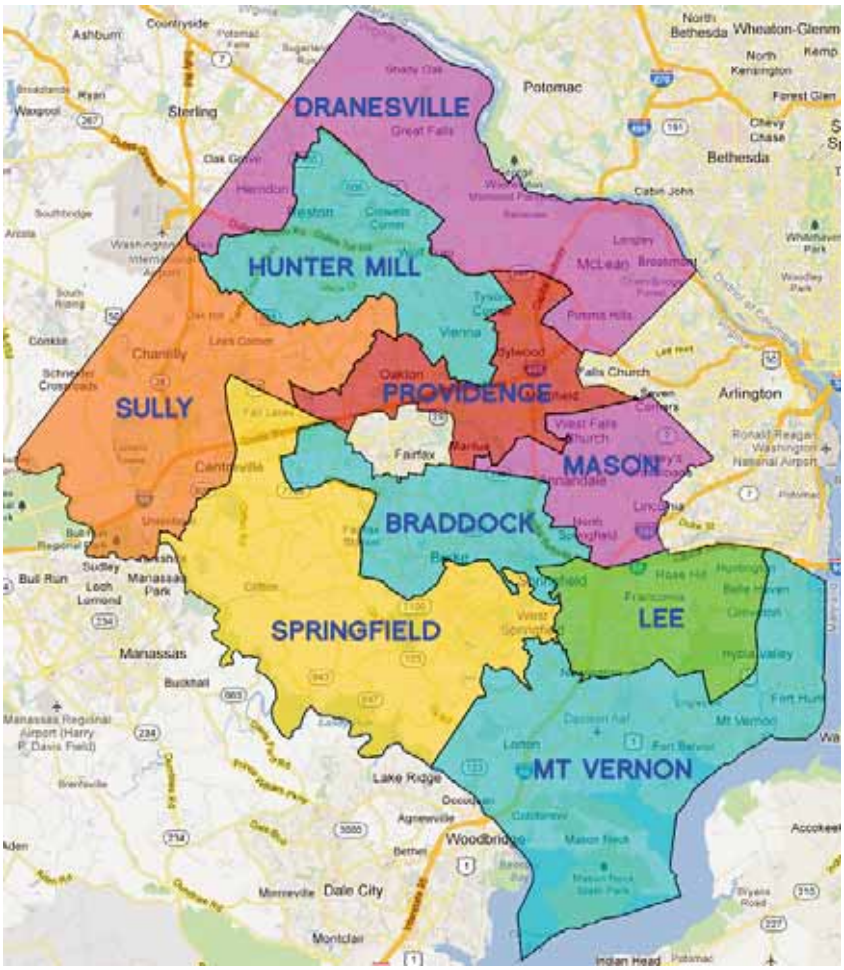
Magisterial District	Total County Maintained (LF)	Total County Maintained (Miles)	Total Asphalt (LF)	Total Asphalt (Miles)	Total Concrete (LF)	Total Concrete (Miles)	Total Other (LF)	Total Other (Miles)
Sully	943,786	178.75	216,246	40.96	715,704	135.55	11,836	2.24
Springfield	612,870	116.07	177,239	33.57	426,894	80.85	8,737	1.65
Hunter Mill	393,697	74.56	143,718	27.22	238,291	45.13	11,688	2.21
Dranesville	321,290	60.85	111,759	21.17	148,667	28.16	60,864	11.53
Providence	276,755	52.42	92,954	17.60	182,970	34.65	831	0.16
Braddock	264,864	50.16	128,056	24.25	134,766	25.52	2,042	0.39
Mount Vernon	238,519	45.17	91,801	17.39	133,947	25.37	12,771	2.42
Lee	222,523	42.14	106,470	20.16	115,389	21.85	730	0.14
Mason	112,230	21.26	34,042	6.45	74,649	14.14	3,539	0.67
TOTAL	3,386,534	641.39	1,102,285	208.77	2,171,277	411.23	113,038	21.41
TOTAL VALUE	**$201,822,854**		**$59,214,750**		**$141,024,441**		**$1,583,662**	

*Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Concrete unit price per square yard = $64.95, Asphalt unit price per square yard = $53.72

Total Pedestrian Bridge Value Estimate

Facility	Total County Maintained Bridges	Total County Maintained Bridges(LF)	Repair Cost for Entire Network	Replacement Cost for Entire Network
Pedestrian Bridge	64	3684	**$921,000**	**$3,871,773**

*Replacement Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Prefabricated Bridge unit price per linear foot=$1050.97. Repair Costs based on a unit price of $250 per linear foot.



I. Introduction

Fairfax County is currently responsible for maintaining approximately 209 miles of asphalt trails, 411 miles of concrete sidewalk, and 64 pedestrian bridges of various ages. In addition, there are 21 miles of other pedestrian facilities (consisting of stone dust, wood chips, and other surfaces) that are less durable than asphalt and concrete. The current replacement value of this infrastructure is estimated to exceed $202 million based on current assessment.

In the past, various programs have been completed to maintain these critical public facilities, but maintenance service levels have significantly fluctuated within these programs based on funding constraints. Currently, there is not an accurate condition assessment for this pedestrian infrastructure. Repairs are performed on a complaint basis only, and they are limited to addressing only emergency failures. In the absence of a thorough evaluation of the condition of these facilities, it is not possible to predict the funding level that will be required annually to address critical needs, nor is it possible to develop a program for performing preventative maintenance that would eliminate the occurrence of emergency repairs. The continued deferral of preventative maintenance simply postpones the need to retain these assets in a serviceable capacity, and can often result in incurring even greater costs of more significant repairs as the facility degrades. Due to recent budget constraints, the funds available for maintaining walkways have decreased from

$450K in FY08 to $100K in FY12. In FY11, no funds were allocated to this activity. However, as determined by acceptable industry reinvestment standards, it is estimated that over $4 million could be required annually to provide for a comprehensive reinvestment program based on infrastructure life cycles of 20-50 years as depicted in the funding requirement sections of this report.

II. Methodology

Location Identification. The first step in the evaluation process was to identify all Fairfax County maintained facilities. Fairfax County provided all relevant GIS layer information, including layers showing sidewalk locations and maintenance responsibilities. RDA consolidated all the GIS information into separate maps for each Magisterial District. Hard copy maps were distributed to team members for review. The databases created by RDA were stratified by Magisterial District and are compatible with the Fairfax County GIS system. The following exhibit shows an example of the GIS maps created for use in the field.

Field Assessment & Data Storage. In order to develop the most accurate inventory and condition assessment of the County sidewalks, each sidewalk and trail was walked/biked in the field. One and two person field crews were set up with data collection tools allowing them to collect data with exact locations of sidewalk defects and photos documenting the findings. A total of eight engineers and technicians were mobilized simultaneously over the two month assessment period. The primary data collection tool used for this project was the mobile application GeoJot. GeoJot is a smartphone application which takes photographs and geotags those locations with Latitude and Longitude coordinates and all pertinent attribute data. RDA developed the attribute data to be included in all geotagged photos. Data tagged to all GeoJot photos includes road names, magisterial district, facility type, facility issues, length of issue, assessed condition, and notes.

Various types of smartphones and tablets were used in the data collection process. The GeoJot application runs on iOS and Android mobile operating systems. Apple iPhones, Samsung Galaxy, and Apple iPads were all used in the data collection. These devices have built in GPS receivers enabling GeoJot to log accurate location data. The stated accuracy of GeoJot is +/- 3-5 meters.

Cloud technology was also utilized in the data collection process. Cloud storage technology allows data to be freely transfered between multiple locations and keeps the data synchronized between those locations. Cloud storage was accomplished using the application Dropbox where the data from each days collections was stored. All data gathered daily was automatically uploaded to Dropbox where it was stored until downloaded at the office at the end of each day. One shared folder was created, enabling all data collectors to upload data to this folder. This ensured the data collected would not become fragmented. At the conclusion of each day, the data was retrieved from Dropbox and added to the databases. The databases were maintained using the GeoJot+ Core program. This program is the sister application to the mobile GeoJot application. Data is collected with GeoJot and then processed with GeoJot Core. One data manager was responsible daily for the download and control of all data. This provided consistency and quality control standards before the data was input into a backend database. The GeoJot Core program provides the ability to create reports, ESRI Shapefiles (.shp), Google Earth maps (.kml/.kmz), and ultimately Geodatabases (.mdb/.gdb).

The format and structure of the collected data was developed in such a way that will allow Fairfax County to easily import the data into their existing GIS system and work with it in the same way as other layers such as roads, or walkways. The layer information provided will consist of point features that represent the location and key attribute data of a particular sidewalk defect. Condition assessment layers are provided stratified by Magisterial District.

III. Condition Assessment Criteria

Distress Identification The next step in the development of the condition assessment was to identify the defect issues that would be observed in the field. After identifying the various defect categories to be used, RDA developed facility condition severity levels for each defect category. The condition assessment criteria were developed so that minimal subjective judgment would be required. Field personnel were presented with category defect examples for review prior to being deployed in the field. **Table 1** is a list of the 12 defect (issue) categories, with their descriptions, used in the condition assessments.

Table 1: Defect Category Descriptions

Defect Category	Description
Castings	Castings are cast iron manholes, valve covers, or other similar devices that are located within a sidewalk slab. Castings can be a tripping hazard and can interfere with the operation of wheelchairs and pedestrians.
Durability Cracking	Durability Cracking usually appears as a pattern of cracks running over the surface. This type of distress may eventually lead to disintegration of the entire area.
Faulting	Faulting is the uneven elevation of sidewalk/trail sections or adjacent concrete slabs. Common causes are settlement because of soft foundation or tree roots that cause the asphalt or concrete to raise.
Gapping	Gaps are horizontal openings between adjacent concrete slabs.
Joint Spalling	Joint Spalling is the breakdown of concrete slab edges within 6 inches of the joint
Linear Cracking	Linear Cracks divide the walkway into pieces
Obstructions	Obstructions are any structure or device that prevents a pedestrian from using at least a four foot section of a walkway.
Protruding Objects	Protruding Objects are objects that protrude more than 4 inches into the walkway. These are objects that would escape detection by blind pedestrians.
Settlements	Settlements occur when a sidewalk/trail section have settled, thus not allowing for proper drainage.
Slope	Slope is not necessarily a distress but excessive slopes cause a section of sidewalk to violate ADA act requirements.
Surface Scaling	Sidewalk that has been abraded and damaged to a depth between ¼" to ½" from the original surface.

Condition Assessment Levels RDA developed facility condition severity levels for all sidewalks, trails, and pedestrian bridges. The condition levels include separate facility type identifiers (Concrete, Asphalt, Bridge, Gravel, Earth) as well as 12 potential surface conditions (e.g. faulting, linear cracking, obstructions, etc.) The condition levels were used to identify the current state of the walkway and also the urgency for repairs. Facilities were rated using a scale ranging from 1 to 3. A **condition 1** rating indicates a poor condition that is hazardous and in immediate need of repair. Condition 1 facilities are in a state that may present an immediate danger to a pedestrian such as a high tripping risk or may be non-traversable/non ADA compliant. A **condition 2** rating indicates that the walkway is in fair condition. A condition 2 facility is currently safely traversable but shows signs of needing repair in the near future (within 5-10 years). **Condition 3** is a facility that is in good condition and is currently in no need of repair. **Table 2** shows each defect category with each condition level rating and its description. This process was taken to insure that, regardless of field

personnel, the condition rating would be as consistent as possible. Each facility identified includes a surface defect (if any), facility type, and a condition rating. The facilities may contain more than one condition depending on its current state. **Figures 3.1** through **3.12** show photo examples of each defect category.

Table 2: Defect Categories with Condition Rating Levels

Defect Category	Condition 1 Poor	Condition 2 Fair	Condition 3 Good
Castings	Casting that present a tripping hazard do to separation (>2") from pavement/concrete. May also be faulting or cracking around casting.	Characterized by moderate separation from walkway. Show signs of possibly degrading into Condition 1, i.e. early stage of faulting in walkway.	Castings are in walkway, however they present no danger to pedestrians
Durability Cracking	Cracking that covers a large area and includes pieces that are uneven, missing, or easily removed.	Cracking that has begun to occur but is not uneven and does not have missing sections or pieces. Cracking that will potentially become hazardous in the future.	Small cracking areas with tight cracks and no pieces that are separated.
Faulting	Uneven elevation of the walkway. Separation of >2" is considered poor. May present significant hazards to pedestrians.	Separation of between ½" and 2". Separation is present, however the walkway is easily traversable.	Faulting of less than ½". Presents no risk.
Gapping	Horizontal openings greater than1". Only applies to concrete sidewalks.	Horizontal openings ½" to 1" that have potential to widen over time.	Horizontal openings less than ½".
Joint Spalling	The width of the spall is greater than 2". Spalled pieces are loose or missing.	Spalls may show craking but no pieces are completely loose or missing.	Beginning crack along the joint of the concrete.
Linear Cracking	Cracks that are >2".	Cracks between ½" and 2".	Beginning cracks that have little to no separation.
Obstructions	Any obstruction that blocks majority of the walkway or does not provide 4' of walkway.	Obstruction exists but still provides at least 4' of walkway.	
Protruding Objects	Objects that cover/impede majority or all of the walkway.	Objects that cover at least part of walkway causing pedestrians to use small section of walkway.	Adjacent objects that may extend into walkway in the future.
Settlements	Depressions at least 1" deep and affecting at least 5 or more feet of concrete/asphalt.	Depressions less than 1" deep and affecting 3-5' of walkway.	Depressions of ¼" to 1" and affecting only 1-2 feet of walkway.
Slope	Only counted if slope of walkway is severe.		
Surface Scaling	Surface that has been damaged to a depth of ½" or more from the original surface.	Surface that is abraded and depth of less than ½" from surface.	Scaling that is becoming evident but not yet damaging sidewalk.

Figure 3.1

Castings (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Castings (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.2

Durability Cracking (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Durability Cracking (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.3

Faulting (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Faulting (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.4

Gapping (Concrete Only)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.5

Joint Spalling (Concrete Only)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.6

Linear Cracking (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Linear Cracking (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.7

Obstructions (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Obstructions (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.8

Protruding Objects

Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.9

Settlements (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Settlements (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.10

Surface Scaling (Concrete)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Surface Scaling (Asphalt)		
Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

Figure 3.12

Bridges

Condition: 1 (Poor) High Severity/High Priority	Condition: 2 (Fair) Medium Severity/Medium Priority	Condition: 3 (Good) Low Severity/Low Priority
		

IV. Condition Assessment Process

Assessment locations were provided to field personnel at the beginning of each day. GIS maps showing all county maintained facilities were printed and used to log exact locations of data captured each day. All assessed sidewalk locations were highlighted on the provided maps to ensure coverage of assigned areas. Overall Magisterial District maps were created in the office for field crews to identify the areas that they assessed each day. This process ensured that no sidewalk would be overlooked and that no sidewalk would be assessed more than once.

Given the large size of the pedestrian network in Fairfax County, multiple field teams were deployed. One and two person field crews were distributed among the nine Magisterial Districts in the County. The field crew personnel were able to walk and/or bike the sidewalk locations. Condition assessment criteria were applied through visual inspection of the sidewalk and documented within the field collection tools. Sidewalks that showed no facility issues were still photographed and logged to provide a complete condition database of all sidewalks in the County.

To increase the accuracy of the field data, attribute pick lists were created in GeoJot to simplify data entry. Pick lists for each Magisterial District, Facility Type, Facility Issue, Assessed Conditions, and Issue Length were used. Field personnel only had to choose from the on screen list of valid data values for each condition assessment. Not only did this ensure that only valid data was entered, it also required less time at each site for data input.

At the conclusion of each day, data that was gathered was automatically updated to the shared Dropbox cloud storage folder, requiring no effort by the field crews to manipulate any of the data. Any discrepancies were flagged by field personnel (e.g., incorrect facility type entry) and corrected at the office before the data was added to the databases. Data entry errors were easily edited within the GeoJot Core program. In addition, the data collected each day was reviewed for accuracy when entered into the database.

V. Current Walkway Complaints

The first task in the sidewalk condition assessment was to inventory and review the current walkway complaint backlog in the County. The current complaints consisted of 11 sidewalk locations throughout the county. The following is a list of the sidewalks with current complaints with a description of the facility issues.

- Boswell Ave (Mt. Vernon District) The asphalt walkway has significant Faulting, Settlements, and Surface Scaling. The Boswell Ave walkway is a school route. Approximately 885 linear feet of asphalt is in need of repair/replacement.
- Copper Ridge Dr. (Hunter Mill District) The asphalt walkway has significant Faulting resulting from tree root growth under the asphalt. Approximately 100 linear feet of asphalt needs replacement.
- Elm Terrace (Providence District) This walkway has various defect conditions. This walkway is a school route leading to Woodburn School. Faulting is seen throughout the path. In addition, this walkway is non-ADA accessible. Wood steps lead to the path from the neighborhood. Approximately 485 linear feet need to be repaired/replaced.
- Gambrill Ct. (Mt Vernon District) The concrete sidewalk on Gambrill Ct. has Faulting and Settlement defects which present tripping hazards. Approximately 900 linear feet of concrete sidewalk was identified as a complaint. This concrete will need partial replacement only in the areas of the specific fault.
- Gambrill Rd. (Springfield District) The walkway on Gambrill Rd is showing significant Faulting and Durability Cracking. Faulting is resulting from the growth of tree roots under the trail. Approximately 505 linear feet of asphalt trail needs replacement.
- Great Heron Dr. (Springfield District) Settlement, Faulting, and Linear Cracking are present in the concrete sidewalk on Great Heron Dr. Faulting has occurred where the sidewalk abuts two separate storm sewer inlets. A large vertical fault has been created presenting a hazardous situation. In addition, a section of

concrete has a large linear crack and has also created a vertical separation. Approximately 16 linear feet of concrete sidewalk needs replacement.

- Jones Branch Dr. @ Park Run Dr. (Providence District) The concrete sidewalk on Jones Branch Dr. has multiple poor defect conditions. Among the conditions are Durability Cracking, Joint Spalling and Surface Scaling. The major poor condition is Durability Cracking as this condition exists in multiple locations along this concrete sidewalk. Approximately 175 linear feet of concrete sidewalk needs replacement.
- Montrose St. (Mason District) This asphalt path has multiple instances of Faulting, and Surface Scaling. The path is very narrow and runs along Montrose St. near the front of Holmes Middle School. Approximately 950 linear feet of asphalt trail needs replacement.
- Mount Vernon Hwy (Mt Vernon District) Multiple sections of Mt Vernon Hwy are on this complaint list. The majority of asphalt trail along this road is in poor condition. Multiple defect conditions are seen including Surface Scaling, Faulting, Settlements, and Castings in the path. This path is a school route in the vicinity of Mt Vernon High School. The approximate total asphalt affected for all sections is 2664 linear feet which is recommended to be replaced.
- Queens St. (Lee District) This section of asphalt walkway along Queens St shows Durability Cracking and Surface Scaling. This small section, roughly 12 linear feet, needs repair/replacement.
- Steeplechase Dr. (Hunter Mill District) The asphalt trail on Steeplechase Dr. runs through a heavily wooded section. Faulting is the major issue along this asphalt walkway. Once again the faulting is a result of significant root growth under the asphalt. Surface Scaling and Settlements are also issues on this path. Approximately 2923 linear feet of asphalt trail need repair and/or replacement.

Appendix A contains the full photo assessment for the current complaints list. The following summary (Table 3) provides the cost estimate for improvements to the walkways on the Current Walkway Complaints log provided by Fairfax County.

Table 3: Cost Estimate for Current Walkway Complaint Repairs

Assest #'s	Location	District	Type	Length	Condition/Priority	Action	Total Area (SY)	Unit Cost (SY)	Amount
WLK0981004635	GAMBRILL RD	Springfield	ASPHALT	305'	1	Replace	203	53.72	$10,905.16
Not on Current Complaint Log	GAMBRILL RD	Springfield	ASPHALT	200'	1	Replace	133	53.72	$7,144.76
WLK0263006026	STEEPLECHASE DR	Hunter Mill	ASPHALT	253'	1	Replace	169	53.72	$9,078.68
WLK0263005666	STEEPLECHASE DR	Hunter Mill	ASPHALT	1600'	1	Partial Replace	533	53.72	$28,632.76
WLK0263002243	STEEPLECHASE DR	Hunter Mill	ASPHALT	810'	1	Replace	540	53.72	$29,008.80
WLK0263100489	STEEPLECHASE DR	Hunter Mill	ASPHALT	260'	1	Replace	173	53.72	$9,293.56
WLK0723006489	MONTROSE ST	Mason	ASPHALT	111'	1	Replace	74	53.72	$3,975.28
WLK0723006515	MONTROSE ST	Mason	ASPHALT	138'	1	Replace	92	53.72	$4,942.24
WLK0723003032	MONTROSE ST	Mason	ASPHALT	268'	1	Replace	179	53.72	$9,615.88
WLK0723003012	MONTROSE ST	Mason	ASPHALT	435'	1	Replace	290	53.72	$15,578.80
WLK1021004780	BOSWELL AVE	Mt Vernon	ASPHALT	270'	1	Replace	180	53.72	$9,669.60
WLK1021000118	BOSWELL AVE	Mt Vernon	ASPHALT	614'	1	Replace	409	53.72	$21,971.48
WLK1102004962	MOUNT VERNON HWY	Mt Vernon	ASPHALT	850'	1	Replace	567	53.72	$30,459.24

Table 3 con't: Cost Estimate for Current Walkway Complaint Repairs

Assest #'s	Location	District	Type	Length	Condition/Priority	Action	Total Area (SY)	Unit Cost	Total Cost
WLK1102001450	MOUNT VERNON HWY	Mt Vernon	ASPHALT	440'	1	Replace	293	53.72	$15,739.96
WLK1102001428	MOUNT VERNON HWY	Mt Vernon	ASPHALT	81'	1	Replace	54	53.72	$2,900.88
WLK1102021427	MOUNT VERNON HWY	Mt Vernon	ASPHALT	58'	1	Replace	39	53.72	$2,095.08
WLK1014004972	MOUNT VERNON HWY	Mt Vernon	ASPHALT	1015'	1	Replace	677	53.72	$36,368.44
WLK1014004500	MOUNT VERNON HWY	Mt Vernon	ASPHALT	220'	1	Replace	147	53.72	$7,896.84
WLK0551004349	GREAT HERON DR	Springfield	CONCRETE	16'	1	Replace	9	64.95	$584.55
WLK0251002008	13602 COPPER RIDGE DR	Hunter Mill	ASPHALT	100'	1	Replace	67	53.72	$3,599.24
WLK0922001678	6721 QUEENS RD	Lee	ASPHALT	12'	1	Replace	8	53.72	$429.76
WLK0292001971	JONES BRANCH DR@PARK RUN DR	Providence	CONCRETE	175'	1	Replace	97	64.95	$6,300.15
WLK0592000478	3332 ELM TERR	Providence	CONCRETE	485'	1	Replace	269	64.95	$17,471.55
WLK0981005920	GAMBRILL CT	Mt Vernon	CONCRETE	100'	1	Partial Repair	56	64.95	$3,637.20
							TOTAL		**$287,299.89**

VI. Condition Assessment Inventory

RDA completed a comprehensive assessment of the entire pedestrian system in Fairfax County. This included assessing over 600 miles of sidewalk and trails, in addition to over 60 pedestrian bridges. The team included eight field crew personnel who were disbursed among the nine Districts. Over the span of two months this team was able to complete this large task. The resulting inventory consists of over 8,000 locations of assessed walkways and pedestrian bridges. Given such a large dataset, the identified locations and the resulting information is stratified by Magisterial District. The amount of Fairfax County maintained walkways varied greatly in each District and is reflected in the assessment results. Sully, Dranesville, and Providence Districts were the largest Districts in terms of County maintained facilities. These areas required the most significant amount of time in completing the assessments. The field crews walked and/or biked each identified county maintained sidewalk in each district. As they traversed each walkway every defect was photographed and given a condition assessment rating. Many sections of walkways have no incidences of defects. In fact the majority of locations throughout the county are in good

condition. If a sidewalk or trail was in good condition the field crew personnel still photographed and documented the locations of the good sidewalks. This provided the data to compile a comprehensive database of ALL the County sidewalks and not only poor and fair conditions.

Various factors played a role in the ability of the field crews to complete the condition assessments. The assessments took place in the Fall months of October and November making fallen leaves an issue in data collection. In some instances, sidewalks and trails were completely covered by leaves. Major defect issues were still able to be identified in these areas. However, the potential of some minor defects being unrecognized exists. Pedestrian bridges provided a challenge in some locations as well. Some pedestrian bridges were unable to be fully assessed because of the inability to access underneath the bridge. Field crews assessed all facilities that they could safely access.

The following list shows the total amount of locations assessed in each District. These location totals include all good, fair, and poor conditions.

- Braddock District 278 Locations
- Dranesville District 1257 Locations
- Hunter Mill District 948 Locations
- Lee District 802 Locations
- Mason District 533 Locations
- Mount Vernon District 668 Locations
- Providence District 1062 Locations
- Springfield District 885 Locations
- Sully District 1659 Locations
- Pedestrian Bridges 69 Locations

A total of 8,161 locations make up the Fairfax County Sidewalk Condition Assessment Inventory. The following sections provide the statistical results breakdown of the assessment inventory.

VII. Sidewalk Condition Assessment Results

The condition assessments for each Magisterial District are broken down in Tables 4 and 5. These tables provide a better understanding of the overall Poor and Fair condition statistics that occur within each district. Asphalt and Concrete constitute the majority of all pedestrian facilities in Fairfax County. All other facilities including Gravel, Brick, and Earth are included under the category of “Other.”

Table 4: Poor Conditions by Facility Type

Poor Conditions by Facility Type*				
Magisterial District	Total Length of Poor Conditions (LF)	Asphalt in Poor Condition	Concrete in Poor Condition	Other in Poor Condition (LF)
Braddock District	1,320	1,070 (81%)	250 (19%)	0
Dranesville District	15,480	9,245 (60%)	2,025 (13%)	4,210 (27%)
Hunter Mill District	2,605	1,790 (69%)	790 (30%)	25 (1%)
Lee District	4,290	3,220 (75%)	870 (20%)	200 (5%)
Mason District	5,145	3,305 (64%)	1,315 (26%)	525 (10%)
Mt Vernon District	5,313	3,698 (70%)	420 (8%)	1,195 (22%)
Providence District	5,501	3,270 (59%)	2,181 (40%)	50 (1%)
Springfield District	2,378	1,108 (47%)	420 (18%)	850 (36%)
Sully District	10,087	7,310 (72%)	2,777 (28%)	0

*All lengths are in Linear Feet

These statistics show that the overwhelming majority of poor conditions in the County occur in asphalt walkways. Similar results are seen in the Fair Condition breakdown by facility type in the following table. (Table 5).

Table 5: Fair Conditions by Facility Type

Fair Conditions by Facility Type*				
Magisterial District	Total Length of Poor Conditions (LF)	Asphalt in Poor Condition	Concrete in Poor Condition	Other in Poor Condition (LF)
Braddock District	1,160	935 (81%)	225 (19%)	0
Dranesville District	19,656	13,810 (70%)	3,031 (15%)	2,815 (14%)
Hunter Mill District	6,650	5,130 (77%)	1,520 (23%)	0
Lee District	14,615	7,980 (55%)	6,635 (45%)	0
Mason District	7,315	3,660 (50%)	3,610 (49%)	45 (1%)
Mt Vernon District	9,565	5,355 (56%)	4,210 (44%)	0
Providence District	9,245	4,355 (47%)	4,715 (51%)	175 (2%)
Springfield District	4,180	3,505 (84%)	675 (16%)	0
Sully District	7,445	5,375 (72%)	2,070 (28%)	0

*All lengths are in Linear Feet

The condition results are broken down further in Table 6 and Table 7 to show the specific occurrences of each defect category for the poor conditions.

Table 6: Asphalt Defect Occurrences for Poor Conditions

	Braddock	Dranesville	Hunter Mill	Lee	Mason	Mt Vernon	Providence	Springfield	Sully	TOTAL
Accessibility	0	3	2	6	2	0	3	0	1	**17**
Castings	1	4	6	5	0	4	6	0	7	**33**
Durability Cracking	5	27	6	5	3	7	14	10	12	**89**
Faulting	5	59	15	21	16	10	6	7	56	**195**
Linear Cracking	14	11	3	10	3	5	3	3	5	**57**
Obstructions	1	31	3	9	8	7	9	5	6	**79**
Protruding Objects	1	5	0	1	1	0	1	0	1	**10**
Settlements	1	30	9	16	10	19	9	2	8	**104**
Slope	3	3	0	0	0	1	0	0	1	**8**
Surface Scaling	5	5	4	7	9	12	7	2	7	**58**
DISTRICT TOTAL	**36**	**178**	**48**	**80**	**52**	**65**	**58**	**29**	**104**	**650**

Table 7: Concrete Defect Occurrences for Poor Conditions

	Braddock	Dranesville	Hunter Mill	Lee	Mason	Mt Vernon	Providence	Springfield	Sully	TOTAL
Accessibility	1	7	2	2	3	0	0	0	0	**15**
Castings	4	2	1	3	6	7	20	1	3	**47**
Durability Cracking	0	4	2	2	5	0	22	5	6	**46**
Faulting	1	18	30	19	15	11	49	5	145	**293**
Gapping	0	0	10	0	1	0	0	0	4	**15**
Joint Spalling	0	0	1	8	2	7	9	1	2	**30**
Linear Cracking	0	5	8	3	4	0	6	1	5	**32**
Obstructions	0	3	1	3	9	4	6	1	5	**32**
Protruding Objects	0	3	0	0	4	1	0	0	0	**8**
Settlements	3	17	5	3	5	0	15	18	12	**78**
Surface Scaling	0	1	2	2	3	6	3	2	5	**24**
DISTRICT TOTAL	**9**	**60**	**62**	**45**	**57**	**36**	**130**	**34**	**187**	**620**

The highest defect occurrence in asphalt walkways was faulting. Faulting results in the uneven elevation of sidewalk/trail sections. The most common observed cause of asphalt faulting was the result of tree root growth underneath asphalt sections. In many instances root growth caused asphalt pavement to elevate and created vertical faults where there was significant separation in the asphalt. Faulting was also the highest occurring concrete defect. Faulting of concrete is similar to asphalt in that it creates an uneven elevation within the walkway. Root growth is also to blame

for much of the concrete faulting. The primary cause of tree inflicted damage to sidewalks is the inadequate space allotted for tree growth. Other instances that were widely observed with concrete faulting were storm inlets and adjacent concrete sidewalk slabs that had vertical separation causing a hazardous tripping condition in the sidewalk. Every instance of these faulting issues, as well as all other defects, have been photographed and added to the condition assessment database. The faulting issue provided some of the most severe conditions observed. The photo assessment reports for all poor and fair conditions in each Magisterial District are found in Appendix B.

VIII. Funding Requirements for Walkways

In order to estimate a cost of walkway, RDA used the Fairfax County Department of Public Works & Environmental Services 2013 Comprehensive Unit Price Schedule. Prices for asphalt, concrete, gravel, and earth sidewalks and trails were obtained from the price schedule. The unit prices used in the development of the cost estimate were $53.72 per square yard for asphalt, $64.95 per square yard for concrete, $14.01 per square yard for earth trail, and $17.52 for stone dust trail. These unit costs have been referenced in comparison to current bid prices that we have observed. The 'Poor" and "Fair" conditions were each tabulated based on the type of facility and the length of need for repair/replacement. An additional 20% for Mobilization and 25% for contingency is being applied to capture the necessary Staff involvement and miscellaneous services.

The condition assessment has identified approximately 9.9 miles of sidewalk/trails that are in "poor" condition. These 9.9 miles of walkways include both asphalt and concrete facilities that are in need of immediate improvement. The estimated immediate repair/replacement cost for these facilities is $2.5 Million. This initial capital cost would allow for the County to rectify the poorest conditions and eliminate hazardous and deteriorating facilities.

The condition assessment has also identified approximately 15.1 miles of walkway that are in "fair" condition with an estimated repair/replacement cost of $4.2 Million if they were addressed today. Without knowing the age of each of these facilities, we have made the following assumptions. Based on our team's observations we have assumed that these facilities in "fair" conditions will have a lifecycle of 10 years and will all need to be replace over this period of time. Some of these trails and walkways in this category may be in need of repair or replacement within a year and other may be sufficient for up to 10 years until they are deemed "poor". Assuming an equal distribution of facilities deteriorating from "fair" to "poor" over the next 10 years, approximately 10% of the "fair" facilities thus need to be repaired/replaced annually. The annual cost for these facilities to be address would be $420K excluding escalation.

Our field assessment also identified 616.4 miles of trails and walkway that are in good condition. The average life for trails and sidewalks can vary from 20 to 50 years depending on the climatic

environment and use. For the purpose of this task, we have assumed the 50 year lifecycle for all the assessed facility in "Good" condition. The lifecycle cost of 50 years translates to 2% of the current network. The current value of the County's network for just trails and walkways excluding pedestrian bridges is approximately $202 Million. This would translate to annual budgetary need of $4.0 Million based on current unit prices for replacement applied in this report in order to maintain the County's asset for just trails and walkways. Based our observations and the "Good" condition of these facilities, we have assumed the 2% deterioration will begin to occur 10 years from our assessment.

In order to keep the condition assessment databases up to date with any completed maintenance as well as any changes in the assessed conditions, an annual assessment of "fair" facilities is recommended, along with the assessment of "good" facilities every 3-5 years. This would include any new complaints added to the inventory that may have been damaged during these periods of time. The annual assessment will not require assessment of the entire pedestrian network. As the poor facilities are improved, the County's database will be updated so that the facilities that have been assessed as "fair" would be the focus of the annual assessment. The efforts for future assessments would be minimized by updating the Sidewalk Condition Assessment databases on an ongoing basis. As individual facilities are improved the databases will be updated to reflect the upgraded condition.

Updating Facilities Based upon the new condition assessment inventory, Fairfax County can now prioritize the improvements to the existing pedestrian network. The facility usage in the poor condition areas should be the main factor in prioritizing which facilities are first to be improved. Facilities in the areas of school zones, activity centers, transit stations, parks and other generators of heavy pedestrian traffic should be given the first consideration. The assessment data provided will enable the County to develop a proactive maintenance program. With appropriate funding Fairfax County will be able to address failing walkways and ensure the safety of its citizens and will minimize potential liability issues as well as save money over time. Currently, because of budgetary constraints, the County has been in a reactive mode in regards to the pedestrian network, only addressing hazardous/emergency facilities.

Appendix C includes the cost summaries for all Poor and Fair Conditions for each assessed facility in each Magisterial District. The following exhibits show the total cost for improvements to the sidewalk and trail network.

Poor Condition Assessment Summary					
Magisterial District	Length (Feet)	*Repair Cost Est.	**Mobilization 20%	***Contingency 25%	Total Cost
Braddock	1320	$45,103	$9,021	$13,531	$67,654
Dranesville	15480	$443,484	$88,697	$133,045	$665,227
Hunter Mill	2605	$93,507	$18,701	$28,052	$140,261
Lee	4290	$146,562	$29,312	$43,969	$219,843
Mason	4945	$166,708	$33,342	$50,012	$250,062
Mount Vernon	5313	$159,912	$31,982	$47,974	$239,868
Providence	5501	$191,865	$38,373	$57,560	$287,798
Springfield	2378	$62,775	$12,555	$18,833	$94,163
Sully	10087	$361,999	$72,400	$108,600	$542,998
County Wide	52119	$1,671,916	$334,383	$501,575	$2,507,874
Total in Miles	9.9				

Fair Condition Assessment Summary					
Magisterial District	Length (Feet)	*Repair Cost Est.	**Mobilization 20%	***Contingency 25%	Total Cost
Braddock	1160	$41,604	$8,321	$12,481	$62,406
Dranesville	19656	$630,072	$126,014	$189,021	$945,107
Hunter Mill	6650	$238,569	$47,714	$71,571	$357,854
Lee	14615	$525,203	$105,041	$157,561	$787,805
Mason	7315	$262,949	$52,590	$78,885	$394,424
Mount Vernon	9565	$338,343	$67,669	$101,503	$507,514
Providence	9245	$329,759	$65,952	$98,928	$494,639
Springfield	4180	$149,882	$29,976	$44,965	$224,823
Sully	7445	$267,189	$53,438	$80,157	$400,784
County Wide	79381	$2,783,570	$556,714	$835,071	$4,175,356
Total in Miles	15.1				

*Repair Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Concrete unit price per square yard = $64.95, Asphalt unit price per square yard = $53.72

**Mobilization cost of 20% of repair cost applied.

***Contingency cost of 25% to include design, inspections, and construction management.

Total Network Value Estimate

Magisterial District	Total County Maintained (LF)	Total County Maintained (Miles)	Total Asphalt (LF)	Total Asphalt (Miles)	Total Concrete (LF)	Total Concrete (Miles)	Total Other (LF)	Total Other (Miles)
Sully	943,786	178.75	216,246	40.96	715,704	135.55	11,836	2.24
Springfield	612,870	116.07	177,239	33.57	426,894	80.85	8,737	1.65
Hunter Mill	393,697	74.56	143,718	27.22	238,291	45.13	11,688	2.21
Dranesville	321,290	60.85	111,759	21.17	148,667	28.16	60,864	11.53
Providence	276,755	52.42	92,954	17.60	182,970	34.65	831	0.16
Braddock	264,864	50.16	128,056	24.25	134,766	25.52	2,042	0.39
Mount Vernon	238,519	45.17	91,801	17.39	133,947	25.37	12,771	2.42
Lee	222,523	42.14	106,470	20.16	115,389	21.85	730	0.14
Mason	112,230	21.26	34,042	6.45	74,649	14.14	3,539	0.67
TOTAL	3,386,534	641.39	1,102,285	208.77	2,171,277	411.23	113,038	21.41
TOTAL VALUE	$201,822,854		$59,214,750		$141,024,441		$1,583,662	

*Repair Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Concrete unit price per square yard = $64.95, Asphalt unit price per square yard = $53.72

IX. Pedestrian Bridges

Fairfax County currently maintains 64 pedestrian bridges throughout the county. The County provided their pedestrian bridge inventory to be reviewed prior to field assessments. The information included in this inventory included locations of the bridges, as well as all other pertinent information relating to the bridge. This bridge inventory includes a wide variety of bridge types and many of varying ages. Along with the sidewalks and trails, all pedestrian bridges in the County have been assessed. During the initial assessment process, the pedestrian bridges were assessed in the same way as the sidewalks. Each bridge was walked and visually assessed based on its condition. During this initial assessment, no in depth assessment was done (i.e. no structural components were assessed.). Field crew personnel walked the bridge and looked for superficial defects only. Any defects that affected the overall safety of the bridge were noted. At the request of Fairfax County, RDA revisited the pedestrian bridges within 30' of any roadway in consideration

of road spray. These bridges were given a thorough assessment, including noting any defect in the structural components of the bridge. Specific components were photographed and assessed. The components assessed included approaches, abutments, handrail, decking, truss panels, bridge seats, bearings, floor beams, and stringers. Other conditions were noted as well, including paint and cleanliness of the bridge.

Our pedestrian bridge assessment has identified 5 locations at Canterbury Woods, Old Chesterbrook Road, Fairfax Road, Newington Road, and Shreve Road that are in need of immediate repair or replacement. Additionally, 6 pedestrian bridges have been identified with poor surface components in need of partial repair. These include the bridges at Telegraph Road, Old Dominion Drive, Lawyers Road, Georgetown Pike, Kirby Road, and Flint Hill ES/Vale Road. The remaining pedestrian bridges inspected were observed to be in good condition.

Other bridges of note include Frying Pan Road and South George Mason Drive. Both of these pedestrian bridges are aerial and span the roadways. A close inspection of these bridges was not possible for this assessment. According to the database supplied by Fairfax County, the Frying Pan Road and South George Mason Road Bridges both had structural inspections in 2011.

Appendix D contains the photo assessment report of all the pedestrian bridges in Fairfax County and their assessed conditions. Appendix E contains the photo reports of all the revisited pedestrian bridges that are within 30' of the roadway.

X. Funding Requirement for Pedestrian Bridges

In order to estimate a cost for Bridges, RDA utilized the Fairfax County Department of Public Works & Environmental Services 2013 Comprehensive Unit Price Schedule. The unit prices used in the development of the cost estimate was $1050.97 per linear foot for prefabricated bridge replacement, and an estimated $250.00 per linear foot for repair work. An additional 20% for Mobilization and 25% for contingency is being applied to capture the necessary Staff involvement and miscellaneous services.

The total length of the County's Pedestrian Bridge network for the 64 bridges is 3684 feet based on GIS data. Based on current replacement pricing, the value of the network is approximately $3.9 Million. Given the fast deterioration of these facilities in this region for the existing bridges, we are assuming the life span to be 25 years. The lifecycle cost for maintaining the pedestrian bridge facilities would be 4% of the asset. Total estimated repair/replacement costs for pedestrian bridges would require an initial capital cost of approximately $471K, plus an annual budget of $156K for future maintenance. The initial capital cost would repair/replace bridges that are in "poor" condition. An annual budget of $156K would provide for the on-going maintenance of bridge repairs and/or replacements. The following exhibit displays estimated repair costs for pedestrian bridges.

Pedestrian Bridge Assessment Summary					
Bridge Location	Length (Feet)	*Repair Cost Est.	**Mobilization 20%	***Contingency 25%	Total Cost
**Canterbury Woods	26	$27,325	$5,465	$6,831	$39,621
Old Chesterbrook Rd	25	$26,274	$5,255	$6,569	$38,098
Fairfax Rd	36	$37,385	$7,567	$9,459	$54,861
Newington Rd	40	$42,039	$8,408	$10,510	$60,957
Shreve Rd	70	$73,568	$14,714	$18,392	$106,674
Telegraph Rd	10	$2,500	$500	$625	$3,625
Old Dominion Dr	52	$13,000	$2,600	$3,250	$18,850
Lawyers Rd	35	$8,750	$1,750	$2,188	$12,688
Georgetown Pike	50	$12,500	$2,500	$3,125	$18,125
Flint Hill ES/Vale Rd	5	$1,250	$250	$313	$1,813
Kirby Rd	30	$7,500	$1,500	$1,875	$10,875
Total		$252,541	$50,509	$63,137	$366,187

**The Canterbury Woods bridge replacement has been completed since the conclusion of the assessment.

Total Pedestrian Bridge Value Estimate

Facility	Total County Maintained Bridges	Total County Maintained Bridges(LF)	Repair Cost for Entire Network	Replacement Cost for Entire Network
Pedestrian Bridge	64	3684	**$921,000**	**$3,871,773**

*Replacement Costs based on Fairfax County 2013 Comprehensive Unit Price Schedule. Prefabricated Bridge unit price per linear foot=$1050.97. Repair Costs based on a unit price of $250 per linear foot.

XI. Conclusion

This Sidewalk and Trail Condition Assessment provides key observations and statistics relating to the condition of the pedestrian facilities in Fairfax County. Deficiencies in sidewalk, trails, and pedestrian bridges have been identified throughout the entire County. It is estimated that roughly 2% of the County's 641 miles of pedestrian network is in "poor" condition. In addition, another 2.5% has been identified as being in "fair" condition. Overall this represents a small percentage of the total walkway network. Although the total amount of sidewalks, trails, and bridges needing attention is small by percentage, the hazardous conditions that exist and the risk incorporated with those conditions is significant.

Through this assessment, cost estimates have been developed for the repair and or replacement of existing "poor" sidewalk facilities, as well as the on-going maintenance of this important infrastructure. A capital cost of **$3.0 Million** is recommended to correct the existing "poor" pedestrian facility conditions, including bridges. After these conditions are resolved, an annual budget of **$576K** is recommended for on-going yearly maintenance for the next 10 years. This would allow for the maintenance of the "Fair" condition assessed facilities and the estimated pedestrian bridges. The cost estimates provided for maintenance only budget and do not give consideration for the design and construction of new sidewalk facilities. Based on the total value of the County's network of **$206 Million** (including sidewalks, trails, and pedestrian bridges), the annual future maintenance cost could exceed **$4.1 Million** when assuming at best a 50 year lifecycle or 2% of the asset. What we have not been able to determine is the age of the current network to determine exactly how much of the infrastructure in "Good" condition will begin to deteriorate and at what rate facilities will become "Poor". However, based on current conditions, we do not believe that we would see deterioration levels from "Good" to "Poor" within the next 10 years under normal wear and tear. This does not eliminate the potential for isolated deterioration but remains consistent with our observations.

During this course of this assignment, RDA has become extremely familiar with the Fairfax County maintained trails, sidewalks and pedestrian bridges. Having contacted Arlington, Prince William, and Montgomery Counties we have determined that no local jurisdiction has a comprehensive maintenance program for their Trail and Sidewalks. Sidewalks and Trails routinely fall within CIP budgets for neighborhood improvements. Montgomery County does have a CIP budget of $6 Million for sidewalk, curb and gutter since they are responsible for all infrastructure maintenance. Neighborhood assessments are done to determine if repair/replacement is needed.

The data and analysis provided in this report may enable Fairfax County to develop an asset management program for its Sidewalk, Trails, and Pedestrian Bridges. A solid asset management program for pedestrian facility assets would maximize use of taxpayer money while delivering the appropriate service level at an acceptable level of risk. An asset management program aid in understanding long-range capital costs. The goal of asset management is about moving from being reactive to proactive. The County is currently in a reactive mode, establishing budgets on past years and responding to complaint/emergency only issues. By moving to a proactive program, the County could establish budgets on future needs, replace high risk facilities before failure, prioritize work based on risk, and focus on high benefit to cost ratio. Given our detailed evaluation, we would recommend an ongoing update of the database provided and a reassessment of the facilities every 2-3 years. The Sidewalk and Trail Condition Assessment has provided the basis to begin this program by providing the County an overall inventory of walkway assets and their current conditions.