REPUBLIC
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SIDEWALK INVENTORY AND ANALYSIS

FOR PUBLIC RIGHT OF WAY

OCTOBER 2016

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Acknowledgement from the Director

All research, analysis and the preparation of this document was completed solely by members of the Public Works Administration team. Special thanks is given to Mike Arnold, Construction Inspector, for completing the vast majority of the field work needed to scrutinize almost 56 miles of city sidewalks and 983 curb ramps. The architect of the data collection scheme, the creator of the analysis methodology and the primary author of this report was Rachael Garrett, GIS Analyst. Ms. Garrett demonstrated extraordinary and unique innovation in developing and applying tools and processes that allowed us to complete this project.

David Brock, Public Works Director

Executive Summary

A comprehensive inventory, inspection and analysis of public sidewalks maintained by the City of Republic, Missouri's Public Works Department was completed in 2016. Approximately 56 miles of public sidewalk and 983 curb ramps were inspected and catalogued using GPS equipment and established field collection procedures. The collected data was then entered into a Geographic Information System (GIS) where each data point was analyzed according to a standardized rubric developed using the United States Department of Justice's *2010 Standards for Accessible Design*. Using these standards to detect barriers to mobility, over 1,800 deficiencies were cataloged as shown below.

Defect Class	Defect Count	Cost to Correct
Vertical Fault	711	$37,100
Horizontal Fault	79	$7,900
Obstruction	353	$75,975
Missing Endpoint Turnaround	200	$40,000
Ramp	473	$543,300
TOTAL	**1,816**	**$704,275**

Individual requests for accommodation will receive the highest priority for repairs. Then repairs were prioritized according to an understanding of the most traveled pedestrian corridors alongside the severity of the deficiencies, and whether any issues pose a significant barrier to pedestrian mobility or safety. Illustrations of priority repairs are included as Figure 6 and Figure 7 of this report.

Repair priorities include:

- Individual requests for accommodation
- Correcting the worst deficiencies on the most traveled corridors
- Issues that pose a significant barrier to mobility
    - Sidewalks that end without a turnaround or ramp
    - Ramps only needing a truncated dome detectable warning mat

With the results of the repair prioritization and an estimated cost to correct of $704,275 in current year dollars, a maximum 25 year timeline was established to fund and complete the identified sidewalk and ramp improvements at the cost included in the above table. Acknowledging that in-house labor and equipment will be primarily used for correcting deficiencies, the dedicated appropriation needed to correct ADA deficiencies in each of next 6 years to make satisfactory progress towards compliance is shown in the table below.

Fiscal Year	2017	2018	2019	2020	2021	2022
Budget Estimate	$15,000	$15,600	$16,224	$16,873	$17,548	$18,250

Purpose

The purpose of this report is to provide the results of a comprehensive assessment of sidewalks located within public right of way relative to the standards developed to achieve compliance with the *Americans with Disabilities Act* "*ADA*". This document and the analytic results contained within also contain the basis for planning and budgeting to correct *ADA* compliance deficiencies. This document represents a summary of a "self-evaluation" of pedestrian travel ways located in the public right of way, a required element for compliance with *ADA Title II*. The standards utilized throughout the inspection, inventory and analysis process are those adopted and published by the Department of Justice and titled *2010 Standards for Accessible Design*, commonly referred to herein as the *2010 Standards*.

Inspection and Inventory

The inspection of the City's 56 miles of public sidewalk and 983 ramps was completed over a period of 25 weeks in the fall and winter of 2015 and concluded in the spring of 2016. An interactive web map displaying the sidewalk inspection and inventory can be found on the City's website or by clicking here.

Methodology

The inventory process began in GIS software with a heads up digitizing of sidewalks and ramps from a 2014 aerial photograph. These digitized GIS features were each given a unique ID and combined with an established map grid to create a map book that served as reference to the field inspection staff on the location of all sidewalks and ramps in the city. Figure 1 on the following page shows the location of all existing public sidewalk within the city.

Prior to beginning field inspections, a *GPS Data Dictionary* was formulated to capture specific attributes for sidewalks and ramps based on the *2010 Standards*. The primary features, all being point geometry types, were defined as:

- Ramps
- Landings
- Sidewalks
- Points of Intersection
- Passing Lanes
- Special Features
- Defects
- Obstructions
- Hazards

Other attributes were also included to record pertinent information such as the date of collection, field notes, and to allow the direct association of a photograph taken at the time of inspection. During the analysis phase additional attributes were created to allow for summations and analysis as will be detailed in a subsequent section. The final data dictionary of GPS point attributes is included in the Appendix as Item A.

A *GPS Field Collection Standards* document (Appendix Item E) was created to give field inspection staff guidance on what features to observe in the field and how to properly categorize the attributes during GPS collection. The field inspection staff was comprised of two primary individuals to limit data subjectivity and further enhance data standardization. A 25 week timeline was established to set the desired pace to reach completion and weekly meetings were held to discuss issues encountered in the field and to check progress against the desired timeline.

During field inspections, measurements were taken using a standard measuring tape and a 2' digital level. Measurements, type categorization, and a coordinate position were collected with a Trimble GEO 7x GPS receiver and if needed, a photo was taken for later visual clarification by office staff. Photo examples of GPS points collected in the field can be seen in Figure 2. Collected data was exported daily from the Trimble GPS and loaded into the GIS system as feature points where they were given the matching ID to associate them to an existing sidewalk or ramp GIS feature. Also quality control was done on each individual point to ensure no null or inaccurate measurements or categorizations were recorded.

Figure 1 – Map of Existing Public Sidewalk

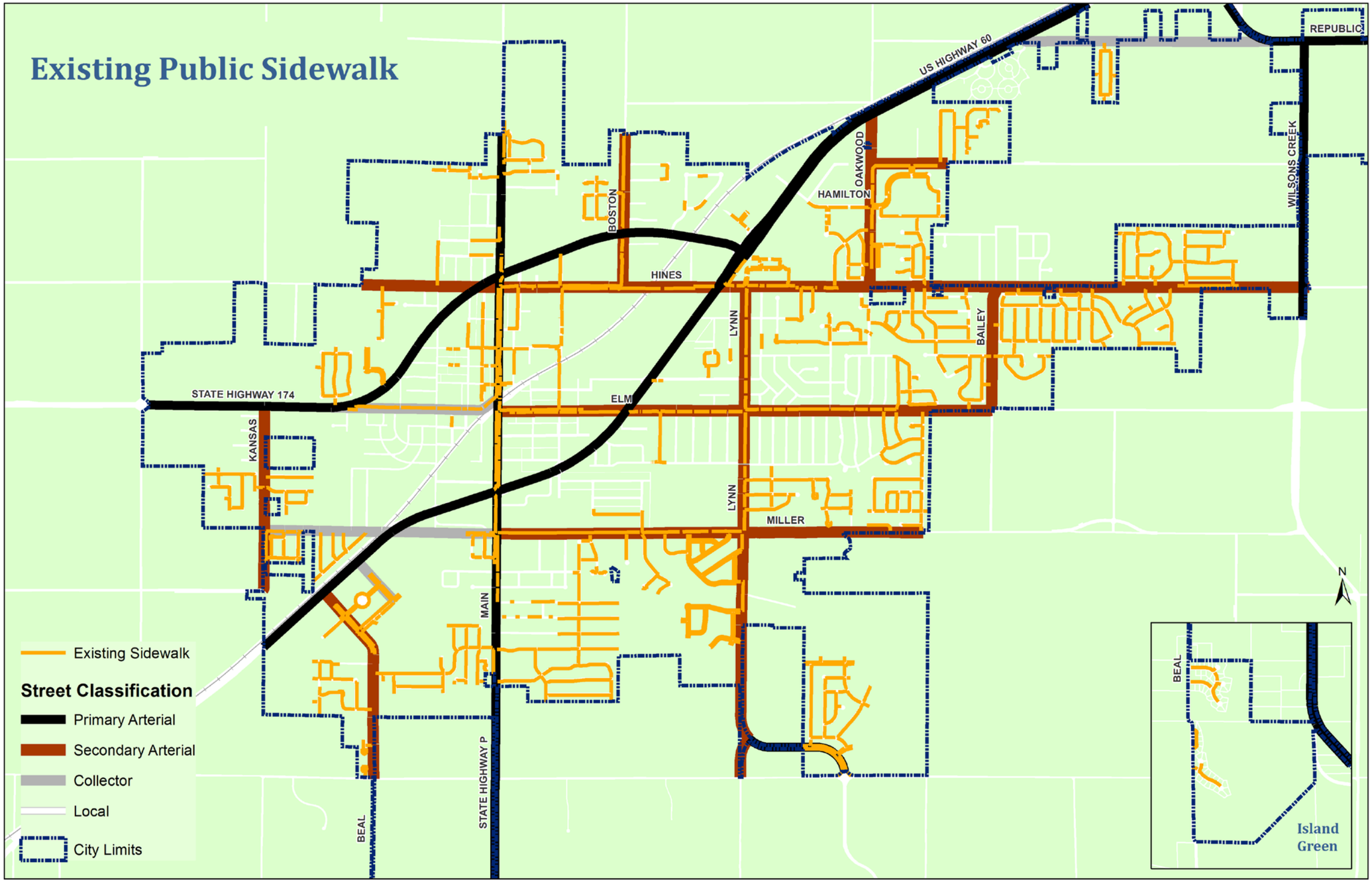


Figure 2 – GPS Field Point Example Photographs

Ramp with truncated dome surface

Ramp with tint

Point of Intersection

Defect with vertical faults

Landing

Passing lane

Obstruction

Sidewalk at endpoint

Bridge special feature

Drop-off hazard

Analysis

Methodology

The analysis process occurred in GIS software and began with a binary categorization of the GPS field points' attributes into pass or fail (0 or 1). Measurements or categorizations that were outside of the standards specified in the *2010 Standards* were classified as "1" (fail); all others received a classification of "0" (pass).

Features collected but not included in the analysis were points of intersection and special features. These were concluded not to have any compliance based standards but were added as part of the sidewalk inventory. Passing lanes were also collected when constructed within a portion of sidewalk. However they were not analyzed due to the City's interpretation of what can constitute a passing lane; this is further clarified in the Results section of this report.

Within the attributes fields, scores were determined based on the severity of the noncompliance issue ranging from 25 to 100 in 25 point increments. A score of 100 meant the feature was 100% noncompliant on the associated *ADA* standard. Lower scores were given to attributes that were deemed partially compliant based on past standards or the ease in which noncompliance could be rectified. The rubric used for classifying and scoring the point data can be seen subsequently in Table 1.

Table 1 – Classification and Scoring

Defect Category	Fail Classification	Score
Vertical Fault	Offsets in the vertical plane of the sidewalk. Measured in ¼ - ½", ½ - 1", 1 – 3", and >3"	25, 50, 75, 100 respectively
Horizontal Fault	Gaps in the horizontal plane of the sidewalk. Measured in ½ - 1", 1 – 3", and >3"	50, 75, 100 respectively
Cracking	Surface cracks greater than hairline size	Scored within vertical or horizontal fault
Heaving	Raising of the sidewalk relative to the surrounding area	Scored within vertical or horizontal faults
Settling	Sinking of the sidewalk relative to the surrounding area	Scored within vertical or horizontal fault
Shrinkage	Reduction in the size of the sidewalk over time	Scored within vertical or horizontal fault
Spalling	Chips or broken fragments in the surface	Scored within vertical or horizontal fault
Obstruction Category	**Fail Classification**	**Score**
Debris	Scattered loose material	25
Overhanging Limbs	Hanging limbs that restrict the vertical clear space	25 (notice mailed)
Ponding	Evidence of standing water	25
Overgrowth	Sod or vegetation growing on the surface	25 (notice mailed)
Solid Object	A structure placed in the sidewalk path	100, 25 (notice mailed)
Tree/Bush	A tree or bush on the surface restricting the clear width	100, 25 (notice mailed)
Utility	Any city or privately owned utility structure	50
Hazard Category	**Fail Classification**	**Score**
Sidewalk Drop-off	Vertical drop off from sidewalk	75
Ramp Drop-off	Vertical drop off from ramp	100
Railroad Safety	Safety issue at rail crossing	100
Sidewalk Category	**Fail Classification**	**Score**
Endpoint	Sidewalk that arbitrarily terminates	100
Width	Width less than 4 feet	100
Grade	Grade greater than 5%	100
Slope	Slope greater than 2%	100
Noncompliant Driveway	Grade >5% and slope >2%	100
Road Grade Exception	Noncompliant due to the grade or slope of the adjacent road	-100

Table 1 – Continued

Ramp Category	Fail Classification	Score
Type	**The ramp design type**	**100**
Landing	Where a landing is required for ramp type but not constructed.	100
Flared Sides	Flared portion of a curb ramp that is greater than 10% slope	100
Detectable Warning	The type of detectable warning; truncated dome, tinted/grooved, tinted, grooved, stamped dome, or none.	0, 25, 50, 50, 50, 100 respectively
Width	Width less than 4 feet	100
Grade	Grade greater than 5%	100
Slope	Slope greater than 2%	100
Counterslope	Where ramp meets street, grade greater than 5%	100
Road Grade Exception	Noncompliant due to the grade or slope of the adjacent road	-100
Landing Category	**Fail Classification**	**Score**
Width	Width less than 4 feet	100
Length	Length less than 4 feet	100
Grade	Grade greater than 5%	100
Slope	Slope greater than 2%	100

Calculations

Using the aforementioned pass/fail categorization and scores, a simple summative equation added all the scored attributes and determined the raw score of each GPS point:

∑ Attribute pass or fail (0 or 1) x Attribute score (25 to 100) = raw score

For example, a ramp point having these attributes would have the following raw score:

[Slope fail (1) x Slope score (100)] + [Width pass (0) x Width score (100)] = 100

A final score was then developed from raw scores being associated to the corresponding sidewalk or ramp using the unique ID and summed again within that unique ID.

For example, the sidewalk feature with unique ID RSW510, having these associated GPS field points would have the following final score:

Defect raw score (100) + Obstruction raw score (25) + Sidewalk Point raw score (200) = 325

Final scores were normalized for data consistency thus achieving a noncompliance score.

Sidewalks were normalized by sidewalk panel:

Final Score / (Length/4 ft.) = Noncompliance Score by Panel

Ramps were normalized based on the number of attributes required to be compliant based on the type of ramp[1]:

Final Score/Number of Attributes = Noncompliance Score by Attribute

The *Analysis Classification and Scoring Guidelines* for the GPS field points are included as Appendix Item D. Also a representation of the final sidewalk and ramp GIS attribute tables, with scores, is shown in Item B of the Appendix.

[1] Parallel and perpendicular ramp types are required to have a landing whereas directional ramps do not require a landing. Landings add 5 measurable attributes to the feature.

Results

The assessment concluded in spring 2016 and includes results for all public sidewalks and ramps constructed as of that date. An average compliance rate was established to encompass the results of all individual sidewalks and ramps. It was utilized to gain an understanding of the condition of the City's sidewalks and ramps as a whole. With 56 miles of sidewalk, there was an average compliance rate of almost 98% per panel. 22% of individual sidewalks panels were below this average rate of compliance. Sidewalks that scored between 88% and 98% were deemed partially compliant while a score less than 88% warranted a noncompliant categorization.

The average compliance per ramp was about 87% per attribute. However citywide ramps had a much higher rate of noncompliance than sidewalks, with 44% of the total ramps being under the 87.28% average. Ramps that scored above the average but had an incorrect ramp design type were deemed partially compliant and ramps with a score below average were labeled as noncompliant. Below, Table 2 summarizes these results.

Table 2 – Compliance Results

Feature	Count	Average Noncompliance	Average Compliance	Percent Above Average Compliance	Percent Partially Compliant	Percent Noncompliant
Ramps	983	12.86%	87.28%	52%[2]	4%	41%
Sidewalk panels	72,109	2.34%	97.66%	78%	22%	<1%

The majority of ramp defects were the result of ramps being constructed to outdated specifications that are no longer compliant with current *ADA* standards and grade breaks at the curb not being perpendicular to the direction of travel. Additionally, a total of 27 ramps could achieve above average compliance with the placement of a truncated dome detectable warning mat and were not considered in the results.

Within the sidewalk compliance results, issues seen repeatedly were sidewalks that would terminate arbitrarily at an endpoint. 78% of these endpoint locations are within 250 feet of another sidewalk or marked for future housing development where a continuous sidewalk path would be constructed. However, currently none of the endpoints have a turning space or ramp to advance a pedestrian along their travel path.

A special note on passing lanes: The *2010 Standards* requirement for a 5 foot wide passing lane every 200 feet along a 4 foot wide sidewalk was also evaluated. Commercial and residential driveways were determined to satisfy the passing lane requirement as long as they maintained the same running grade and cross slope of a compliant sidewalk. In a separate analysis, residential housing and commercial buildings constructed alongside public sidewalk were evaluated to find the average distance to the

[2] 27 additional ramps can be brought into above average compliance with the placement of a truncated dome detectable warning mat.

neighboring structure. Where sidewalk length would require a passing lane every 200 feet, the average distance between buildings was 94 feet. Special care was taken in the analysis to exclude small outer buildings and include only the primary building that joins the driveway. During sidewalk field inspections, any noncompliant driveways were collected with a defect GPS point, but these only accounted for 11% of the driveways classified as passing lanes.

The overwhelming majority of sidewalks, 71%, were built in between 2000-2009. This rate of construction corresponds to a period of substantial economic and residential growth of the City within that same time period. Although it might be expected to see fewer defects in newer construction, the same time period had the highest percentage of defects. Sidewalks and ramps built in the 1990's had the next highest rate of defects. It is determined that stricter construction standards on sidewalks and ramps and increased oversight during the construction process will prevent these unexpected results from continuing into the future. The following Table 3 and Table 4 present sidewalk and ramp defects associated with each decade of construction.

Table 3 – Sidewalk Defects by Decade

Construction Decade[3]	Miles of Sidewalk	Percent of Total Length	Number of Defects	Percent of Total Defects
1980's	2	4%	55	8%
1990's	12	21%	221	31%
2000's	40	71%	418	58%
2010's	1	2%	3	0%
Unknown[4]	1	2%	18	3%
Total	56	100%	715	100%

Sidewalk construction date unknown

Sidewalk constructed in 2003

[3] Decade was estimated from the recorded date of the corresponding subdivision.
[4] Unknown values were likely constructed prior to the 1980's.

Table 4 – Ramp Defects by Decade

Construction Decade[3]	Number of Ramps	Percent of Total	Number of Defects	Percent of Total Defects
1980's	15	<2%	9	<3%
1990's	160	16%	57	16%
2000's	723	74%	277	77%
2010's	28	3%	3	1%
Unknown[6]	57	6%	13	4%
Total	983	100%	359	100%

Ramp constructed in 1990

Ramp constructed in 2008

Figure 3 on the following page shows sidewalk compliance via a thematic map followed by Figure 4 displaying a map of ramp compliance. The complete results of the analysis are included as Appendix Item C.

Figure 3 – Map of Sidewalk Compliance Results

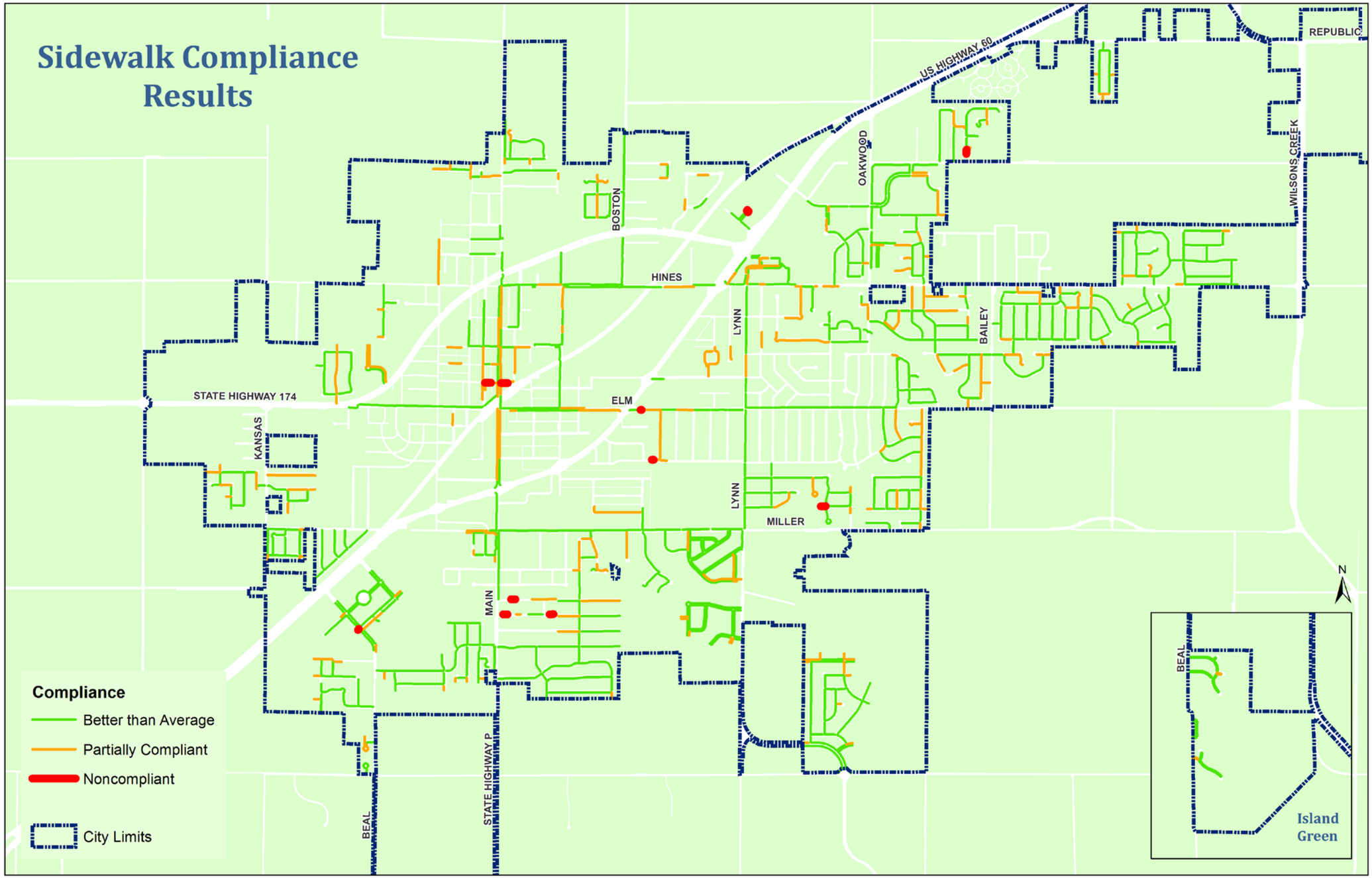
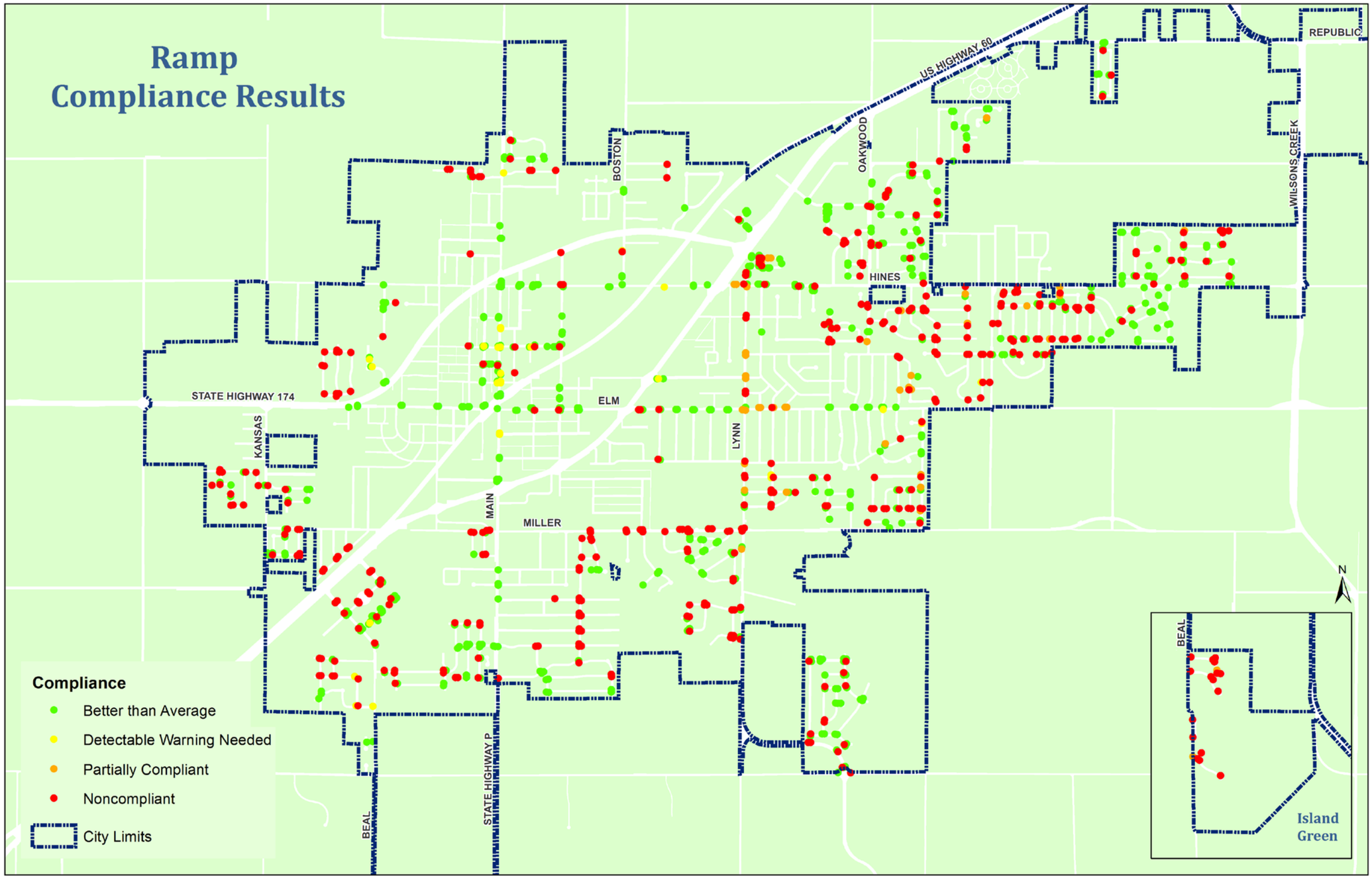


Figure 4 – Map of Ramp Compliance Results



Prioritization of Repairs

Methodology

The sidewalk network was classified into a tiered system of primary, secondary, and local sidewalks. Primary sidewalks are those running parallel to a road with a classification of primary arterial, secondary arterial, or collector. Sidewalks adjacent to primary snow plow routes were also used to consider classification in this highest tier as these routes lead to schools, public buildings, and/or commercial activity nodes. The second tier, secondary sidewalks, consists of all sidewalks running parallel to a road on secondary snow plow routes. Secondary snow plow routes are designated such that the vast majority of residences are no more than two blocks away. Secondary snow routes always terminate on arterial roadways. Under this scheme, secondary tiered sidewalks will serve as feeders from neighborhoods to the primary sidewalk network. The remaining sidewalks are solely located alongside local neighborhood streets and are classified in the lowest tier as local sidewalks. Figure 5 shows the locations of the three different sidewalk networks.

Regardless of classification tier, submitted *Requests for Reasonable Accommodation* regarding sidewalks or ramps will be provided the highest prioritization for repairs when feasible. Following any submitted request, prioritization for correcting deficiencies will follow the tiered system of primary, secondary, and local travel ways with repairs and improvements being performed respectively. The network tiers were assigned a weight (1, 2/3, and 1/3) that was factored into the existing noncompliance scores. Sidewalks and ramps with the highest weighted noncompliance score will be addressed first then work will be distributed downward toward the lowest weighted noncompliance score.

Some compliance issues were determined to warrant high priority independent of their network tier and noncompliance score because they present fundamental barriers to pedestrian mobility or safety. These issues are as follows: endpoints that stop at an intersection with no ramp present, endpoints that stop along the sidewalk where future development is not planned, and ramps that would be of average compliance with the addition of a truncated dome detectable warning mat.

Figure 6 and Figure 7 on pages 16-17 display maps of the prioritization of repairs for sidewalks and ramps, respectively. These results include the aforementioned method using the network tier weight and noncompliance score but also include the additional three high priority issues discussed above.

New sidewalk and ramp construction projects that overlap any existing infrastructure will be required to include work necessary to make the current sidewalks and/or ramps *ADA* compliant.

Independent of the prioritization scheme described in this document, *ADA* compliant curb ramps are expected to be installed in conjunction with pavement resurfacing projects pursuant to *US Department of Justice* and *Federal Highway Administration* guidance. Furthermore, any permits issued for driveway construction will include City oversight and standards to achieve compliance for the driveway to serve as both a part of the sidewalk travel network and as a passing lane.

Table 5 on the following page lists the top repair priorities with their project location and repair type.

Table 5 – Repair Projects of Priority

Sidewalk ID	Location	Repair Type
RSW294	Miller Rd and Basswood Ave	Endpoint turnaround
RSW290	Cottonwood Ave at Well #3	Endpoint turnaround
RSW724, RSW725	Township St at Lowe's Entrance	Endpoint turnaround
RSW807, RSW808	Anderson St at Housing Authority of Republic	Endpoint turnaround
RSW429	Hines St at Cherrywood Ave	Endpoint turnaround
RSW129	Elm St at Superfund Site	Endpoint turnaround
RSW845	Grant St at Pine Ave	Endpoint turnaround
RSW844	Hampton Ave at Schofield Elementary	Endpoint remove
RSW842	Elm St at 622 E Elm	Vertical faults
RSW821	Lynn Ave at Freedom St	Vertical faults, slope
RSW839	1200 block of Independence St at Justice Ave	Vertical faults
RSW813	200 block of Main St	Vertical & horizontal faults, sidewalk drop-offs
RSW822	Hampton Ave at Price Elementary	Vertical faults, noncompliant driveway, slope
RSW846	1100 Block of Grant St	Vertical & horizontal faults, noncompliant driveway, grade
RSW650	Hampton Ave at Price Elementary ball field	Vertical faults, noncompliant driveway, slope
RSW848	Justice Ave at Freedom St	Vertical fault
RSW626	Justice Ave at Independence St	Noncompliant driveway
RSW596	100 block of Main St	Sidewalk drop-off, obstructions
RSW823	Hine St at Middle School	Vertical faults, sidewalk drop-offs, noncompliant driveways, slope
RSW851	1200 block of Hines St	Vertical fault

Ramp ID	Location	Repair Type
27 ramps		Add truncated dome detectable warning
n/a	Old Town Ave at 930 N Old Town	Construct ramp
n/a	NE & SE corner of Main St at Elm St	Construct ramp
n/a	Southside of 2100 block of Haley St	Construct ramp
n/a	Northside of 2100 block of Haley St	Construct ramp
n/a	700 block of Denver Ave	Construct ramp
n/a	Cedarwood Ave at Elm St	Construct ramp
n/a	Cox Ave at Hines St	Construct ramp

Table 5 – Continued

n/a	Charles St at Conroy Ave	Construct ramp
RMP921	NW corner Redwood St at Basswood Ave	Replace ramp
RMP103, RMP105	Colorado Ave at 640 W US Hwy 60	Replace ramp
RMP227	Miller Rd at Aquatics Center driveway	Replace ramp
RMP100, RMP101	Illinois Ave at 804 W US Hwy 60	Replace ramp
RMP210	NW Corner Jewell St at Fountain Ave	Replace ramp
RMP208, RMP223	NE & NW corner Miller Rd at Conroy Ave	Replace ramp
RMP834	SW corner Main St at Olive St	Replace ramp
RMP28	SE corner Oneal Rd at Angel Ave	Replace ramp
RMP916	SW corner Kentwood St at Matteson Ave	Replace ramp
RMP225	Miller Rd at Community Center driveway	Replace ramp
RMP263	NW corner Basswood Ave at Charles St	Replace ramp
RMP629	SW corner Elm St at Peach Tree Ln	Replace ramp
RMP658	Justice Ave at 1110 E Independence St	Replace ramp
RMP1049	Elm St at 622 E Elm	Replace ramp
RMP694	NE corner Williamsburg Walk at Farm Rd 194	Replace ramp
RMP702	NE corner Williamsburg Walk at Appomattox Ave	Replace ramp

Project Examples:
Hampton Ave at Schofield Elementary

Elm Street before Main Street

Figure 5 – Map of Sidewalk Prioritization Network

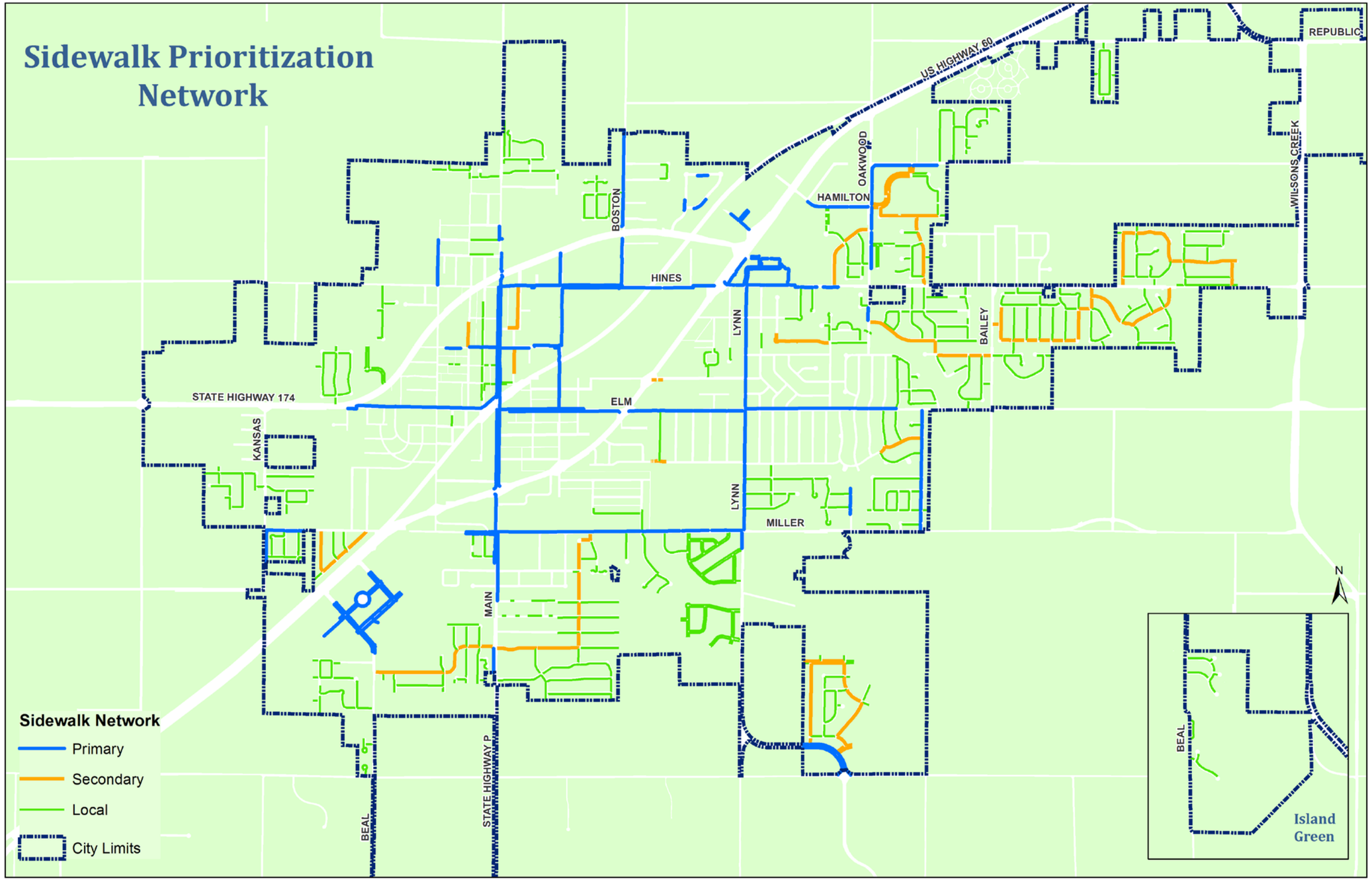


Figure 6 – Map of Sidewalk Repair Priorities

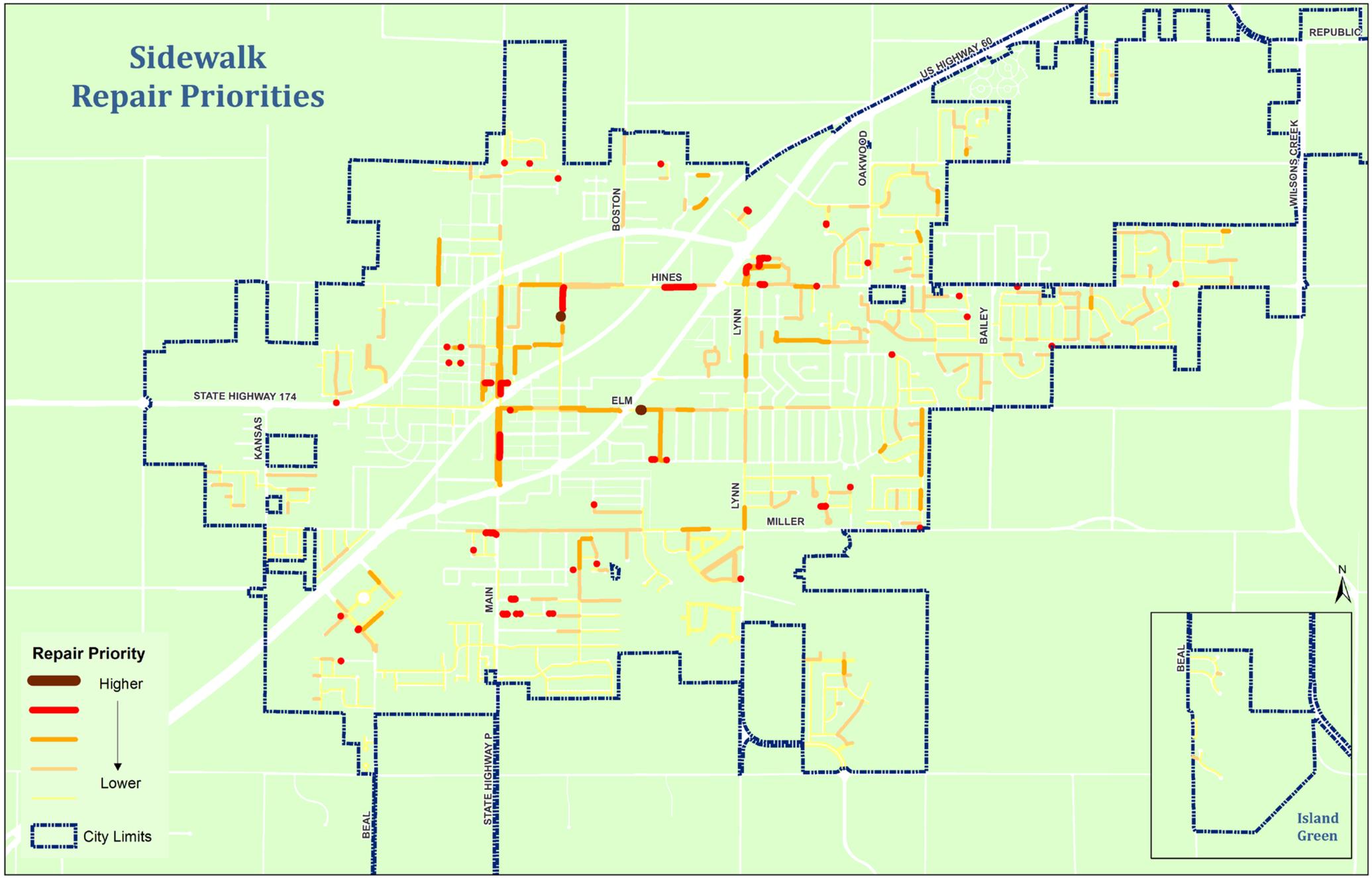
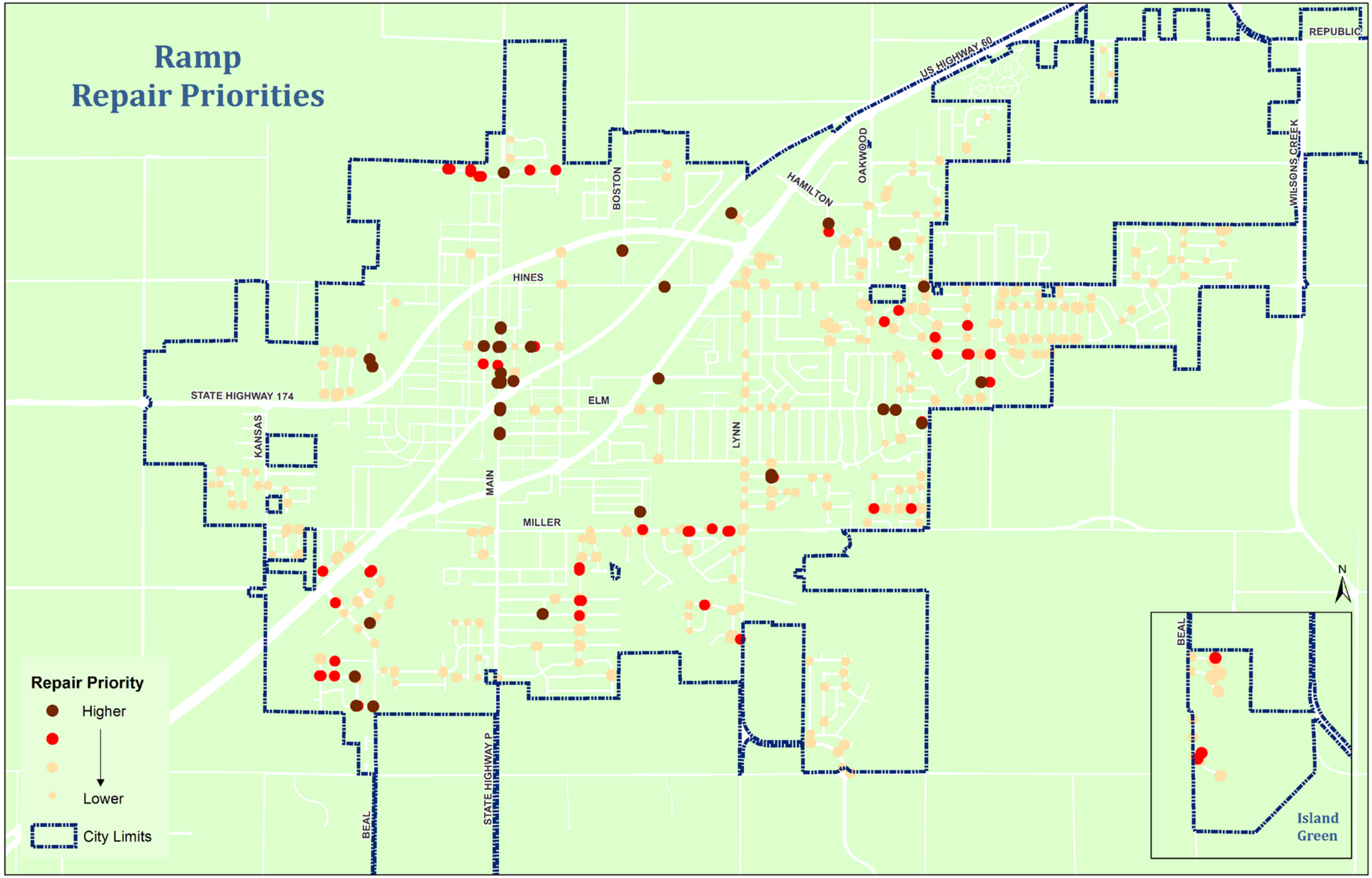


Figure 7 – Map of Ramp Repair Priorities



Expenses and Budgeting

Cost of Repairs

Having classified and quantified *ADA* deficiencies, the cost to make permanent repairs was estimated by assigning a flat rate unit cost based on the type and magnitude of each deficiency. The remainder of this section provides tabular calculations for each deficiency, the supporting rational for unit pricing and a summarization to complete all corrections.

Table 6 – Repairs of Vertical Faults

Vertical Fault	Count	Unit Price	Total
1/4" to 1/2"	78	$25	$1,950
1/2" to 1"	563	$50	$28,150
1" to 3"	65	$100	$6,500
> 3"	5	$100	$500
		Total	**$37,100**

Vertical faults of 1" or less were presumed to be correctable by hand milling the obstructing sidewalk panel. Larger vertical faults would likely require the replacement of one 4 foot panel of sidewalk and estimated accordingly.

Table 7 – Repairs of Horizontal Faults

Horizontal Fault	Count	Unit Price	Total
½" to 1"	40	$100	$4,000
1" to 3"	31	$100	$3,100
> 3"	8	$100	$800
		Total	**$7,900**

All horizontal faults were presumed to require the replacement of one four foot sidewalk panel. Temporary repairs, such as caulk or patching tar, may be employed on a transitory basis but are not considered a permanent repair.

Table 8 – Repairs of Obstructions

Obstruction	Count	Unit Price	Total
Debris	25	$25	$625
Overhanging limbs	42	$50	$2,100
Ponding	5	$1,000	$5,000
Sod/Overgrowth	140	$25	$3,500
Solid Object	10	$500	$5,000
Tree/Bush	23	$250	$5,750
Utility	108	$500	$54,000
		Total	**$75,975**

Based on a summarization of identified field conditions most ponding instances will likely require the replacement of five 4 foot sidewalk panels and drainage reconfiguration. Similarly, the elimination of solid object obstructions is expected to require reconfiguring the walkway around the object or the equivalent cost to replace five 4 foot sidewalk panels. Relocation or adjustment of a utility obstruction is expected to include the removal and replacement of one 4 foot sidewalk panel to facilitate the utility adjustment.

Table 9 – Missing Endpoint Turnarounds

Sidewalk	Count	Unit Price	Total
Endpoint turnaround	45	$200	$9,000
Endpoint turnaround (temporarily until development extends sidewalk)	156	$200	$31,200
Endpoint needing ramp	11	$1,200	$13,200
		Total	**$53,400**

Sidewalk turnarounds are estimated to consist of a 5 foot by 5 foot concrete panel.

Table 10 – Ramps

Ramp	Count	Unit Price	Total
Compliant	510	$0	$0
Partially Compliant	41	$1,200	$49,200
Noncompliant	405	$1,200	$486,000
Detectable Warning	27	$300	$8,100
		Total	**$543,300**

Both partially compliant and noncompliant ramps are presumed to require the complete removal and replacement of the ramp.

Table 11 – Summary of Projected Cost to Correct Deficiencies

Fault	Class Subtotal
Vertical Fault	$37,100
Horizontal Fault	$7,900
Obstruction	$75,975
Missing Endpoint Turnaround	$53,400
Ramp	$543,300
Total	**$717,675**

Future Funding Allocations and Correcting Deficiencies

This section of the analysis will project the annual appropriation necessary to correct all identified deficiencies within a 25 year time frame and presumes all corrections will be completed by City forces. The projection does not incorporate improvements that may occur in conjunction with large scale replacement/improvement projects but assumes each individual deficiency will be corrected within the prioritization plan described above

It is important to note that budgeting and appropriations are legislative acts subject to the approval of the City Council of the City of Republic. The multi-year goals and objectives stated herein will require the formal approval of successive and future City Councils.

In order to correct all deficiencies within a minimum of 25 years an estimated $28,700 (2016 dollars) in resources should be allocated within each annual budget. Presuming one-half of the repair costs will be for labor, equipment and overhead costs which are included in other customary expense line items, the explicit annual allocation to correct deficiencies can be further refined to $14,850 or rounding up to

$15,000 (2016 dollars). This explicit allocation represents the cost to purchase concrete, forms, truncated dome plats and/or other materials and appurtenances needed to correct each deficiency.

The cost for future years' repairs and the associated desired funding allocation can be adjusted to incorporate an annual rate of inflation of 4%; the results are illustrated in the following example table.

Table 12 – Future Year Funding Appropriations

Fiscal Year	2017	2018	2019	2020	2021	2022
Budget Estimate	$15,000	$15,600	$16,224	$16,873	$17,548	$18,250

Fiscal Year	2023	2024	2025	2026	2027	2028
Budget Estimate	$18,980	$19,739	$20,529	$21,350	$22,204	$23,092

Rate of Inflation = 4% annual increase

Appendix

Item A – GPS Data Dictionary

FEATURE TYPE	DATA FIELD NAME	DATA FIELD DEFINITION	VALUE
RAMP	OWNERSHIP	The entity responsible for maintenance	City, State, Private, Other
RAMP	RAMP TYPE	Design type of the ramp	Directional, Diagonal, Parallel, Perpendicular, Combination
RAMP	FLARED SIDES	Sides of a pedestrian path that flare into a curb ramp	Yes < 10%, Yes > 10%, No
RAMP	BLENDED TRANSITION	Depressed corners of a sidewalk	Yes, No
RAMP	LANDING	A turning space at the top of a perpendicular curb ramp or bottom of a parallel curb ramp	Yes, No
RAMP	DETECTABLE WARNING	A visually and physically contrasting surface that signifies a street crossing	None, Tinted, Grooved, Tinted/Grooved, Truncated Dome
RAMP	ADJOINS	The adjacent infrastructure	Street, Railroad, Commercial Drive, Trail, Other
RAMP	WIDTH	Measure of the opening of the curb ramp at the gutter or street	
RAMP	RUNNING SLOPE	The grade parallel with the direction of travel	
RAMP	CROSS SLOPE	The slope perpendicular to the direction of travel	
RAMP	ROADWAY GRADE EXCEPT	Allowing a noncompliant slope or grade due to the grade of the adjacent street	Possible, No
RAMP	SLOPE BREAK RAMP	The slope of the ramp above the curb	
RAMP	SLOPE BREAK STREET	The slope of the street below the curb	
RAMP	NOTES	Additional comments	
RAMP	PHOTO	Picture from the inspection	

LANDING	WIDTH	Measure perpendicular to direction of travel	
LANDING	LENGTH	Measure parallel with the direction of travel	
LANDING	RUNNING SLOPE	The grade parallel with the direction of travel	
LANDING	CROSS SLOPE	The slope perpendicular to the direction of travel	
LANDING	NOTES	Additional comments	
LANDING	PHOTO	Picture from the inspection	
SIDEWALK	OWNERSHIP	The entity responsible for maintenance	City, State, Private, Other
SIDEWALK	POINT LOCATION	The position of the GPS point along the sidewalk	Endpoint, Interval, Ramp, T Junction, Commercial Drive, Railroad
SIDEWALK	MATERIAL	Substance in which the sidewalk is comprised	Concrete, Asphalt, Other
SIDEWALK	WIDTH	Measure perpendicular to direction of travel	
SIDEWALK	RUNNING SLOPE	The grade parallel with the direction of travel	
SIDEWALK	CROSS SLOPE	The slope perpendicular to the direction of travel	
SIDEWALK	ROAD GRADE EXCEPTION	Allowing a noncompliant slope or grade due to the grade of the adjacent street	Possible, No
SIDEWALK	NOTES	Additional comments	
SIDEWALK	PHOTO	Picture from the inspection	
PI	HORIZONTAL PI	Change in direction of the sidewalk on the horizontal plane	Yes, No
PI	VERTICAL PI	Change in direction of the sidewalk on the vertical plane	Yes, No
PI	WIDTH	Measure perpendicular to direction of travel	
PI	RUNNING SLOPE	The grade parallel with the direction of travel	
PI	CROSS SLOPE	The slope perpendicular to the direction of travel	
PI	NOTES	Additional comments	
PI	PHOTO	Picture from the inspection	
PASSING LANE	WIDTH	Measure perpendicular to direction of travel	
PASSING LANE	LENGTH	Measure parallel with the direction of travel	

PASSING LANE	RUNNING SLOPE	The grade parallel with the direction of travel	
PASSING LANE	CROSS SLOPE	The slope perpendicular to the direction of travel	
PASSING LANE	NOTES	Additional comments	
PASSING LANE	PHOTO	Picture from the inspection	
SPECIAL	FEATURE TYPE	Type of structure	Bridge, Headwall, Safety Rail, Curb, Other
SPECIAL	RELATED FEATURE	Sidewalk or ramp in which the special feature is located	Sidewalk, Ramp
SPECIAL	NOTES	Additional comments	
SPECIAL	PHOTO	Picture from the inspection	
DEFECT	RELATED FEATURE	Sidewalk or ramp in which the defect is located	Sidewalk, Ramp
DEFECT	ISSUE	Underlying problem creating the defect	Cracking, Settling, Shrinkage, Spalling, Heaving, Debris, Multiple, Other
DEFECT	NC DRIVEWAY	Driveway does not meet the slope or width standards of the travel path	Yes, No
DEFECT	VERTICAL FAULT	Uneven surface elevation	No, 1/4"-1/2" No 50% Bevel, 1/2"-1", 1"-3", > 3"
DEFECT	HORIZONTAL FAULT	Gap within the surface	No, 1/2"-1", 1"-3", > 3"
DEFECT	NOTES	Additional comments	
DEFECT	PHOTO	Picture from the inspection	
OBSTRUCTION	RELATED FEATURE	Sidewalk or ramp in which the defect is located	Sidewalk, Ramp
OBSTRUCTION	ISSUE	Underlying problem creating the obstruction	Sod/Overgrowth, Overhanging Limbs, Tree/Bush, Ponding, Solid Object, Utility
OBSTRUCTION	NOTES	Additional comments	
OBSTRUCTION	PHOTO	Picture from the inspection	
HAZARD	HAZARD TYPE	Type of hazard	Railroad Safety, Ramp Drop-off, Sidewalk Drop-off
HAZARD	NOTES	Additional comments	
HAZARD	PHOTO	Picture from the inspection	

Item B – Final GIS Attribute Tables

SIDEWALKS							
OWNER	**UNIQUE ID**	**YEAR**	**NETWORK**	**SCORE**	**NORMAL SCORE**	**LENGTH**	**ASSOCIATED RAMP**
CITY	RSW1	2004	OTHER	325	3.994078	325.481907	RMP2
CITY	RSW4	2004	OTHER	100	1.75558	227.844977	RMP3, RMP2
CITY	RSW5	2004	OTHER	100	3.855404	103.75048	RMP1
CITY	RSW6	2004	OTHER	100	2.269917	176.21787	RMP7, RMP6
CITY	RSW7	2004	OTHER	200	3.342974	239.307866	RMP5, RMP6
CITY	RSW8	2004	OTHER	0	0	202.030218	RMP4, RMP5
CITY	RSW9	2004	OTHER	0	0	463.413692	RMP14, RMP8
CITY	RSW10	2004	OTHER	250	1.392298	718.23724	RMP9, RMP8
CITY	RSW11	2004	OTHER	125	2.143323	233.282605	RMP10, RMP9
CITY	RSW12	2004	OTHER	200	7.451798	107.356643	RMP11
CITY	RSW13	2004	OTHER	100	1.589236	251.693314	RMP11, RMP994
CITY	RSW14	2003	OTHER	25	0.433428	230.718725	RMP13, RMP12
CITY	RSW15	2003	OTHER	225	2.532715	355.349844	RMP12
CITY	RSW16	2003	OTHER	0	0	141.31355	RMP15, RMP993
CITY	RSW17	2004	OTHER	100	0.98068	407.88033	RMP16, RMP992
CITY	RSW19	2004	OTHER	525	4.98361	421.381314	RMP18, RMP17
CITY	RSW20	2004	OTHER	100	1.661048	240.811859	RMP19, RMP18
CITY	RSW21	2004	OTHER	100	0.956532	418.177474	RMP20, RMP19
CITY	RSW22	2004	OTHER	50	0.832234	240.31704	RMP182, RMP17, RMP20
CITY	RSW23	2004	OTHER	350	6.714223	208.512584	RMP21
CITY	RSW24	2004	OTHER	100	3.520641	113.615682	RMP22
CITY	RSW25	2007	PRIMARY	50	0.519882	384.702425	RMP31
CITY	RSW26	2007	OTHER	0	0	115.34477	RMP30, RMP31
CITY	RSW27	2007	OTHER	100	1.405621	284.571767	RMP30

RAMPS							
OWNER	**UNIQUE ID**	**YEAR**	**NETWORK**	**SCORE**	**NORMAL SCORE**	**FACTORS**	**ASSOC IATED SIDEWALK**
CITY	RMP1085	2004	SECONDARY	300	25	12	RSW136
CITY	RMP1084	2000	PRIMARY	200	16.666667	12	NONE
CITY	RMP1083	2000	PRIMARY	25	2.083333	12	RSW653
CITY	RMP1082	2000	PRIMARY	25	2.083333	12	RSW652
CITY	RMP1081	2000	PRIMARY	200	16.666667	12	RSW823
CITY	RMP1080	2005	PRIMARY	100	8.333333	12	RSW728
CITY	RMP1079	2005	PRIMARY	100	8.333333	12	RSW730
CITY	RMP1078	2005	PRIMARY	100	8.333333	12	RSW727
CITY	RMP1077	2005	PRIMARY	100	8.333333	12	RSW725
CITY	RMP1076	2005	PRIMARY	100	8.333333	12	RSW723
CITY	RMP1075	2005	PRIMARY	100	8.333333	12	RSW724
CITY	RMP1074	2003	OTHER	100	8.333333	12	RSW66
CITY	RMP1073	2003	OTHER	200	16.666667	12	RSW66
CITY	RMP1072	2003	OTHER	200	16.666667	12	RSW67
CITY	RMP1071	2003	OTHER	100	8.333333	12	RSW66
CITY	RMP1070	2001	PRIMARY	200	16.666667	12	RSW154
CITY	RMP1069	2001	PRIMARY	100	8.333333	12	RSW154
CITY	RMP1068	2001	PRIMARY	100	8.333333	12	RSW139
CITY	RMP1067	2001	PRIMARY	100	8.333333	12	RSW137
CITY	RMP1066	2008	OTHER	100	8.333333	12	RSW141
CITY	RMP1065	2008	OTHER	100	8.333333	12	RSW140
CITY	RMP1064	2004	SECONDARY	100	8.333333	12	RSW122
CITY	RMP1063	2000	PRIMARY	100	8.333333	12	RSW118
CITY	RMP1062	UNKNOWN	PRIMARY	200	16.666667	12	RSW815, RSW845
CITY	RMP1061	UNKNOWN	PRIMARY	200	16.666667	12	RSW596, RSW846

Item C – Compliance Results

Feature	Count	Average Noncompliance	Average Compliance	Percent Above Average Compliance	Percent Partially Compliant	Percent Noncompliant
Ramps	983	12.86%	87.28% Per attribute	52%[5]	4%	41%
Sidewalk panels	72,109	2.34%	97.66% Per panel	78%	22%	<1%

Network

Prioritization Network	Miles of Sidewalk	Miles Under Avg Compliance	% of Panels Under Avg Compliance	Number of Ramps	Number Under Avg Compliance	% of Ramps Under Avg Compliance
Primary	15	3	24%	324	101	31%
Secondary	8	1	12%	144	73	51%
Other	33	8	24%	515	258	50%
Total	56	12	22%	983	432	44%

Sidewalks

Construction Decade	Miles of Sidewalk	Percent of Total Length	Number of Defects	Percent of Total Defects
1980's	2	4%	55	8%
1990's	12	21%	221	31%
2000's	40	71%	418	58%
2010's	1	2%	3	0%
Unknown[6]	1	2%	18	3%
Total	56	100%	715	100%

Ramps

Construction Decade	Number of Ramps	Percent of Total	Number of Defects	Percent of Total Defects
1980's	15	<2%	9	<3%
1990's	160	16%	57	16%
2000's	723	74%	277	77%
2010's	28	3%	3	1%
Unknown[6]	57	6%	13	4%
Total	983	100%	359	100%

[5] 27 additional ramps are of above average compliance with the placement of a truncated dome detectable warning mat.

[6] Unknown values were likely constructed prior to the 1980's.

Item D – Classification and Scoring Guidelines

Defects - Defects create vertical or horizontal faults on the sidewalk surface.

Defect Category	Fail Classification	Score
Vertical Fault	Offsets in the vertical plane of the sidewalk. Measured in ¼ - ½", ½ - 1", 1 – 3", and >3"	25, 50, 75, 100 respectively
Horizontal Fault	Gaps in the horizontal plane of the sidewalk. Measured in ½ - 1", 1 – 3", and >3"	50, 75, 100 respectively
Cracking	Surface cracks greater than hairline size	Scored within vertical or horizontal fault
Heaving	Raising of the sidewalk relative to the surrounding area	Scored within vertical or horizontal faults
Settling	Sinking of the sidewalk relative to the surrounding area	Scored within vertical or horizontal fault
Shrinkage	Reduction in the size of the sidewalk over time	Scored within vertical or horizontal fault
Spalling	Chips or broken fragments in the surface	Scored within vertical or horizontal fault

Cracking and Heaving

Settling

Shrinkage

Spalling

Obstructions - Obstructions restrict the clear width of the sidewalk path to less than 4 feet. Notices were mailed to the responsible party regarding the removal of obstructions. Categories with a low score and no mailed notices were deemed easily rectifiable by city personnel. High scores are associated with obstructions not easily rectifiable.

Obstruction Category	Fail Classification	Score
Debris	Scattered loose material	25
Overhanging Limbs	Hanging limbs that restrict the vertical clear space	25 (notice mailed)
Ponding	Evidence of standing water	25
Overgrowth	Sod or vegetation growing on the surface	25 (notice mailed)
Solid Object	A structure placed within the sidewalk path	100, 25 (notice mailed)
Tree/Bush	A tree or bush on the surface restricting the clear width	100, 25 (notice mailed)
Utility	Any city or privately owned utility structure	50

Overhanging limbs

Ponding

Overgrowth

Solid Object

Tree/Bush

Utility

Hazards - Hazards have the potential to cause bodily harm to pedestrians. Ramp drop offs pose a greater risk than sidewalk drop offs because of the maneuvering needed to traverse them; thus they have a higher score.

Hazard Category	Fail Classification	Score
Sidewalk Drop-off	Vertical drop off from sidewalk	75
Ramp Drop-off	Vertical drop off from ramp	100
Railroad Safety	Safety issue at rail crossing	100

Sidewalk Drop-off

Ramp Drop-off

Railroad Safety

Sidewalks - **Sidewalk features are specific structural attributes that must comply with ADA guidelines.**

Sidewalk Category	Fail Classification	Score
Endpoint	Sidewalk that arbitrarily terminates	100
Width	Width less than 4 feet	100
Grade	Grade greater than 5%	100
Slope	Slope greater than 2%	100
Noncompliant Driveway	Grade >5% and slope >2%	100
Road Grade Exception	Noncompliant due to the grade or slope of the adjacent road	-100

Endpoint

Noncompliant Driveway

Sidewalk Network Category	Description
Primary	Streets classified higher than a collector, on the primary snow removal route, or located near schools or commercial districts
Secondary	On the secondary snow removal route
Other	All other

Landings - **Landing features are specific structural attributes that must comply with ADA guidelines.**

Landing Category	Fail Classification	Score
Width	Width less than 4 feet	100
Length	Length less than 4 feet	100
Grade	Grade greater than 5%	100
Slope	Slope greater than 2%	100

Ramps - Ramp features are specific structural attributes that must comply with ADA guidelines.

Ramp Category	Fail Classification	Score
Type	The ramp design type	100
Landing	Where a landing is required for ramp type but not constructed.	100
Flared Sides	Flared portion of a curb ramp that is greater than 10% slope	100
Detectable Warning	The type of detectable warning; truncated dome, tinted/grooved, tinted, grooved, stamped dome, or none.	0, 25, 50, 50, 50, 100 respectively
Width	Width less than 4 feet	100
Grade	Grade greater than 5%	100
Slope	Slope greater than 2%	100
Counterslope	Where ramp meets street, grade greater than 5%	100
Road Grade Exception	Noncompliant due to the grade or slope of the adjacent road	-100

Truncated Dome

Tinted/Grooved

Only Tinted

Only Grooved

Item E – GPS Field Collection Standards

Point Collection

- When first creating the data file, put the inspector's initials at the end of the default file name.
    - i.e. R092309_RG

Collect GPS points for all ramps, sidewalks, landings, and special features.

- If the sidewalk stops at a ramp, collect both a sidewalk point and ramp point.
    - Under sidewalk, choose ramp as the location.
- Choose endpoint as the sidewalk location for:
    - the beginning or end of a sidewalk that terminates
    - commercial drives without ramps
    - street crossings without ramps
    - railroad crossings without ramps
    - gaps
- Collect a landing point at any ramp where there is a change in travel direction.
    - Unless there is no obvious landing present.
- Bypass residential drives
    - Unless a gap in sidewalk construction.
    - Or if they are noncompliant.
        - Collect a defect point and mark NC driveway.
- Special features include current edge protection such as safety rails and curbs, and bridges, headwalls, etc.
- Collect vertical drop offs that may require edge protection as a Hazard.
    - This includes any ramps, sidewalks, or special features that pose an obvious risk to pedestrians. i.e. open culverts, steep ditches

- Collect sidewalk point "health check" intervals every 100 feet.
    - Health checks can include PI's and special features.
    - NOT defects or obstructions
- If the slope looks questionable, collect an interval point regardless.
- When choosing "Other" or "Multiple" as the attribute, include a description in notes as to what it refers.

Defect & Obstruction Issues

Only collect defects that create faults or impact mobility.

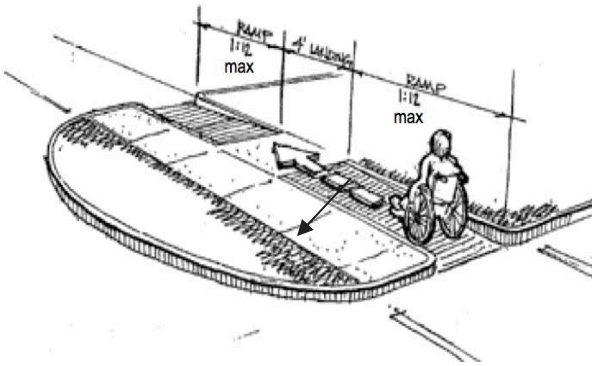
Only collect obstructions that protrude into the minimum path of travel.

- Vertical fault – less than **0.25 inches** is permitted (do not collect)
    - 0.25-0.50 inches is permitted if maximum bevel is 50% (do not collect)
    - 0.25-0.50 inches without 50% bevel (collect point)
    - Greater than 0.50 inches requires a ramp or bevel (collect point)
- Horizontal fault (gap) or grate – less than **0.50 inches** is permitted (do not collect)
    - Greater than 0.50 (collect point)
    - Elongated grate opening must be perpendicular to direction of travel.
    - Railroad crossings with flangeway gaps greater than 2.5 inches will be collected.
- If the defect is greater than 1 sidewalk panel, collect the point in the middle of the area.
    - Note the total issue length in "Notes" using the format ## ft.
- If there is sod/overgrowth or a tree/bush obstruction, collect obstruction point.
    - Note the address number and street name in "Notes".
- Overhanging objects
    - Must be at least 27 inches above the ground.
    - May protrude 4 inches into a 60 inch path.
    - Handrails may protrude 4.5 inches into a 60 inch path.
    - Nothing can obstruct the 48 inch minimum path.

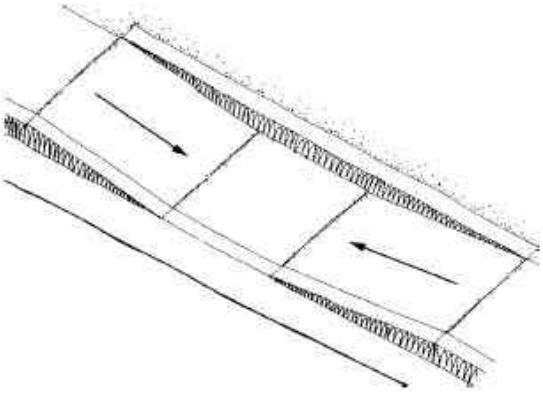
List of Examples

Ramp Types

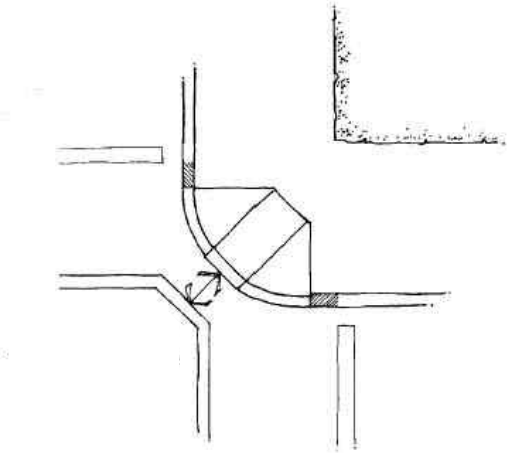
Directional to travel (perpendicular to curb)



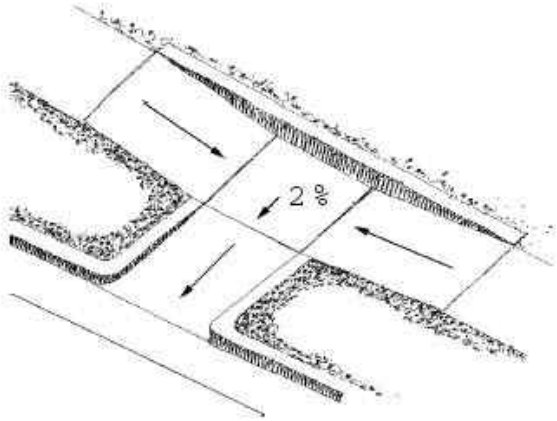
Parallel to curb



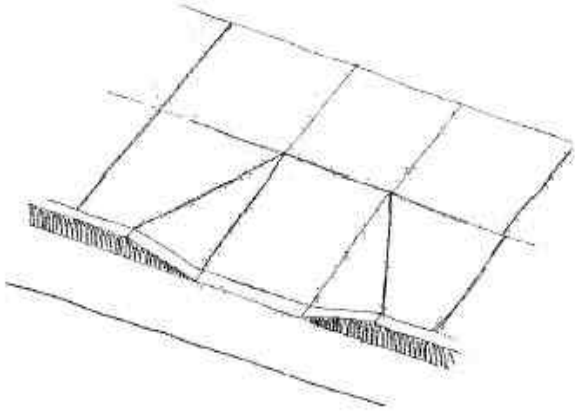
Perpendicular to curb



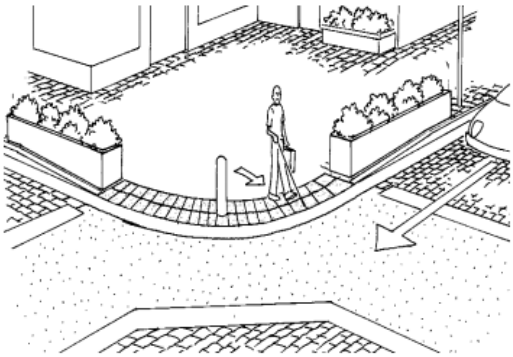
Combination



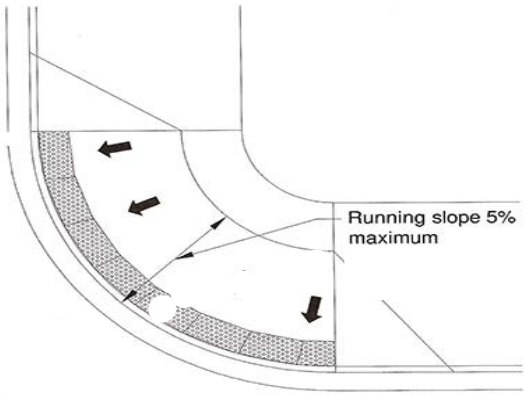
Flared Sides



Blended Transition (no flared sides)



Blended Transition (flared sides)



Defect Types

Heaving

Cracking

Settling and Cracking

Settling and Ponding

Spalling

Ponding