City of El Monte

SIDEWALK INVENTORY REPORT

ACKNOWLEDGEMENTS

City of El Monte

Leonardo Torres

Christopher Ortiz

Steven Wright

KTUA

Joe Punsalan

Alex Samarin

Marissa Tietz

Jorge Nozot

Evari GIS

Brian Gaze

Josh Edge

Kevin Volz

TABLE OF CONTENTS

Chapter 1
INTRODUCTION

1.1 INTRODUCTION

A City's sidewalk network allows widely used and easy access to neighborhoods, schools, businesses, government facilities, parks and other activity centers. Sidewalks enhance safety by separating vehicles and pedestrians and in some cases, providing shelter from the sun through street trees. The sidewalk streetscape areas also add to the aesthetic appeal to City neighborhoods. In addition to providing a pedestrian network, sidewalks serve as meeting places for friends and neighbors, play areas for children and settings for special events.

The El Monte sidewalk network includes all sidewalks constructed on public right-of-ways, along public easements or on public property and in which the City is responsible for construction, maintenance, repair and replacement. The sidewalk system includes concrete sidewalks, brick sidewalks, asphalt sidewalks and sidewalk curb ramps. The "ramps" are the short inclines that connect sidewalks to crosswalks. The City sidewalk system does not include private or public driveway approaches or aprons that are constructed in the right-of-way for vehicle access. Curb ramps were not comprehensively audited in data collection for this project.

The purpose of this project is to perform a complete, Citywide inventory and assessment of the City's sidewalk network, using a web based GIS application database of the City's sidewalk network and a spatial database deliverable. This goal of this data is to identify the location and condition of sidewalks and curb ramps and provide the capabilities to process and analyze the recorded data and actively manage, track and update ongoing sidewalk and curb ramp maintenance programs and conditions. In addition, strategies for prioritizing sidewalks repairs and monitoring progress are also included. The sidewalk issues summarized in this project are not assumed to be the responsibility of the City, as damage to sidewalk from private landscaping is the responsibility of the private property owner.

1.1.1 EXISTING POLICIES

The El Monte General Plan is a comprehensive plan that applies to and affects all territory within the boundary of the community. It is comprehensive because it addresses a wide range of municipal issues ranging from the City's physical development, to the provision of services, to other concerns that affect quality of life. The General Plan sets forth Citywide goals, policies, and implementation plans that are in relationship and limitations of each part. Various General Plan elements contain at least one (1) goal statement followed by related policy statements, which are further implemented by programs. Without goals and policies, programs are simply reacting to a circumstance, and without programs, goals and policies cannot be implemented. To provide guidance on this sidewalk inventory, the following are excerpts from the General Plan that led to the development of this sidewalk inventory to continue addressing various goals, policies and programs related to the pedestrian environment.

According to the General Plan, City recreation surveys showed that walking is the most popular activity for residents of all ages. A safe, well-maintained, and complete sidewalk network is fundamental to encourage residents of all ages to walk. Sidewalks should also be of sufficient width, to accommodate all users, including families with children, people with disabilities, and seniors, especially in high pedestrian use areas. The Circulation Element of the General Plan proposes the creation of a comprehensive pedestrian plan that will allow the redesign and retrofit of the City's circulation system to encourage and foster pedestrian activity. This sidewalk inventory will be a great asset for that plan.

1.1.2 COMMUNITY DESIGN ELEMENT

Goals

Goal CD-2

Attractive commercial corridors exemplified by consistency of hardscape, landscaping, signage, sidewalks, and other treatments appropriate to their context to foster a pleasant driving and pedestrian experience.

Policies

CD-2.6 Pedestrian Design. Improve pedestrian safety and comfort along major corridors by incorporating wider sidewalks, appropriate landscape buffers and canopy trees, and other pedestrian amenities to facilitate a walkable street environment.

1.1.3 PARKS AND RECREATION ELEMENT

Goals

Goal PR-5

A comprehensive system of walking, hiking, biking, and equestrian paths and trails that are accessible, safe, and connect to homes, residences, parks, and other community destinations.

Policies

PR-5.1 Sidewalks. Create a network of paths and sidewalks that are safe and accessible to all people, with pedestrian amenities that connect residences to schools, parks, shopping, and public facilities.

1.1.4 CIRCULATION ELEMENT: MULTI USE PATH SYSTEM

Goals

Goal C-5

A connected, balanced, and integrated system of walking, biking, and equestrian paths and trails that is accessible and safe and connect to homes, residences, parks, and other community destinations.

Policies

C-5.5 Citywide Pedestrian Network. Establish a Citywide network of sidewalks, trails, and paths that connects neighborhoods, schools, open space, and major destinations, where feasible. Coordinate provision of the pedestrian network with adjacent jurisdictions.

C-5.6 Pedestrian Amenities. Provide amenities along pedestrian routes, such as well-maintained and landscaped sidewalks, tree shade cover, benches, pedestrian phases at signalized intersections, and midblock signalized or well-signed pedestrian crosswalks.

1.1.5 CIRCULATION ELEMENT: LAND USE AND TRANSPORTATION PLANNING

Goals

Goal C-6

Integration of circulation and land use development policies and practices that support walking, bicycling, and use of transit through a variety of supportive land use development and urban design measures.

Policies

C-6.2 New and Substantially Rehabilitated Development. Require new development to provide amenities for transit, bicyclists, and pedestrians and to provide connections to the bicycle and pedestrian networks where appropriate.

Chapter 2

SIDEWALK AND CURB RAMP DATA COLLECTION

2.1 COMPREHENSIVE SIDEWALK DATA COLLECTION

The data collection efforts of this project entails walking over 250 linear sidewalk miles and identifying issues on sidewalks such as cracks, spalls, horizontal separation, raised and depressed sections, missing panels and missing sidewalks altogether. Minimum criteria was established that was deemed as needing repair to begin developing the GIS database for in the field data collection. ArcGIS Collector and a Story Map was developed to provide up to the minute data monitoring, along with pictures of each issue.

A pilot study was initially conducted to test the data collection efforts, calibrate tools and determine the estimated time of completion. Upon approval of the pilot study, the Citywide data collection effort was underway. Data was collected between March 2020 and January 2021 with the latter months used for quality control and summary of findings. The data collection team, typically two (2) people, walked along the same corridor on opposite sidewalks to collect data and take photos. In some cases, areas or streets were prioritized based on on-going projects that needed data.

Due to the onset of the COVID-19 pandemic, the data collection team received permission from the City and Police Department to continue collecting data. Masks and social distancing was practiced throughout the course of the field work.

2.2 FIELDWORK PROCESS

Appendix A identifies the standards which were followed for the El Monte sidewalk audit. Auditors from Evari GIS Consulting, part of the KTUA team, used these standards as a field guide for sidewalk data collection. A data dictionary (schema) of potential sidewalk issues, their minimum measurement thresholds and increments of measurement, and spatial accuracy requirements were established with City staff are included in Appendix A.

2.2.1 DATA COLLECTION STANDARDS

Sidewalk Terminology

Sidewalks are concrete walkways adjacent to roads. In many cases, sidewalks run on public land between public streets and private property. The scope of work for this project is limited to public sidewalks in the City.

The sidewalk diagram in Figure 2-1 is referred to as a “standard drawing” or “standard,” and is typically developed by individual jurisdictions. While unique to each City, certain dimensions and characteristics are standard across the country consistent with national guidelines developed and formalized by the landmark Americans with Disabilities Act.

Sidewalks can be physically separated from roads with a landscaped strip, sometimes called a “parkway.” The sidewalk edge closest to the road is referred to as the “front of walk” and the opposite sidewalk edge – often the edge closest to homes or businesses – is referred to as the “back of walk”.

Sidewalks are divided in rectangular panels along the direction of travel that allow for water drainage and panel movement due to soil expansion and contraction. These panels can vary in length but are always divided from adjoining panels with a joint that runs the full vertical depth of the sidewalk, which is typically four (4) to eight (8) inches. Per the American Disability Act of 1991, sidewalks are required to be three (3) feet wide from front to back with the typical range from three (3) to six (6) feet.

Sidewalks are often crossed by public or private driveways that provide vehicular access between parking areas and roads. The portion of the driveway that crosses the straight line created by a public sidewalk is called a driveway approach. These are paved and maintained by the City and are part of the project scope. Private driveway past the back of the sidewalk and driveway approaches with no public sidewalk connecting to either side are not in the project scope and were not part of data collection.

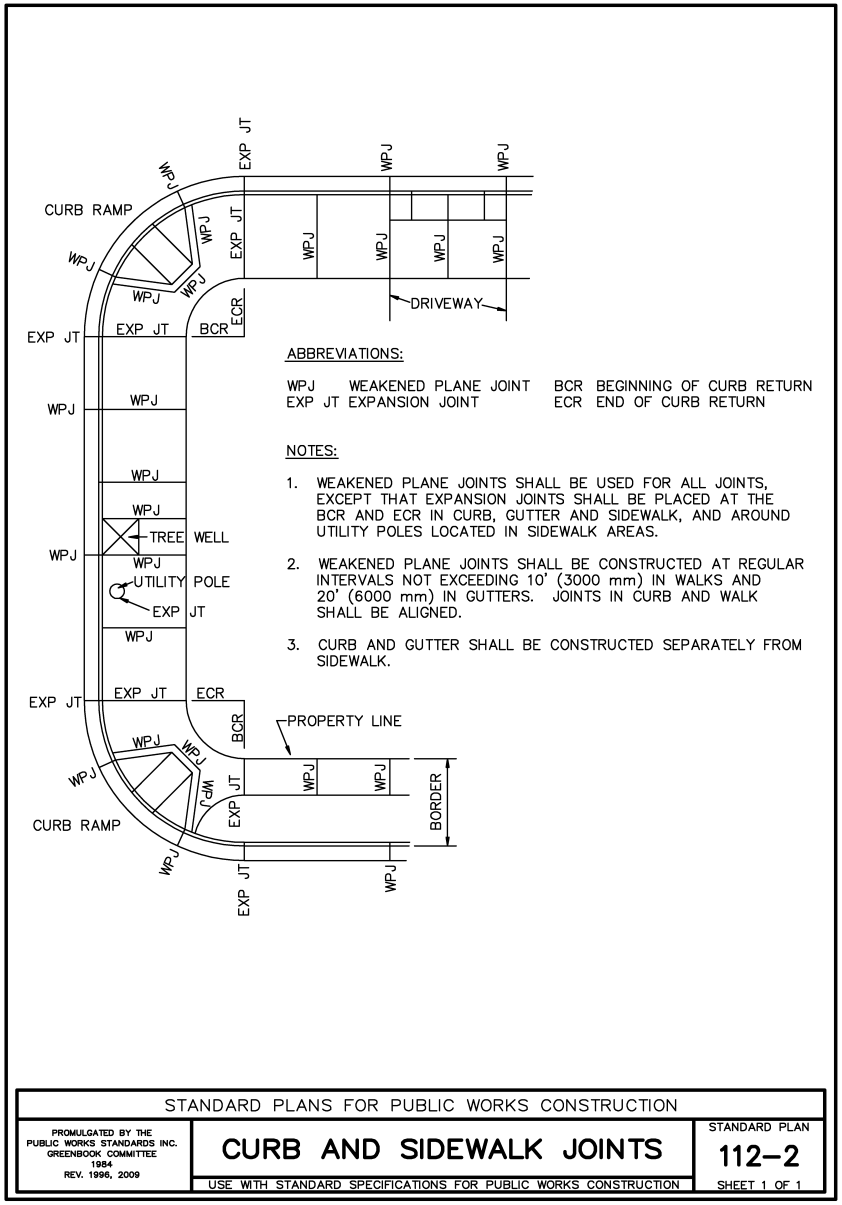


FIGURE 2-1: Greenbook Standard Plans for Public Works Construction

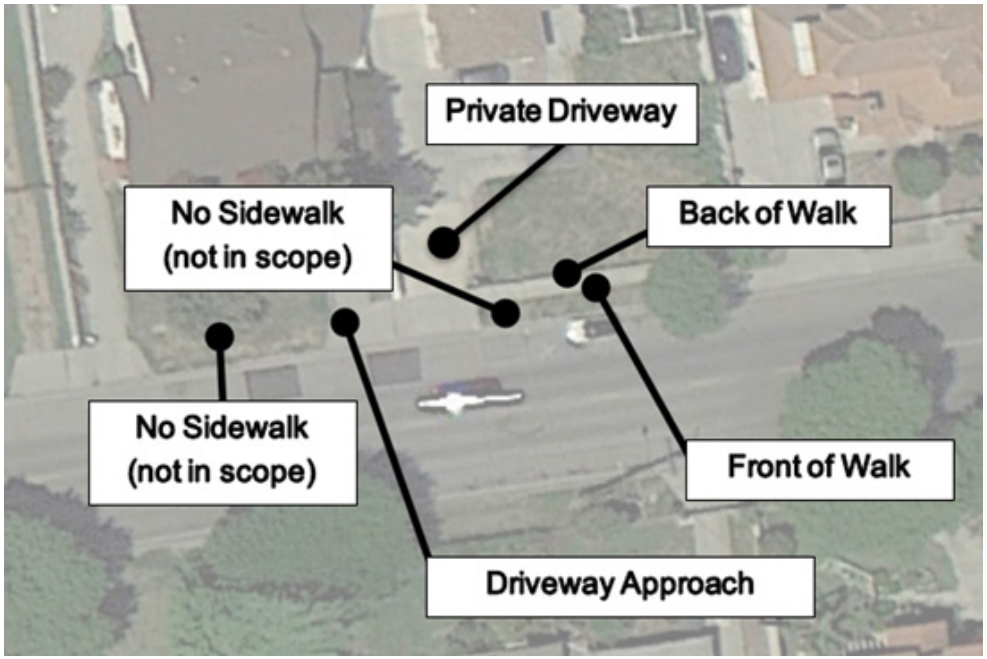


FIGURE 2-2: Sidewalk and driveway descriptions for project area definition

FIGURE 2-3: Driveway approach in scope

FIGURE 2-4: Driveway approach not in scope

Sidewalk Issue Definitions

Field auditors collected the location and attributes of specific pedestrian hazards on City-maintained sidewalks and driveway approaches. Field auditors did not collect issues found on the sidewalk curb, or on private property. Hazards include but are not limited to:

- Cracks
- Spalling
- Vertical and horizontal separation
- Horizontal displacement
- Broken and missing panels of sidewalk.

Each of these issues have a minimum measurement criterion that defines whether or not it is a significant issue that must be recorded. The following figures illustrate the sidewalk issues that were collected, followed by a short definition (Figure 2-5 - Figure 2-13).

FIGURE 2-5: Sidewalk hump

Definition: A sidewalk issue where a panel edge is lower than the adjacent and joining panel edge due to subsurface subsidence, adjacent panel cracking, or other aberration.

FIGURE 2-6: Sunken sidewalk

Definition: A sidewalk issue where a panel edge is lower than the adjacent and joining panel edge due to subsurface subsidence, adjacent panel cracking, or other aberration.

FIGURE 2-7: Spalling

Definition: A sidewalk issue consisting of pits on the concrete surface caused by removal of material after fracturing.

FIGURE 2-8: Cracked sidewalk

Definition: A mid-panel separation of sidewalk surface running lengthwise, widthwise, or diagonally. Cracks do not necessarily run the length or width (edge to edge) or depth (top to bottom) of sidewalk. Portions of panel on either side of crack are not vertically displaced.

FIGURE 2-9: Horizontal separation

Definition: A sidewalk issue where two (2) adjacent panels are horizontally separated to a distance greater than the as-built 0.5 inches, but the two (2) panels remain and are not vertically displaced.

FIGURE 2-10: Missing sidewalk panel

Definition: A sidewalk issue where the underlying substrate is exposed in dimensions roughly equivalent to one (1) or more panels with panels existing on either side. Missing panels are different than what is sometimes called “missing sidewalks” in that missing panels once existed, and lengths of “missing sidewalks” are lengths of road edge that were never developed for pedestrian travel.

FIGURE 2-11: Broken panel

Definition: A single panel or multiple panels with a section cracked or spalled for the full sidewalk depth then material removed, or spalled to a partial sidewalk depth and filled with sediment and debris.

FIGURE 2-12: Vertical separation

Definition: A sidewalk issue involving two (2) adjacent panels where the top edge of one (1) panel is raised higher than the plane between panel's opposite edge and the joining edge of the adjacent panel.

FIGURE 2-13: Horizontal displacement

Definition: A sidewalk issue involving two (2) adjacent panels where the joined corners are horizontally offset.

2.2.2 CITY-WIDE SIDEWALK ISSUE DATA SUMMARY

The City currently uses maintenance zones (Figure 2-14) identified by the Public Work Department for street repair and maintenance. Figure 2-15 shows the areas of highest concentration of all types of sidewalk issues Citywide. Table 2-1 displays the count of sidewalk issues per maintenance zone. Table 2-2 show the count of each issue type per zone, where Figure 2-17 shows the status and location of all curb ramps.

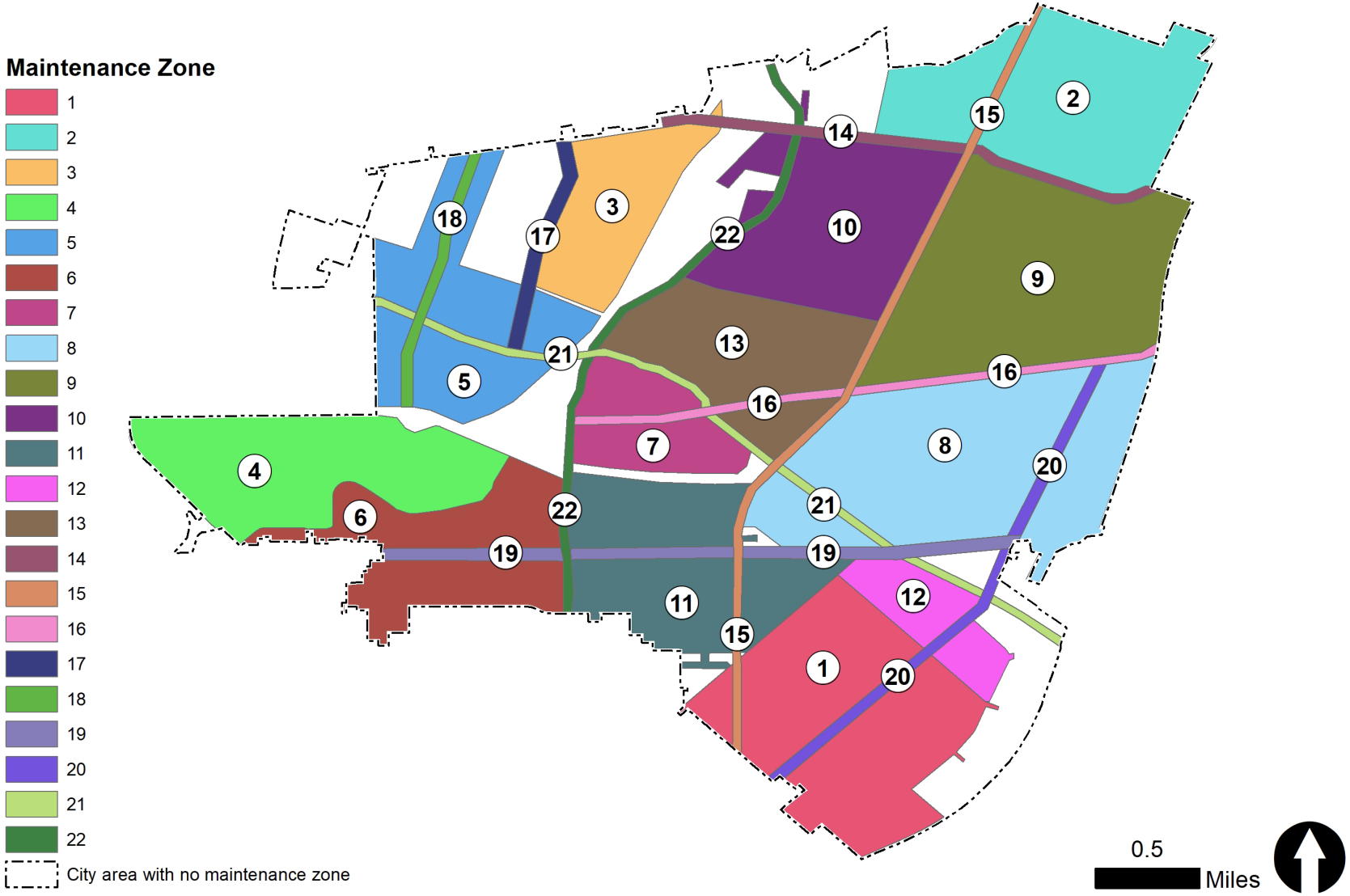


FIGURE 2-14: Maintenance Zones

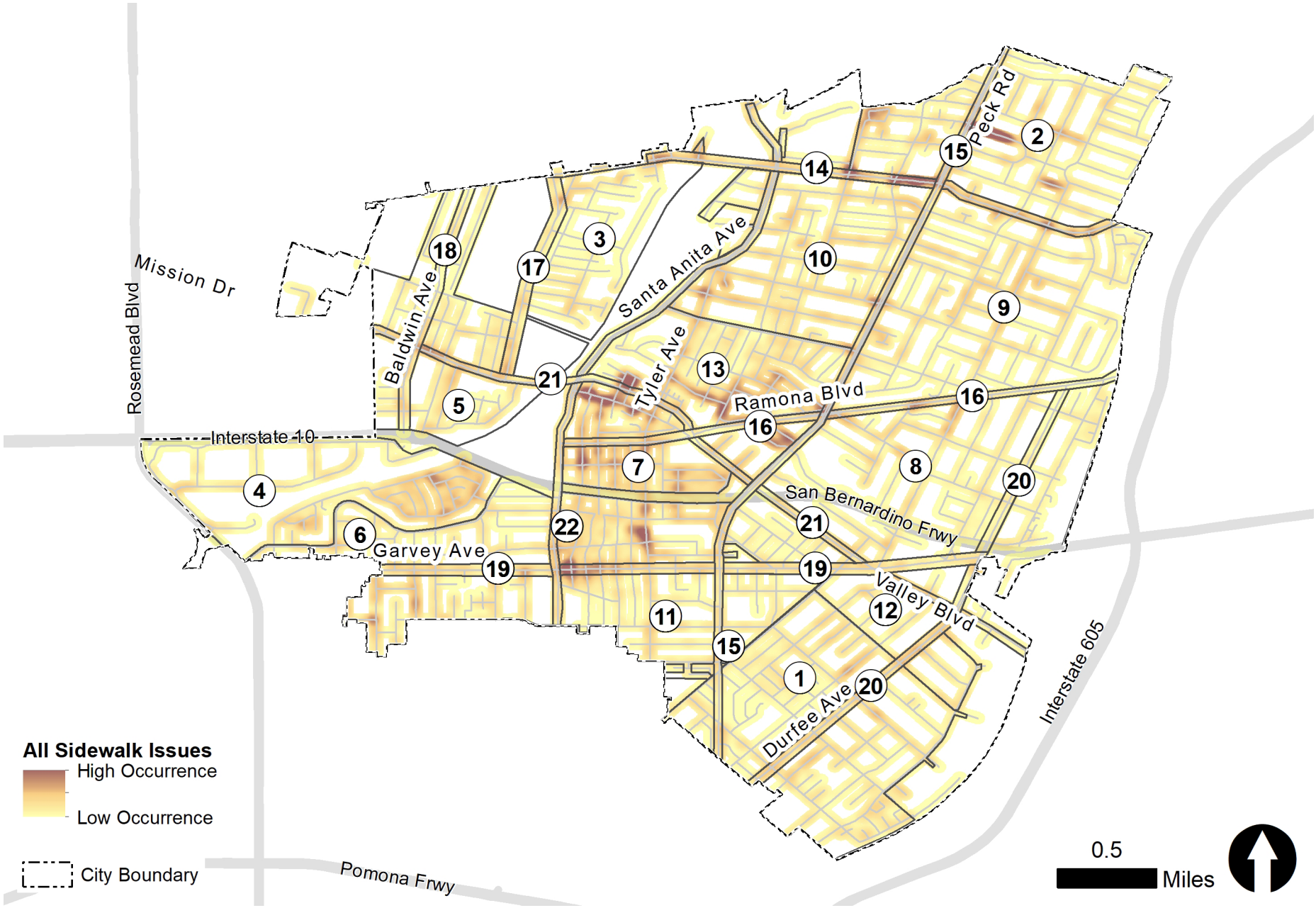
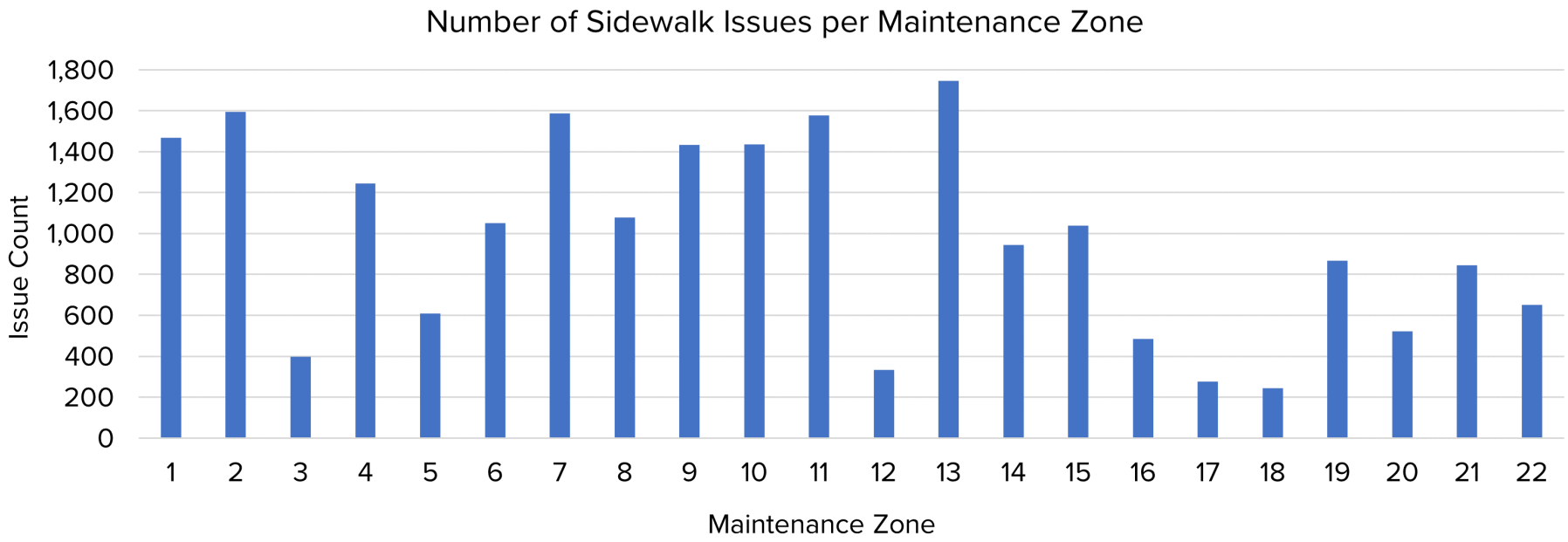


FIGURE 2-15: City-wide issues

TABLE 2-1: Number of Sidewalk Issues per Maintenance Zone



The five (5) main zones with the most issues are zone 13 (1,746), zone 2 (1,594), zone 7 (1,586), zone 11 (1,578), and zone 1 (1,468) (7,972 total issue count).

Citywide, the most common sidewalk issue is spalled concrete (10,852). The second most common issue are cracked sidewalks (4,662), and the third most common issue is vertical separation (2,318).

2.2.3 CITY-WIDE CURB RAMP ISSUE DATA SUMMARY

Curb ramps in the City were inventoried through inspection of recent high-resolution aerial imagery provided by the County of Los Angeles. In GIS, the point locations of each curb ramp were recorded and categorized based on the characteristics visible in the aerial imagery.

Curb ramps were categorized as:

- Visually compliant: Curb ramp exists and has a detectable warning surface (i.e. truncated domes)
- Visually non-compliant: Curb ramp exists but does not have a detectable warning surface
- Curb ramp does not exist
- Unable to determine (curb is obscured in aerial imagery by tree or other cover)

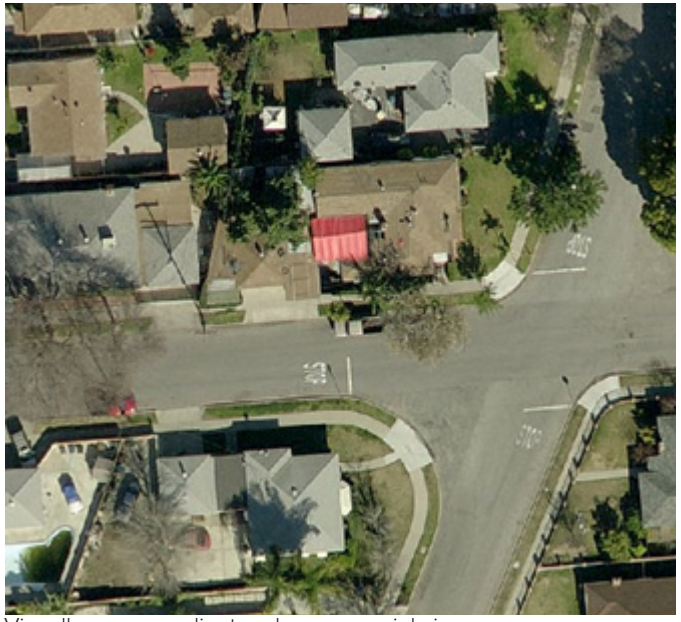
This method does not record the engineering-level characteristics of curb ramps such as running slope, cross slope, and clear width.

Figure 2-16 below is the data collection tool that was used to classify curb ramps.

FIGURE 2-16: Web Application

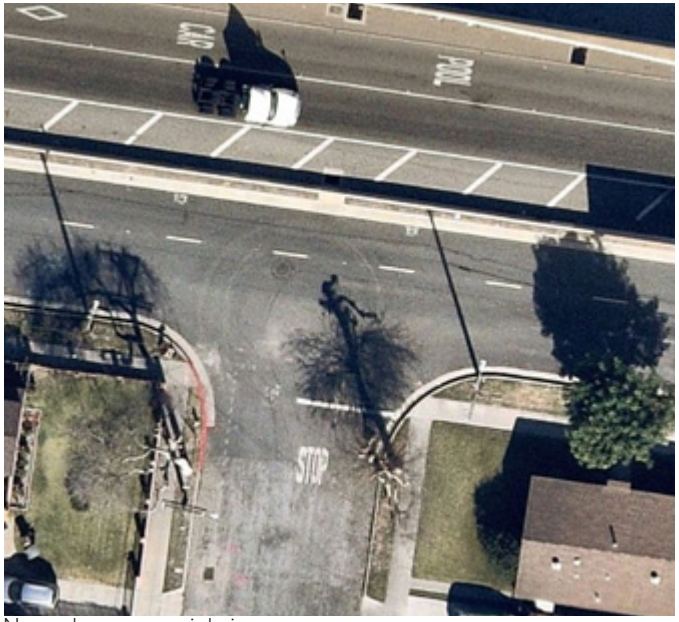
The following images give examples of each curb ramp category from an aerial and street-level view.

Visually compliant curb ramp, aerial view


Visually non-compliant curb ramp, aerial view


Visually compliant curb ramp, street view


Visually non-compliant curb ramp, street view



No curb ramp, aerial view


No curb ramp, street view


Unable to determine, aerial view

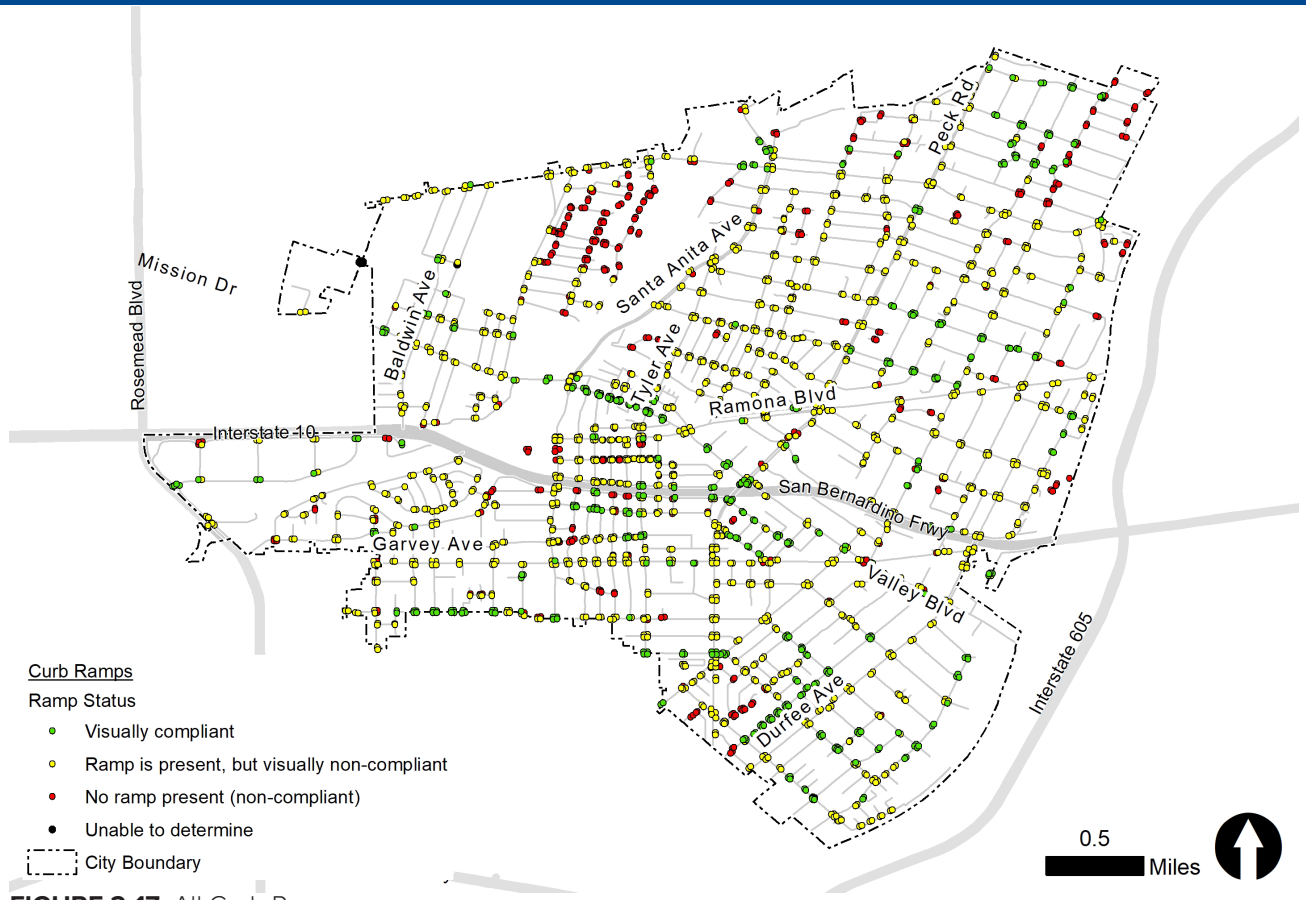


FIGURE 2-17: All Curb Ramps

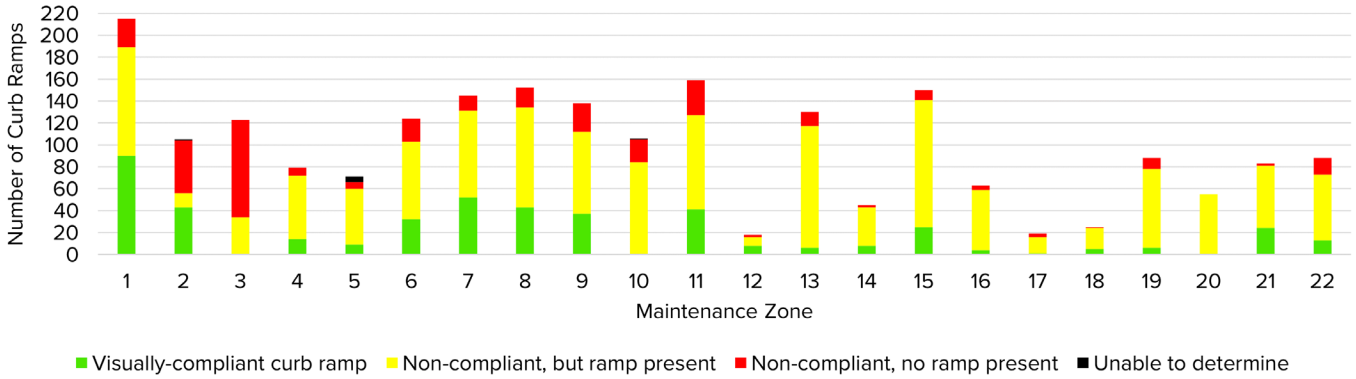


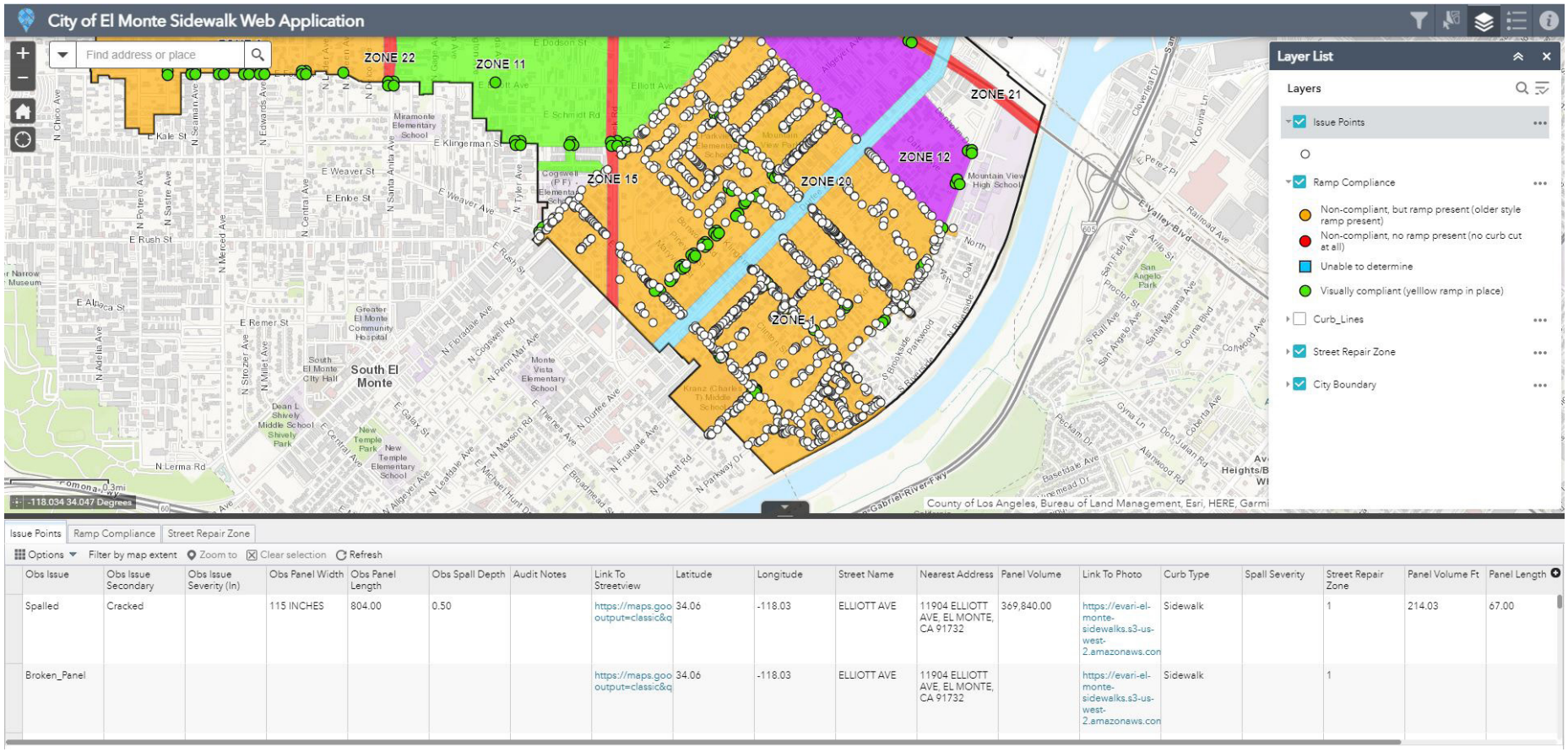
TABLE 2-2: All Maintenance

2.2.4 UTILITY OF PROJECT DELIVERABLES

The resulting deliverables of this project are two (2) datasets (sidewalk issues and curb ramps) that enable City staff to prioritize and track improvements made by maintenance crews. The data also can be shared with land developers to show where permits may be conditioned on repairing sidewalks adjacent to a development site, or summarized in grant documents to pursue funds for sidewalk and curb ramp improvements.

The two (2) datasets are displayed in an online map that enables data filtering and summarization for non-technical users. A video tutorial has also been provided for City staff to learn how to use this tool.

FIGURE 2-18: El Monte Data Application



Obs Issue	Obs Issue Secondary	Obs Issue Severity (In)	Obs Panel Width	Obs Panel Length	Obs Spall Depth	Audit Notes	Link To Streetview	Latitude	Longitude	Street Name	Nearest Address	Panel Volume	Link To Photo	Curb Type	Spall Severity	Street Repair Zone	Panel Volume Ft	Panel Length
Spalled	Cracked		115 INCHES	804.00	0.50		https://maps.goo output=classic&q	34.06	-118.03	ELLIOTT AVE	11904 ELLIOTT AVE, EL MONTE, CA 91732	369,840.00	https://evari-el-monte-sidewalks.s3-us-west-2.amazonaws.com	Sidewalk		1	214.03	67.00
Broken_Panel							https://maps.goo output=classic&q	34.06	-118.03	ELLIOTT AVE	11904 ELLIOTT AVE, EL MONTE, CA 91732		https://evari-el-monte-sidewalks.s3-us-west-2.amazonaws.com	Sidewalk		1		

Chapter 3
SIDEWALK MAINTENANCE AND REPAIR

3.1 MANAGEMENT PLAN

3.1.1 EXISTING MAINTENANCE PROGRAMS

The City currently repairs sidewalks on a service request basis. When a request is received, repairs in a one (1) to two (2) block radius are assessed and made. A three (3) person crew responds to service request, on average 10 cubic yard of concrete are removed and replaced. In the future, large development projects that are subject to discretionary reviews will be conditioned to repair damaged sidewalks adjacent to the site. The City does have programs that are catered to street resurfacing and repairs through their Pavement Status and Recommended Work Program (2019) and Long Term Pavement Improvement Plan that can include sidewalk repairs. A crew of three (3) people completes all concrete repairs, including curb and gutter, sidewalks, installation of pedestrian and wheelchair ramps as needed. In addition, all traffic legends, as well as pedestrian crosswalks, school zones, red curbs, and signage are maintained on a regular and as-needed basis.

The following sections provide guidance to assist the City to determine the best strategies to develop a sidewalk prioritization process and maintain and monitor sidewalk data and conditions Citywide.

3.1.2 SIDEWALK PRIORITIZATION STRATEGIES

With the sidewalk inventory and assessment completed, the City has the data to monitor and update the data on a regular basis. The City can share this information with the developers to make necessary repairs or replacements as conditions to development, incorporate into street improvement projects and or simply prioritize repairs and replacements by querying the data to repairs with the high need. While spot repairs and replacements in need are common and are typically identified by residents or businesses, there are some strategies to consider to prioritize sidewalks segments to provide efficiencies by allowing repairs and replacement to occur in proximity to each other. The following are some GIS-based strategies that can be further researched and eventually employed.

STREET REPAIR ZONES OR RESIDENTIAL NEIGHBORHOODS

The City's Long Term Pavement Improvement Plan contains maps that divide the City into street repair zones. Quantifying the high need repairs and replacements within these street repair zones will allow repairs to be done in areas of the City that have the most need. This strategy can also be implemented by residential neighborhood designations from the General Plan. As part of these zones/neighborhoods, additional criteria can be used to prioritize such as the number of schools, parks, number of bus stops and activity centers that are frequently accessed by sidewalks. Demographic criteria can also be used such as number of households without vehicles, median income and population and employment density. Demographics can even be further delineated by using age groups such as elementary to high school ages and seniors, who are more likely to walk to their destinations.

CAPITAL IMPROVEMENT PROJECTS AND LONG TERM PAVEMENT MANAGEMENT AND STATUS WORK PROGRAMS

Ongoing improvements can be integrated into Capital Improvement Projects (CIP) and part of the Long Term Pavement Management and Pavement Status Work Programs. As CIPs are being developed, data can be shared with the developer to include repairs around the agreed upon sphere of influence of the project.

The Long Term Management Program and Pavement Present Status and Recommended Work Programs assesses the condition of the road network to develop cost effective work programs that the City can implement over the next number of years. While this program primarily focuses on roadway pavement, deficiencies can be prioritized within the recommended projects to concurrently address the necessary repairs.

The City does have a Tree Protection and Preservation Ordinance where trees require City Review and Approval. Through this process, if street trees are to be removed or replaced, there could be the opportunity to make any needed sidewalk repairs within close proximity of these removals.

DEVELOP A PRIORITY SCORING MATRIX

A Priority Scoring Matrix can be developed to prioritize sidewalk segments within the City where there is a high propensity for pedestrian use (either currently or if missing walkway improvements were added). This scoring matrix is designed to include existing and potential pedestrian activity areas Citywide. This strategy provides an objective, unbiased approach and can be strictly data driven. However, opportunities for the community, City staff and stakeholders engagement to provide input can be in the weighting of the various criteria. There are numerous ways to approach this matrix with the example from the Austin Sidewalk Master Plan / ADA Transition Plan Update being a comprehensive example.

This data driven analysis entails awarding points to each sidewalk segment based on its proximity to demographics, safety, proximity to attractors, transit and existing conditions. Proximity is measured by buffers around the sidewalk segment at varying distances between 1/8 mile and ½ mile. This Priority Scoring Matrix can assist with proposing a phasing strategy to implement sidewalk repairs incrementally and in high-demand areas that should be implemented first. Remaining projects can then be built after high-priority projects are completed. This scoring matrix can also be used to prioritize individual streets within the City and streets by Street Repair Zones.

TABLE 3-1: Austin Scoring Matrix - Base Score Weight 44% (City of Austin example)

Table 3-3: Absent Sidewalk Prioritization Matrix Pedestrian Safety Score (PSS) 0 - 100 Base Score Weight 44%		
Element	**Criteria**	**Points**
Street Classification Weight 45%	a) Arterial b) Collector c) Residential	100 75 50
Pedestrian Health and Safety Status Weight 35% (health needs per zip code, based on factors such as crime statistics, obesity, diabetes, heart disease, and respiratory disease)	a) Very High Needs b) High Needs c) Moderate Needs d) Low Needs e) Very Low Needs	100 75 50 25 0
Pedestrian/Automobile Incidents Weight 20%	Number of incidents reported to APD involving pedestrians and motorized vehicles in previous 36 months multiplied by 10 (only applied to sidewalk on the street where the incident took place)	10x *(max 100 pts)*

TABLE 3-2: Austin Scoring Matrix - Base Score Weight 56% (City of Austin example)

Table 3-2: Absent Sidewalk Prioritization Matrix Pedestrian Attractors Score (PAS) 0 - 100 Base Score Weight 56%			
Element	**Criteria**	**Points**	
Proximity to Attractors Weight 45% (max 100 pts)	Multiply Possible Points by number of attractors within specific radius of:	1/8 Mile	1/4 Mile
	State or Local Government Offices	10x	5x
	Commuter Rail Stations	10x	5x
	Public or Private Schools	10x	5x
	Transit Stop (Max of 50 pts)	9x	4.5x
	Major Grocery Stores	9x	4.5x
	Places of Public Accommodation (Includes parks, fire stations, police stations, hospitals, convention centers, health centers, libraries, museums, post offices, and recreation centers.)	8x	4x
	Places that Older Adults Frequent (health care facilities, clinics, nursing homes, senior living centers, congregate meal sites).	8x	4x
	Employers with > 500 Employees	8x	4x
	Income Restricted Affordable House Secured though City and Federal Programs for every 25 units	7x	3.5x
	Public Parking Facilities	5x	2.5x
	Religious Institutions	5x	2.5x
Residential Population Weight 25%	Total population residing within 1/2-mile radius of proposed project? a) Population >/= 8,000 b) Population >/= 4,000 and < 8,000 c) Population >/= 1,000 and < 4,000 d) Population >/= 500 and <1,000 e) Population < 500	100 75 50 25 0	
Element	**Criteria**	**Yes**	**No**
Existing Facilities on Street Weight 10%	For arterials and collector streets, are there complete sidewalks on <u>both</u> sides of the street?	0	100
	For local / residential streets, is there an existing complete sidewalk on either side of the street?	0	100
Requests Weight 10%	Was the project requested by ADA Task Force?	75	0
	Was the project requested by a citizen through 311?	25	0
Core Transit Corridors Weight 2.5%	Is the sidewalk within a 1/4 mile of a Core Transit Corridor?	100	0

GIS-BASED PROPENSITY MODEL

Another strategy to help define study focus areas or corridors is developing a Geographic Information Systems (GIS) model to reveal relationships between the many factors analyzed. The inputs are very similar to the Priority Scoring Matrix and can use available GIS data. This Propensity Model can be developed to establish where pedestrians are most likely to be, either currently or if improvements were to be made to assist with prioritizing improvements. This model consists of three (3) submodels: Attractor, Generator, and Barrier Models. These three (3) sub-models are then combined to create the composite Propensity Model. Data from the sidewalk inventory and streets can be joined with the results of the model to create a map and list of priority projects.

Attractors are essentially activity centers known to attract bicyclists and pedestrians. Examples are schools, transit stops, and shopping centers. Generators are developed from demographic data and address potential pedestrian volume based on how many people live and work within the study area. Examples of generators are population density, employment density, primary mode of transportation to work and vehicle ownership. Barriers are features likely to discourage or detract people from walking. These are generally physical limitations, such as areas with high numbers of pedestrian-related collisions, high vehicle volumes and speeds, and missing sidewalks.

The following is an example of the inputs, weighting and scoring for the propensity model. This model is meant to be flexible and weighting can be modified by City staff and stakeholders.

Propensity Model Criteria and Weighting Example

Attractors	Weighting Points	Distance Multiplier		
		0.25 Miles (2)	0.5 Mile (1.5)	1 Miles
Preschool/Elementary Schools	5	10	8	5
Parks	5	10	8	5
Shopping Centers & Commercial Land Uses	4	8	6	4
Bus Stops and Transit Centers	4	8	6	4
Community Attractions (City Hall, Library, Convalescent Homes, Aquatic Centers, Civic Centers, Arts Centers, Healthcare, Church)	3	6	5	3
Middle/High School	3	6	5	3

Generators	Weighting Points	Scoring Multiplier	Final Score
CalEnviroScreen			
71%-100%	2	2	4
50%-70%	1		2
Age Density: Child resident density (Ages 0-14)			
> 27.5%	2	2	4
24% - 27.5%	1		2
Age Density: Senior resident density (Ages 65+)			
> 9.2%	2	2	4
7.5% - 9.2%	1		2
Disability: % of residents reporting to be living with a disability			
> 11.5%	2	2	4
9.7% -11.5%	1		2
Population Density: Residents per Acre			
> 13.5	2	2	4
9.7 - 13.5	1		2
Non-Vehicular Transportation: % of residents that take public transportation to work			
>1.3%	2	2	4
0.65% - 1.3%	1		2
Walking Mobility: % of residents that walk to work			
> 0.6%	2	2	4
0.3% - 0.6%	1		2
Vehicle Ownership: % of residents without access to a vehicle			
> 1.2%	2	2	4
0.75% - 1.2%	1		2

Barriers	Weighting Points	Scoring Multiplier	Final Score
Speed (Buffer 150')			
> 45 MPH	4	1	4
40 - 45	3		3
30 - 35	2		2
Major Crossings			
Crossing 1/16-Mile Buffer	3	2	6
Bike/Ped Related Collisions (1/16-Mile Buffer)			
6+	4	3	12
3-6	3		9
2 - 3	2		6
1	1		3

PROXIMITY TO ACTIVITY CENTERS

The closer destinations are between homes and activity centers or employment, the more likely they will walk to them. Using buffers similar to that of the Priority Sidewalk Matrix (between ⅛ and ½ mile), sidewalk improvements can be prioritized to those that are closest to schools, parks, transit and employment, as examples. This can be developed into a simplified version of the Priority Scoring Matrix. As part of this strategy, improvements in City-owned property that have the highest use can also be prioritized first such as parks and civic facilities.

ADDITIONAL CONSIDERATIONS FOR SIDEWALK PRIORITIZATION TIERS

Highest Priority

- Reported sidewalk hazards in which a person with a disability is known to use the sidewalk. This requires immediate repair.
- Reported sidewalk hazards in which no person with a disability is known to use the sidewalk.
- Sidewalks with needed repairs located along streets being resurfaced as part of Long Term Pavement Management Plan.
- Any designated school walking route
- On one side of the street with a high pedestrian volume generator (schools, park entrances, etc.).

Medium Priority

- A missing link (usually a block or less) that impedes pedestrian connectivity in the sidewalk grid and where it is economically and logistically practical to provide that connectivity.
- An area without sidewalks where there is evidence of regular pedestrian traffic (dirt path/desire lines) and where City government and residents deem it desirable to place a sidewalk.
- Any sidewalks near a bus stop.

Lowest Priority

- Streets in industrial zoned districts.
- On at least one (1) side of the street in cases in which there is no sidewalk present on either side of the street. Sidewalk construction should be undertaken in conjunction with new road construction or resurfacing projects if possible.
- On the second side of any streets with a designated high pedestrian volume generator (schools, park entrances, etc.).
- On the second side of the street where there is sidewalk present on one (1) side of the street

3.1.3 DATA MONITORING

The GIS datasets will require ongoing maintenance so that the prioritization scoring is based on current data and can be updated as needed. The City will be responsible for maintaining updates to the GIS datasets. The dataset maintenance procedures vary based on the source and condition of the datasets. As part of this project, the data was developed in a cloud GIS format and through Story Maps that allowed the City to review data as it was collected. Once this project was completed, the data was delivered in standard shapefile format for City use with their existing GIS network.

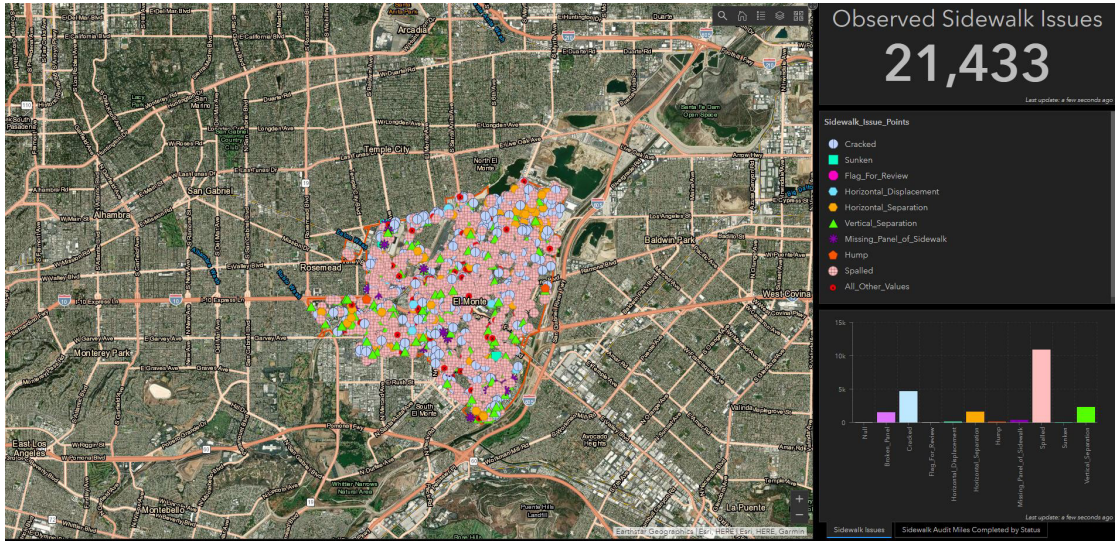
GIS DESKTOP AND CLOUD MONITORING AND MAINTENANCE

The sidewalk inventory datasets can be updated with little or no preprocessing or geoprocessing in standard GIS desktop software using ArcMap. Reassigning attributes in the data is all that is needed when updating the data. Maps and tables can be produced annually to assess the progress of repairs and any new deficiencies that are collected. This project used a cloud-based service to collect and store data through the duration of the data collection process. The City could explore continuing this service so data could be readily available to City staff, repair teams, developers and consultants. It's recommended that only City staff, or if managed by an outside company, update the data.

REGULAR UPDATES AND TRACKING YEARLY IMPROVEMENTS

Set aside a data collection budget to update the GIS data and reassess high need sidewalk deficiencies on a regular basis. Examples of keeping track of improvement and developing performance measures may include the following, but limited to:

- Tracking and updating the number of sidewalk improvements completed each fiscal year
- Tracking and updating the number of curb ramp improvements
- Tracking and updating number of new repairs
- Tracking and updating the number of new development projects near City property that can condition sidewalk replacement/repairs



Appendix A
DATA COLLECTION

Sidewalk issues on vertical and horizontal curb faces were not collected as part of this audit (Figure A-1).

Figure A-2 and Figure A-3 illustrate different cases for determining public sidewalk where data is collected. In Figure A-2, private property assumed to start at and include the asphalt, with public concrete sidewalk up to the change in surface. In Figure A-3 the concrete surface is assumed to be public sidewalk up to the gateline.

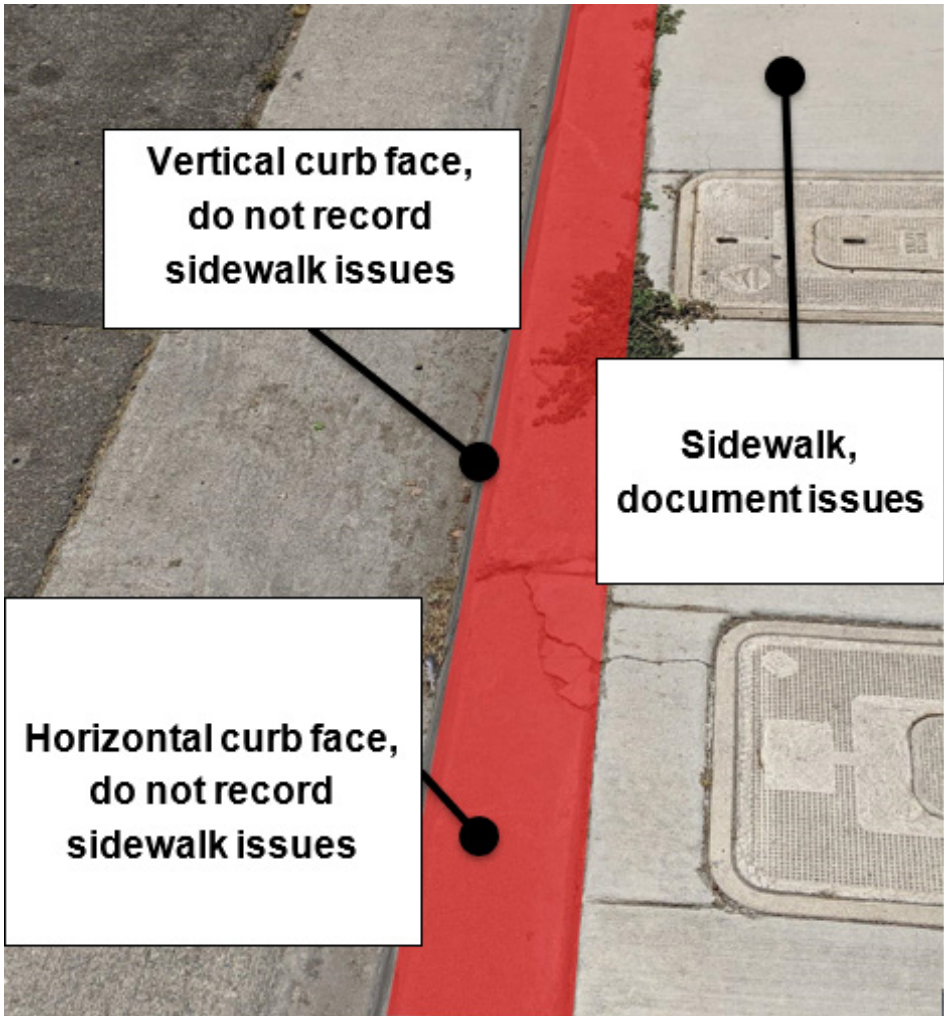


FIGURE A-1: Data collection not collected on curb faces

FIGURE A-2: Delineation of public and private property: private property assumed to start at and include asphalt

FIGURE A-3: Delineation of public and private property: private property assumed to start at gate (driveway approach in image does not meet criteria for data collection)

GPS Collection of Sidewalk Issues (Points)

Handheld Global Positioning System (GPS) units with sub-meter accuracy were used for data collection. For each sidewalk panel with one (1) or more observed issues, field auditors collected only one (1) GPS point along with a photo of the panel. If satellite reception for the GPS unit was poor, the point was placed manually using location-based aerial image display on the GPS unit, and flagged for poor location accuracy.

Data Attribute Descriptions

The following attributes were collected for GPS points. Not all points have values for all attributes, depending on the number and type of issues.

- Obs_Issue_1 - The primary issue type on the sidewalk panel, identified by field auditor as the issue that poses the largest pedestrian hazard
- Obs_Issue_2 - The secondary and next most severe issue
- Obs_Issue Severity - Dimension in inches for primary issue
- Obs_Spall_Depth - Depth of the spall, if the primary issue is spalling
- Obs_Panel_Length - Panel length in inches, if the primary issue is missing panel
- Obs_Panel_Width - Panel width in inches, if the primary issue is missing panel
- Audit_Notes - Any relevant notes to clarify the data being entered
- Photo (Required) - A photo of the issue within the context of the panel
- Halo Override - Used to override “halo” indicators for quality control flags for subsequent quality assurance checks

Issue criteria and priorities

Issues that met criteria in Table A-1 were recorded. For panels with more than two (2) issues that are pedestrian hazards, priorities were assigned to issues to facilitate data collection. Issue Priority 1 was collected over Priority 2, Priority 2 over Priority 3.

TABLE A-1: Issue Criteria and Priorities

Issue Type	Criteria	Priority
Missing Panel	n/a	1
Broken Panel	n/a	2
Vertical Displacement	Grater than 0.75” above-grade	3
Horizontal Separation	Grater than 0.5”	4
Cracked	Greater than 0.25” within the panel OR panel cracked into 3 or more pieces	5
Spalled	Greater than 0.5” deep OR 4” or more horizontal dimension	6
Horizontal Displacement	Greater than 1”	7
Sunken	Greater than 3” below normal grade	8
Hump	Greater than 3” above normal grade	9

Audit Notes

Field auditors took specific notes for the scenarios in Table A-2:

TABLE A-2: Field Notes

Scenario	Note
Panel is cracked in more than 3 pieces	"3+"
Point was mistakenly added or needs to be removed	"bad add"
Issue occurs adjacent to a tree well	"tree well"
GPS unable to acquire signal	"poor location accuracy"
More than two issues present	"additional issue names"
Odd or irregular panel	"irregular panel"

Fieldwork Progress Diagram

Figure A-4 outlines the data collection process.

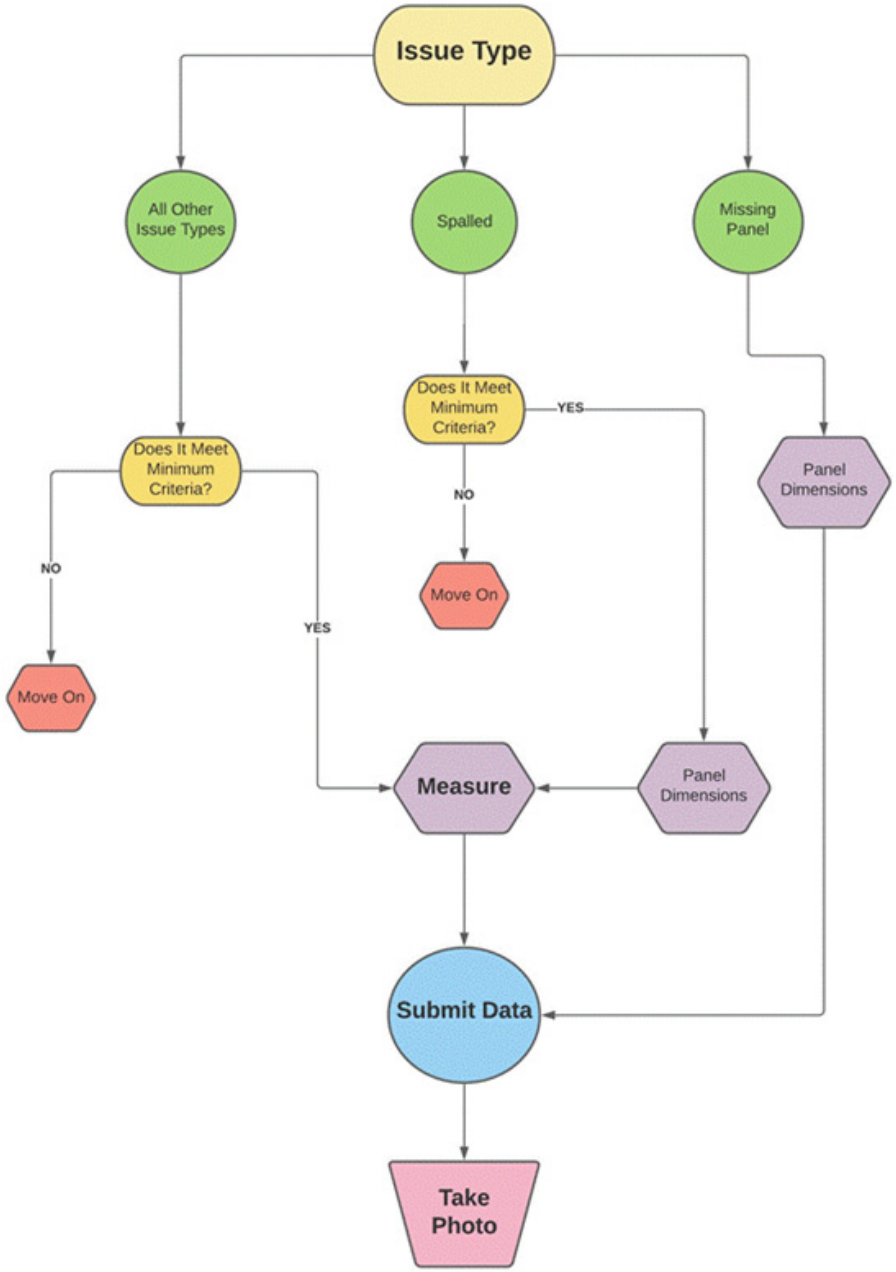


FIGURE A-4: Fieldwork Progress Diagram

Photo (required)

Photographs were required for all Issue points. Photos were taken with the context of the panel (rather than a closeup) and photos are linked to the GPS point as a good or bad photo:

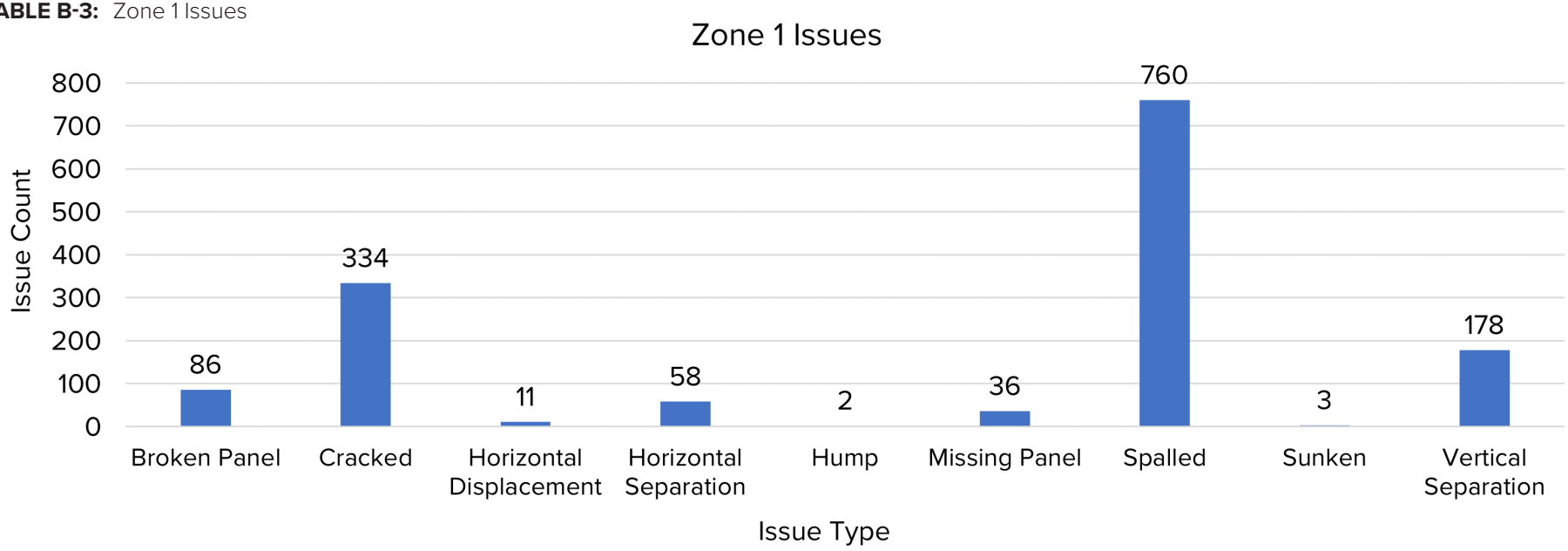
Good Photo:

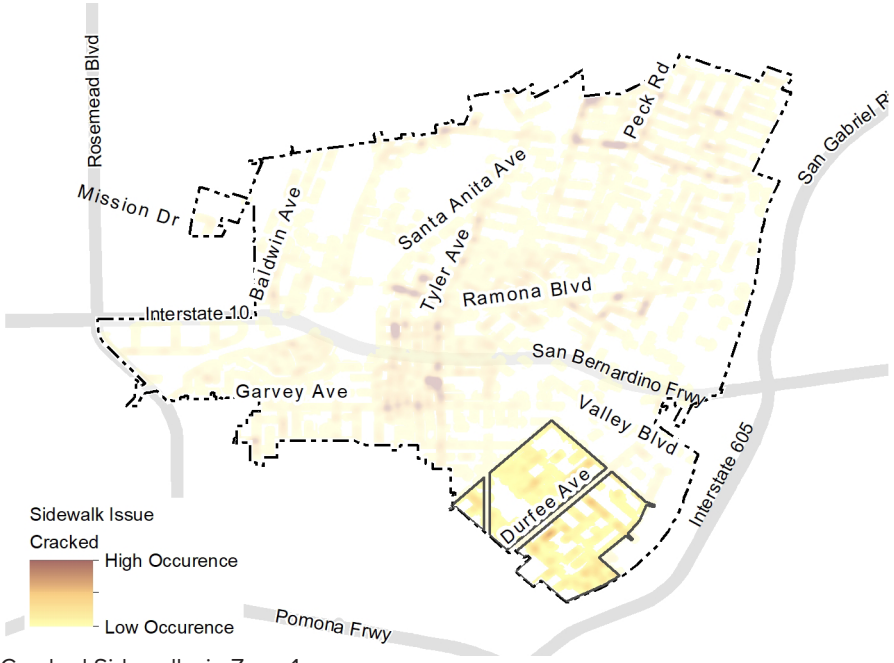
Bad Photo:

Appendix B

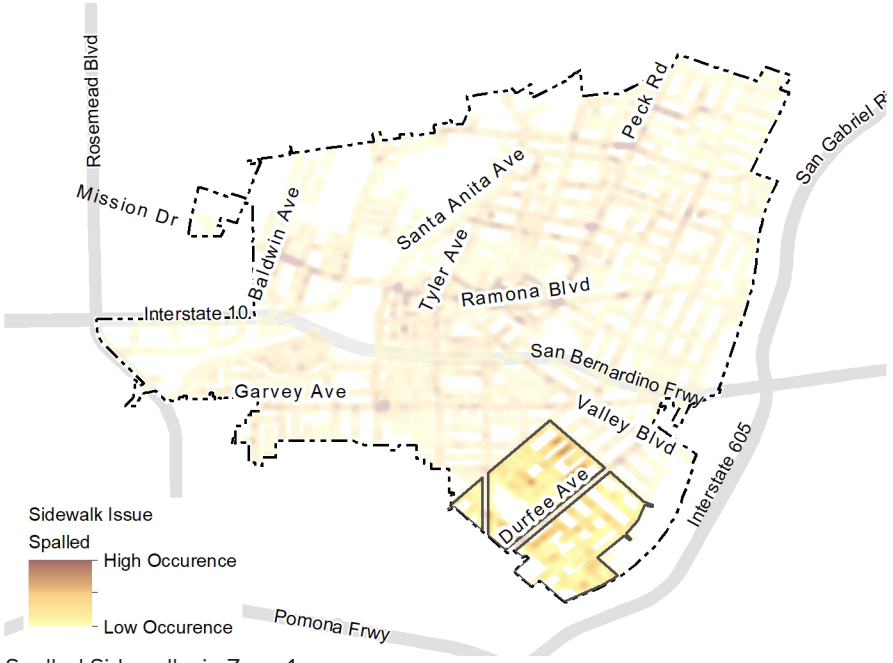
SIDEWALK DATA SUMMARY

TABLE B-3: Zone 1 Issues



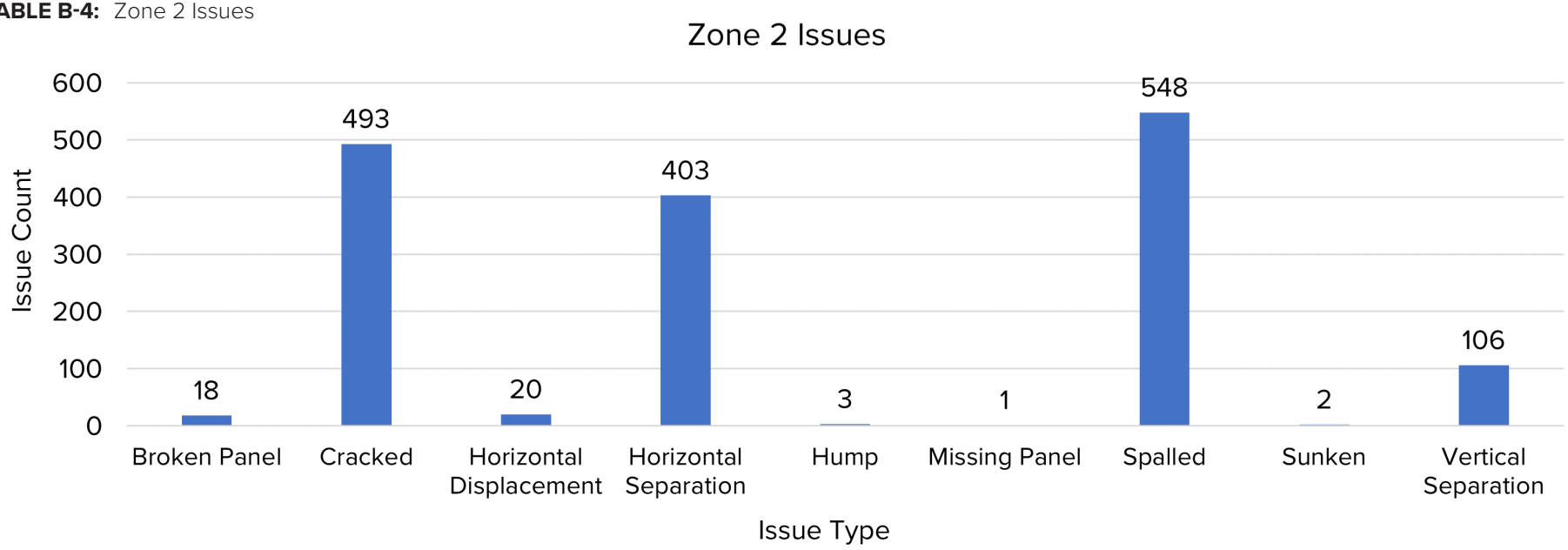


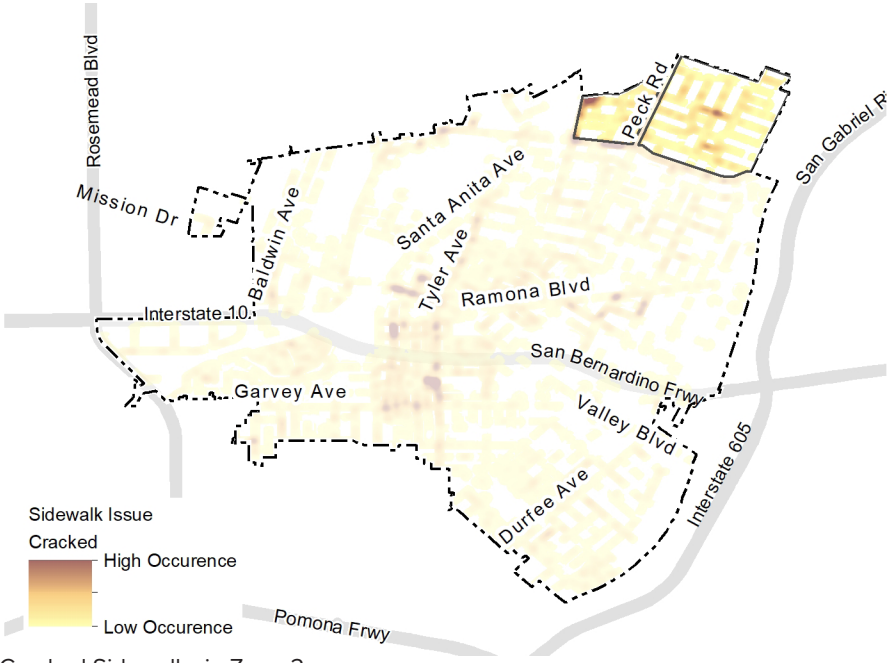
Cracked Sidewalks in Zone 1



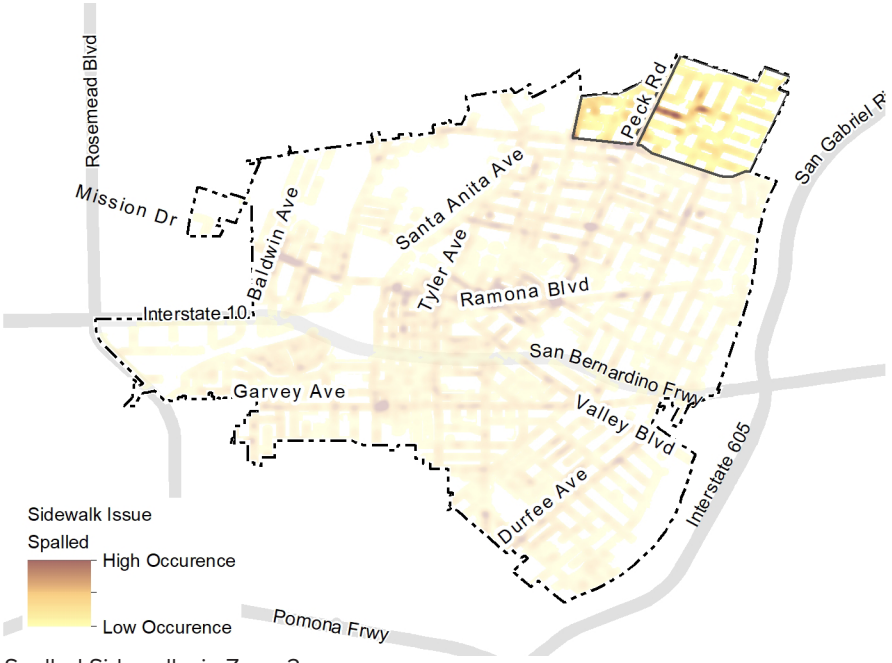
Spalled Sidewalks in Zone 1

TABLE B-4: Zone 2 Issues



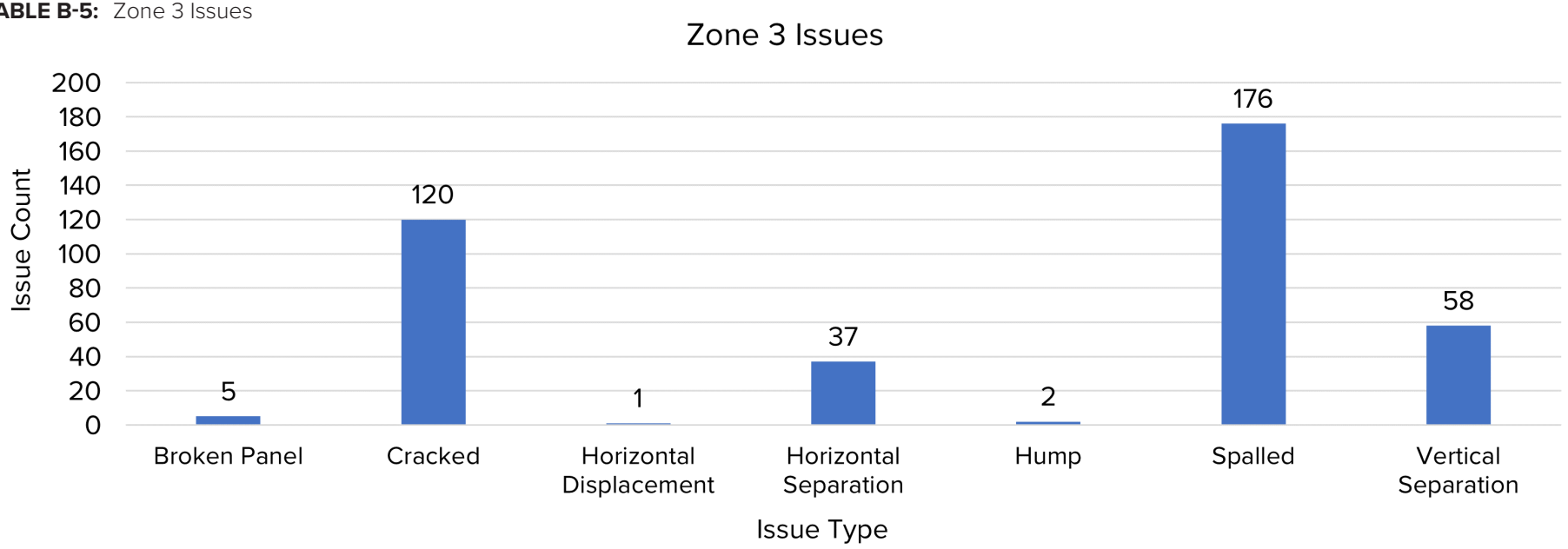


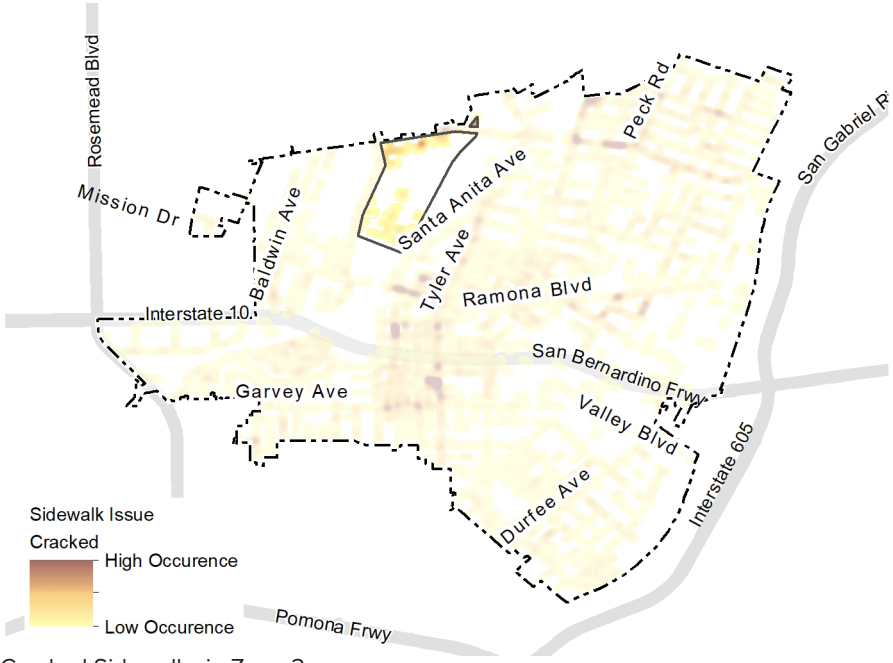
Cracked Sidewalks in Zone 2



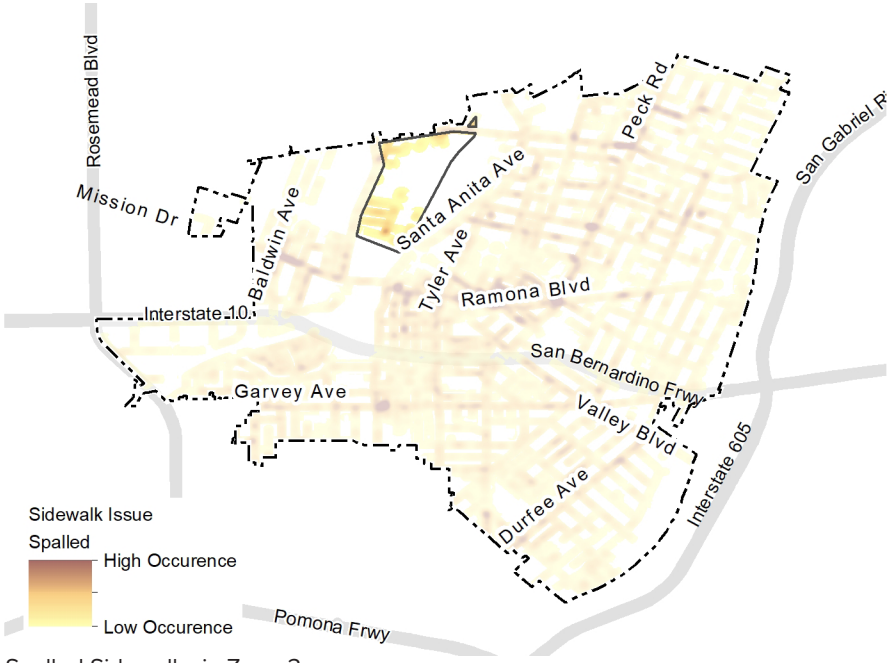
Spalled Sidewalks in Zone 2

TABLE B-5: Zone 3 Issues



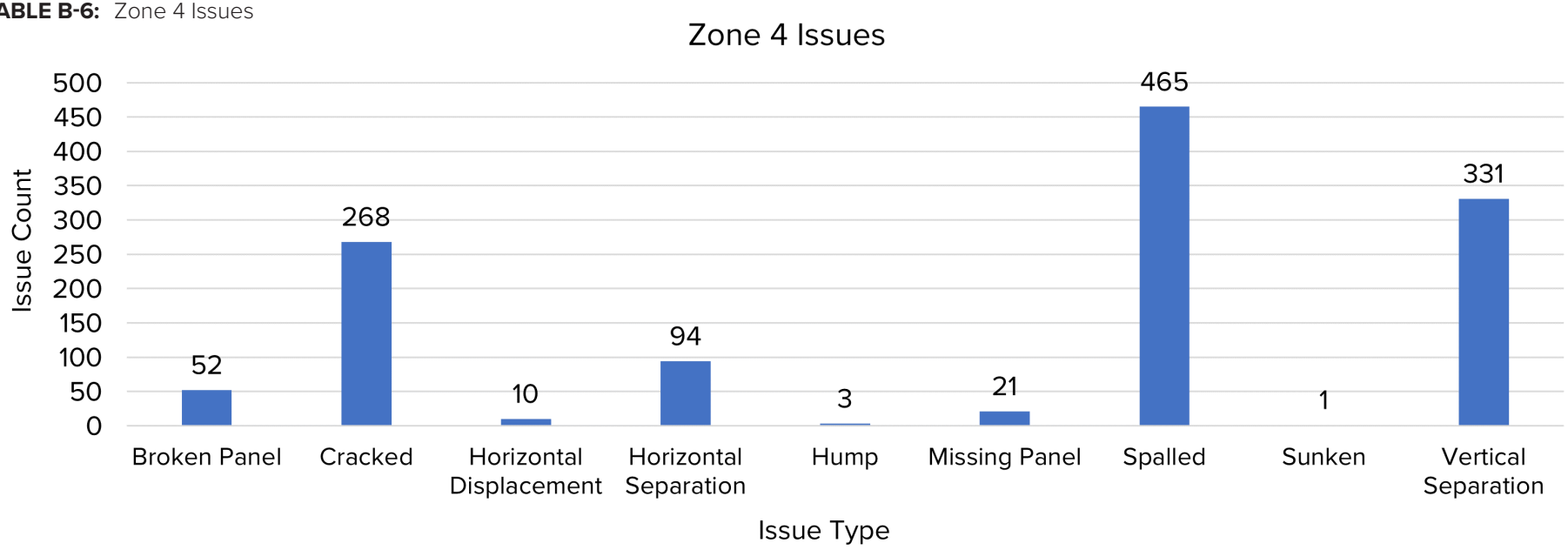


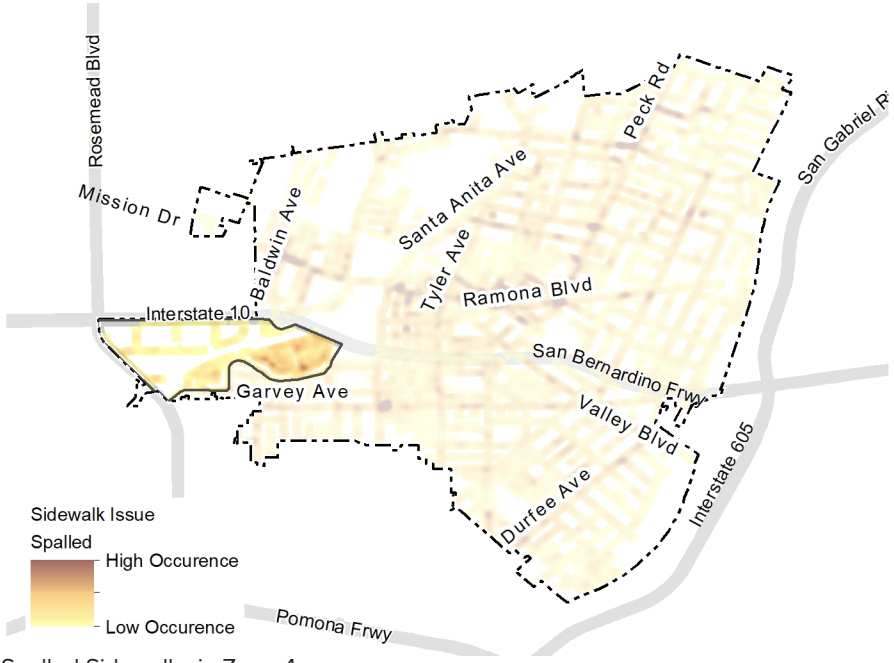
Cracked Sidewalks in Zone 3



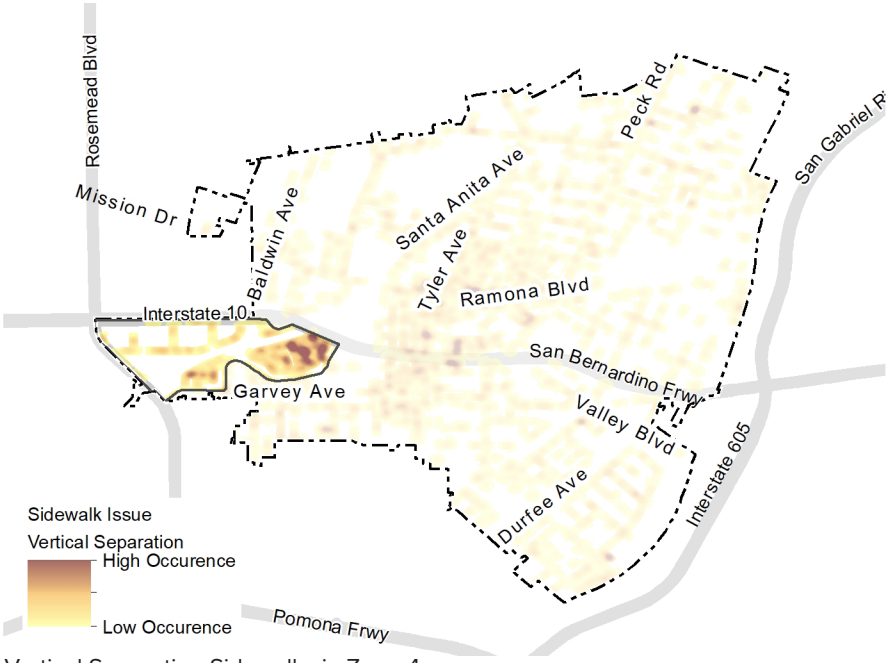
Spalled Sidewalks in Zone 3

TABLE B-6: Zone 4 Issues



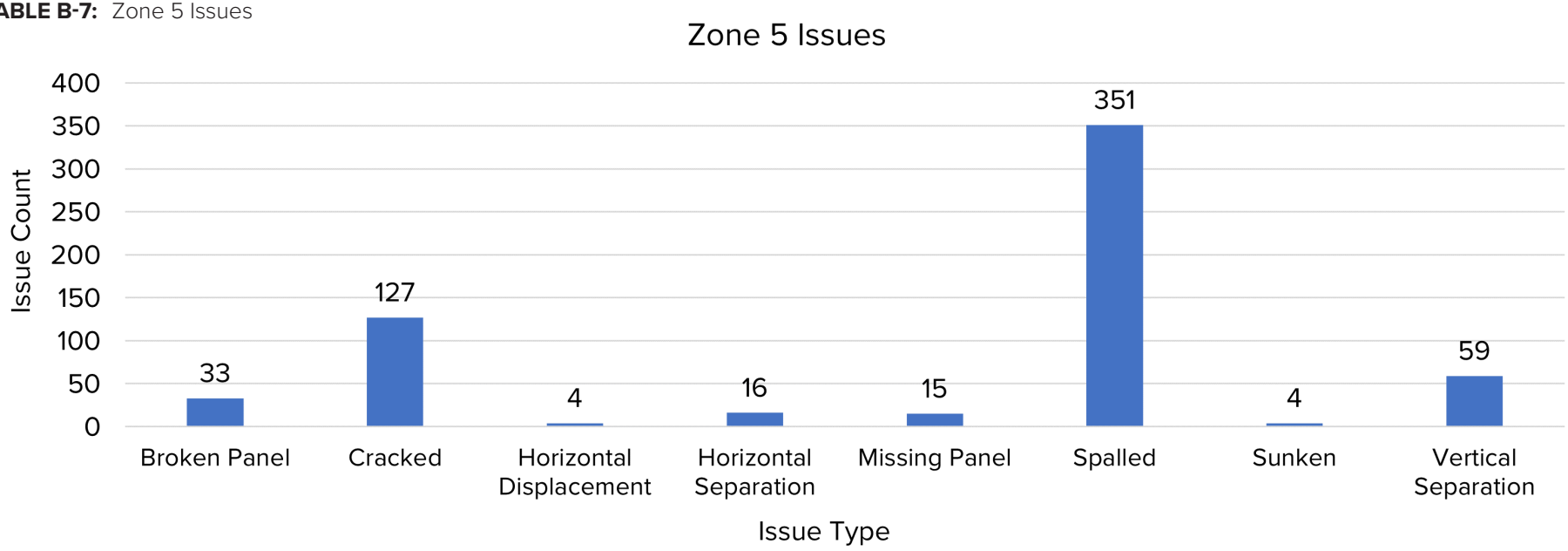


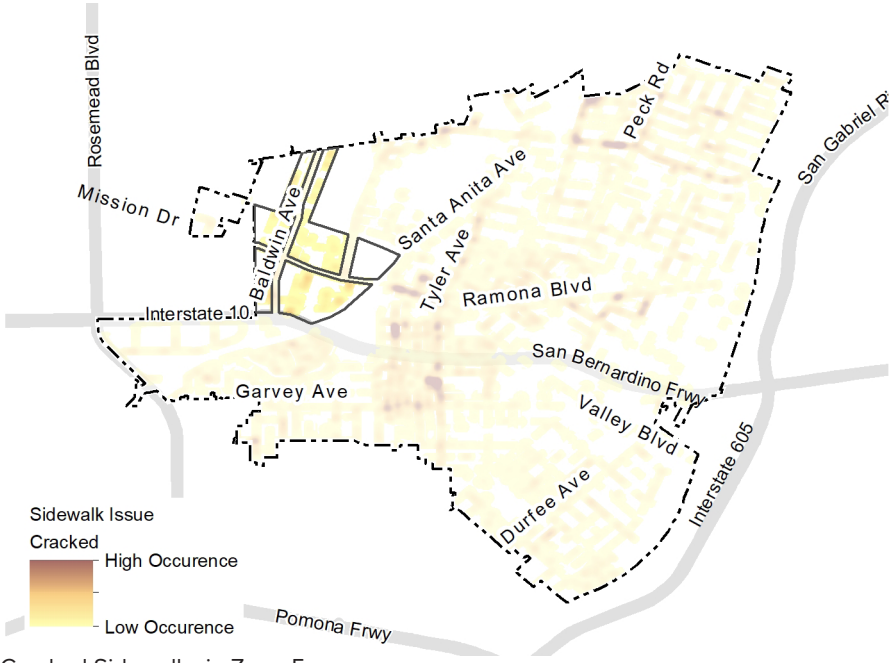
Spalled Sidewalks in Zone 4



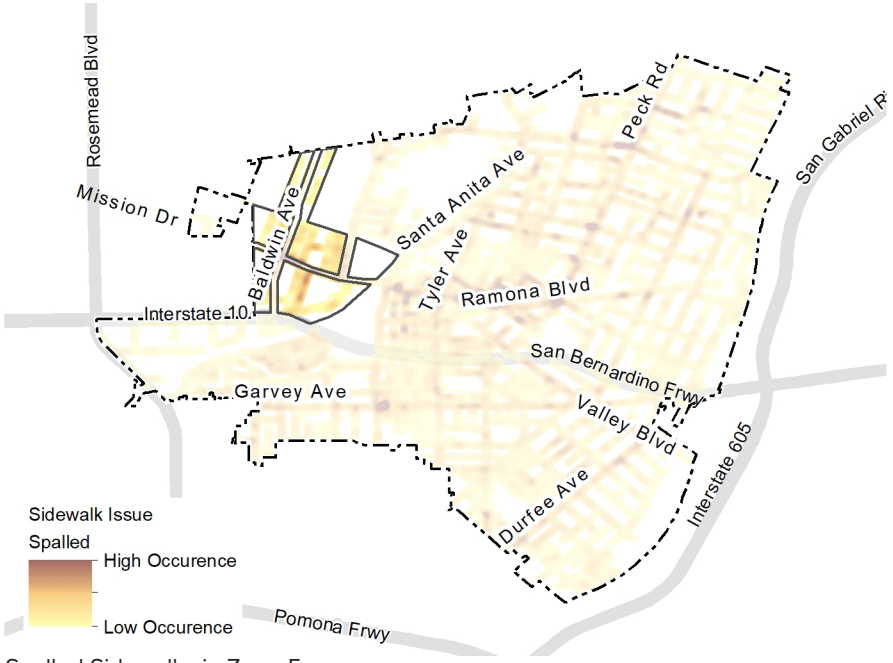
Vertical Seperation Sidewalks in Zone 4

TABLE B-7: Zone 5 Issues



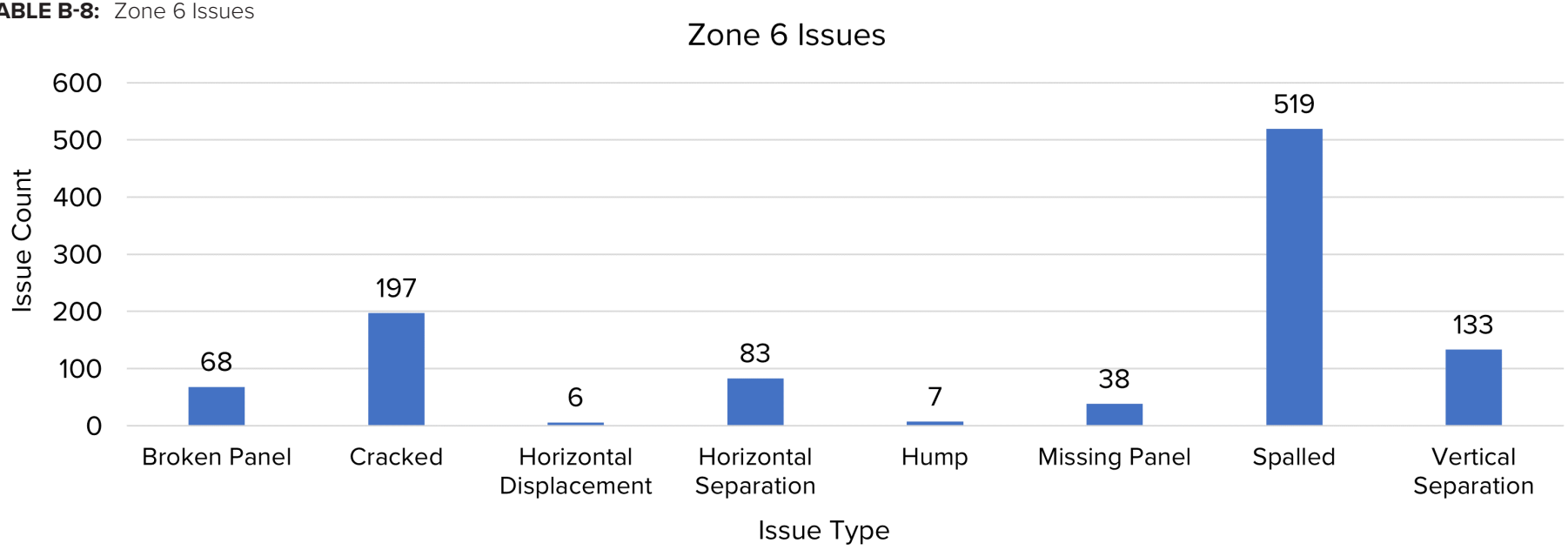


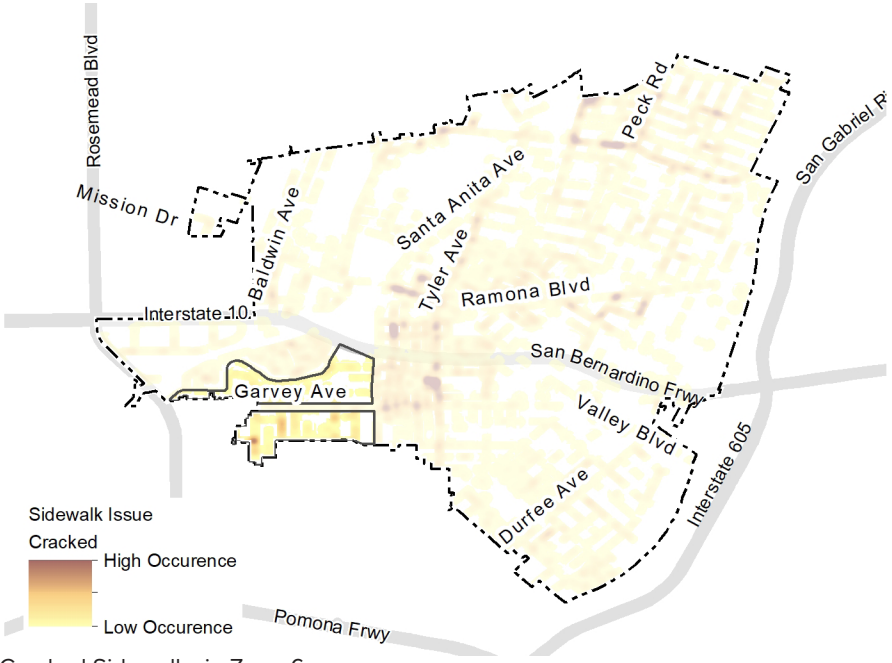
Cracked Sidewalks in Zone 5



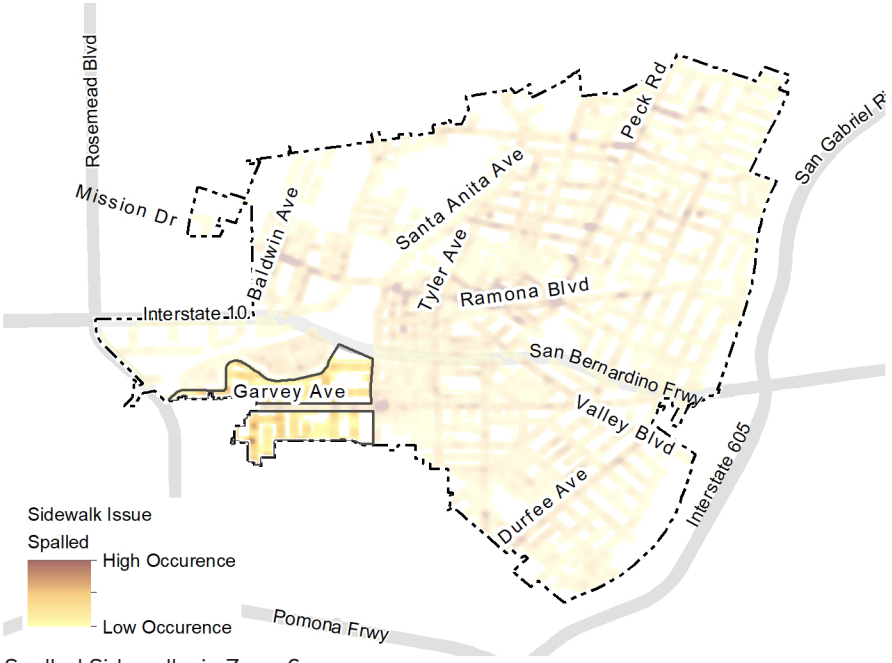
Spalled Sidewalks in Zone 5

TABLE B-8: Zone 6 Issues



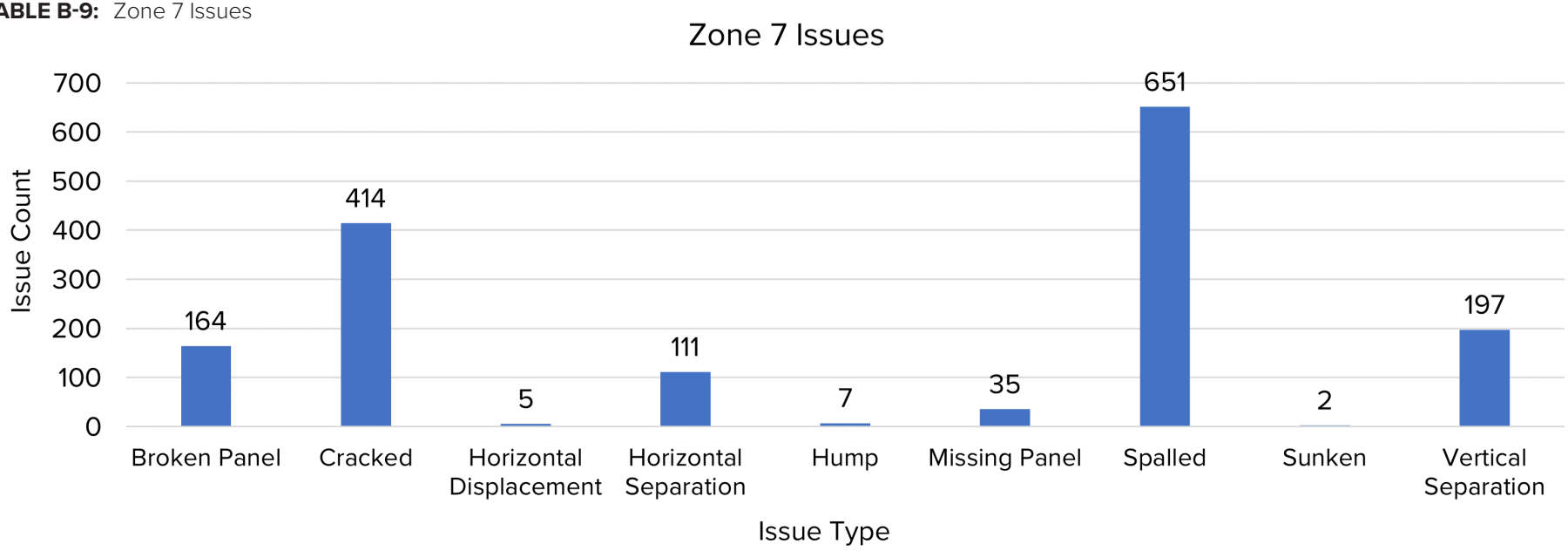


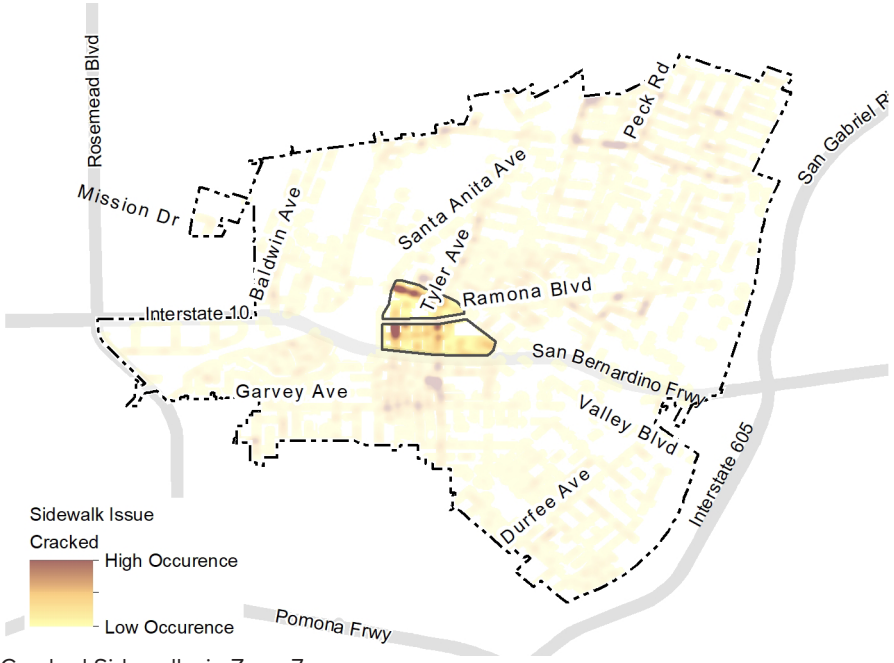
Cracked Sidewalks in Zone 6



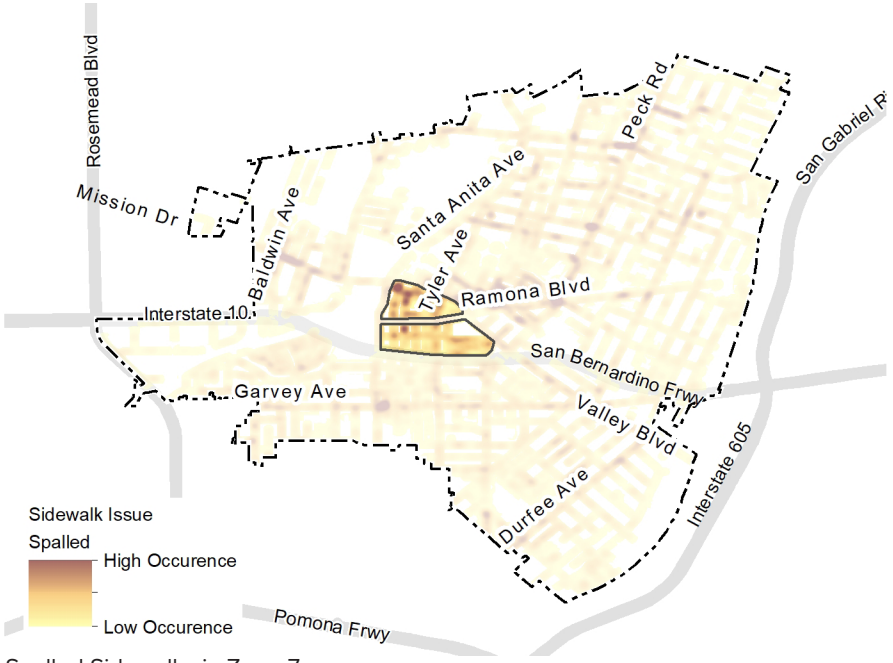
Spalled Sidewalks in Zone 6

TABLE B-9: Zone 7 Issues



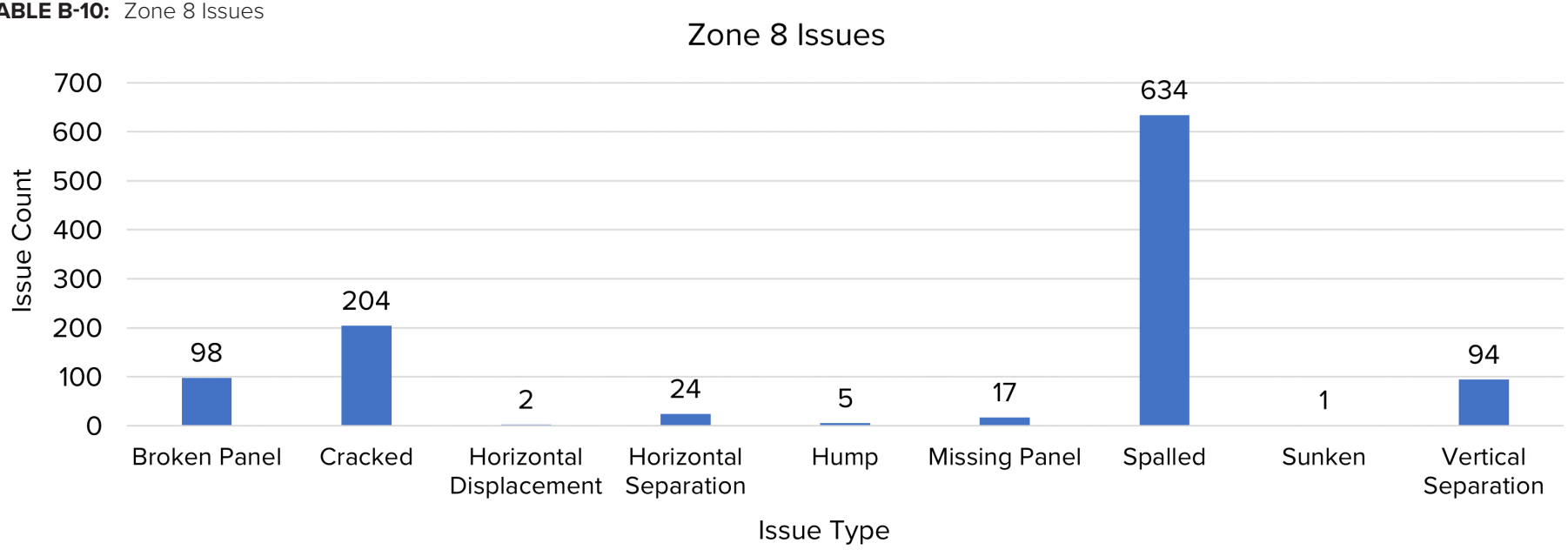


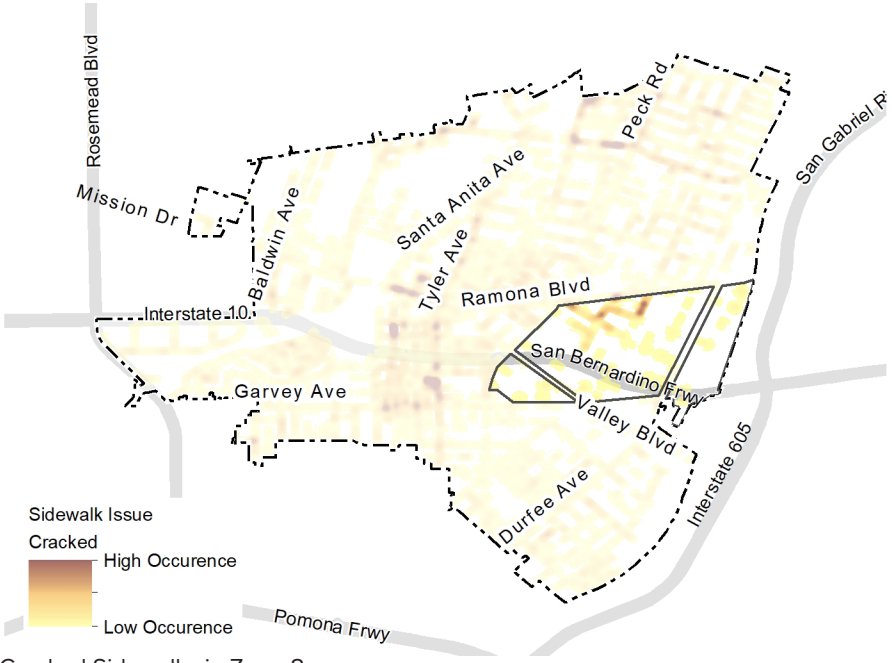
Cracked Sidewalks in Zone 7



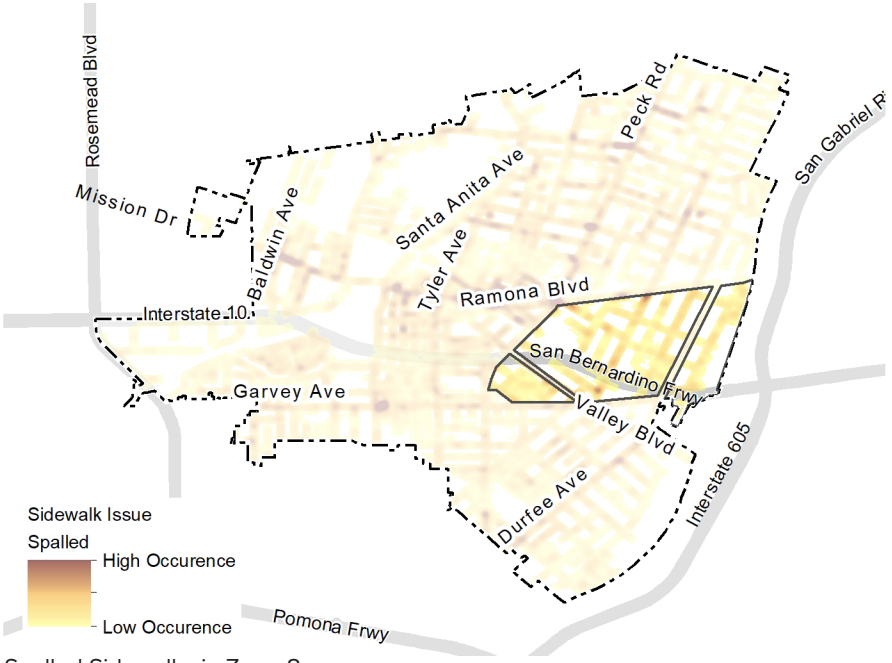
Spalled Sidewalks in Zone 7

TABLE B-10: Zone 8 Issues



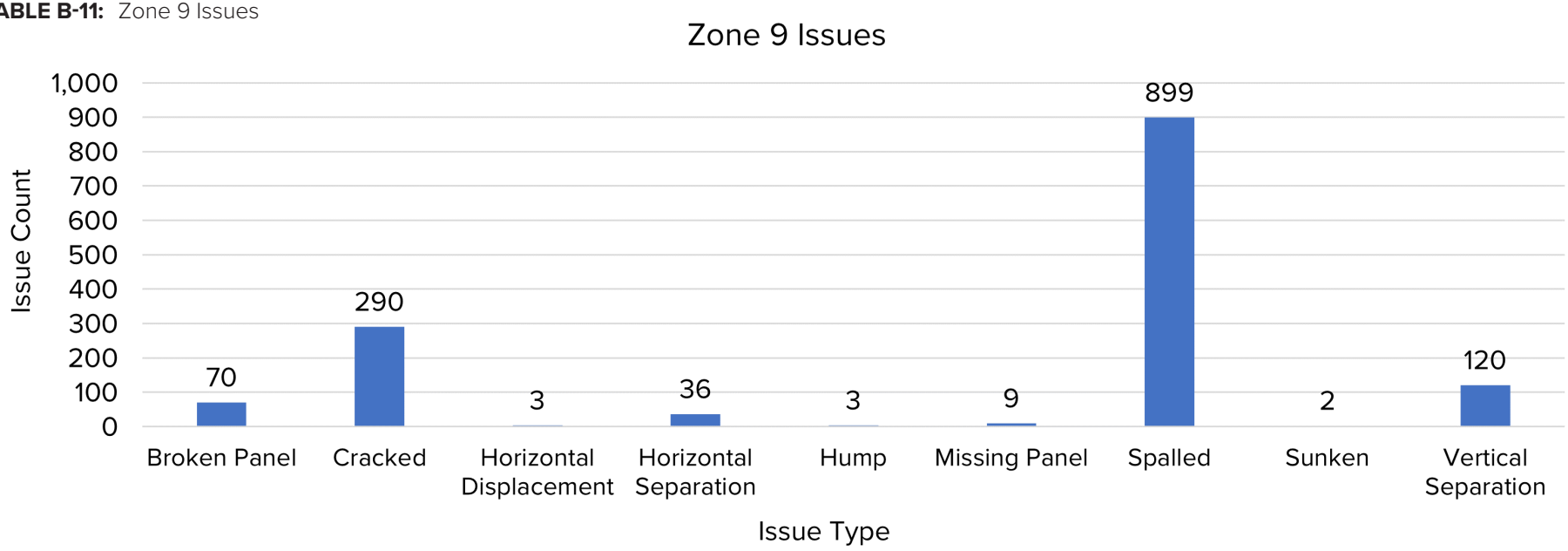


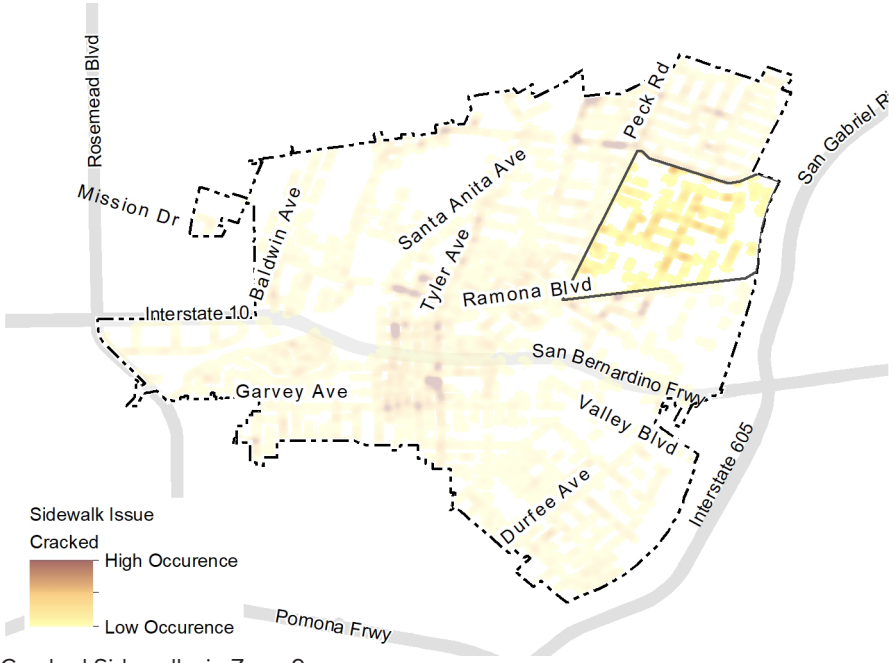
Cracked Sidewalks in Zone 8



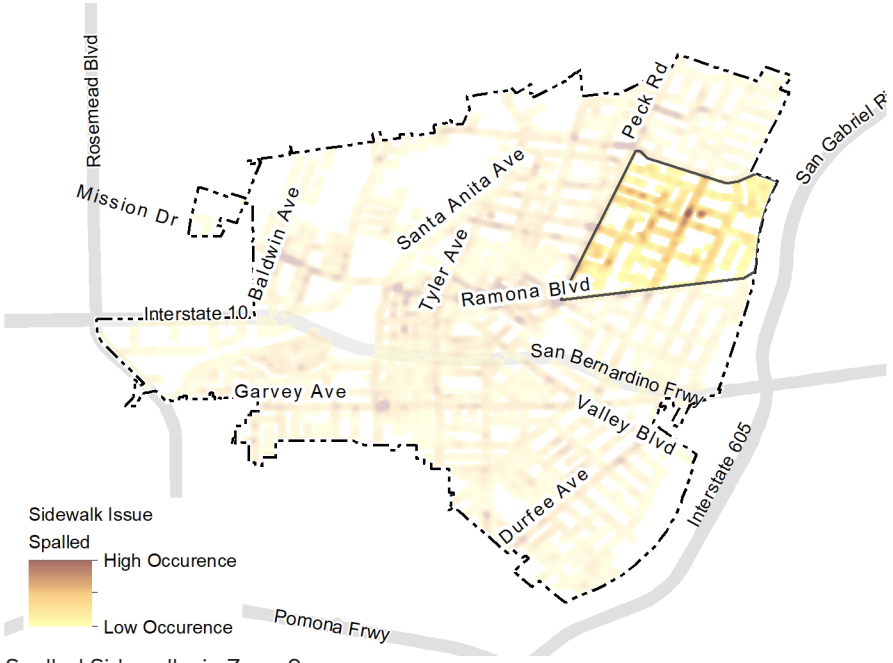
Spalled Sidewalks in Zone 8

TABLE B-11: Zone 9 Issues



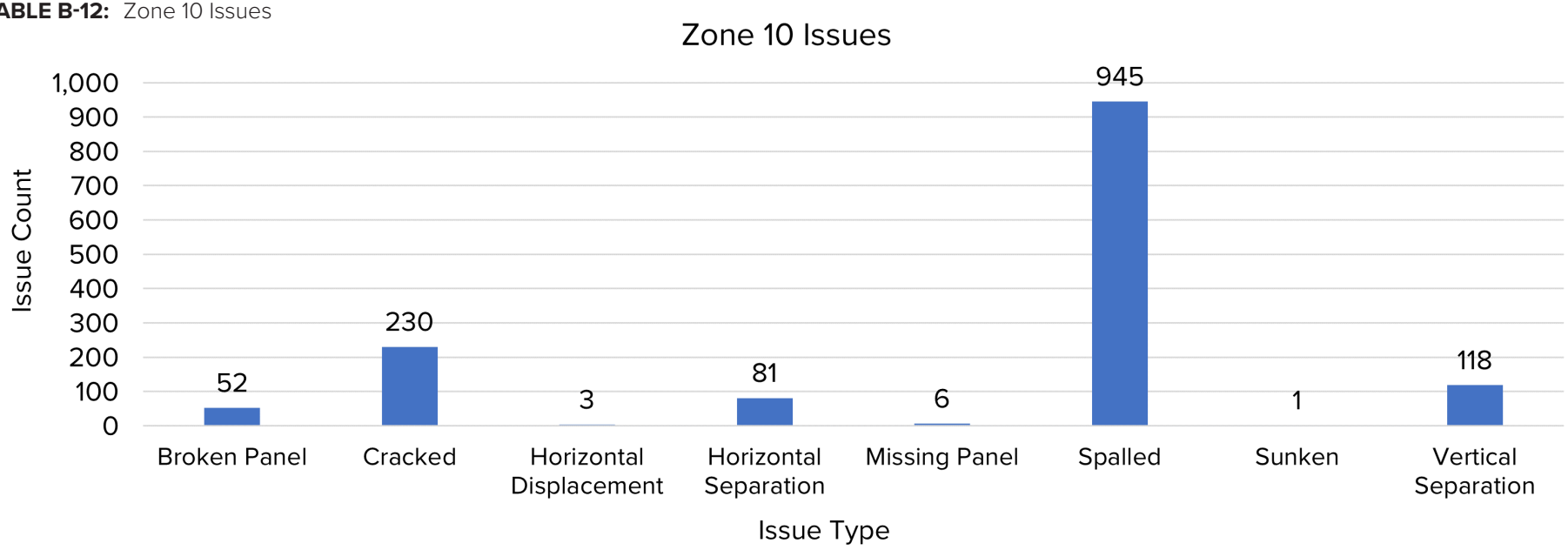


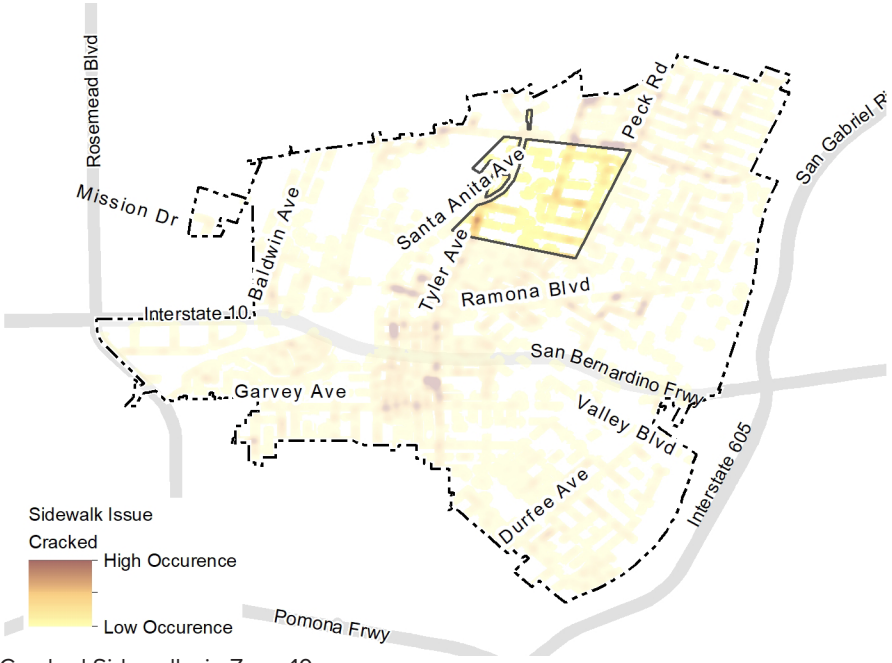
Cracked Sidewalks in Zone 9



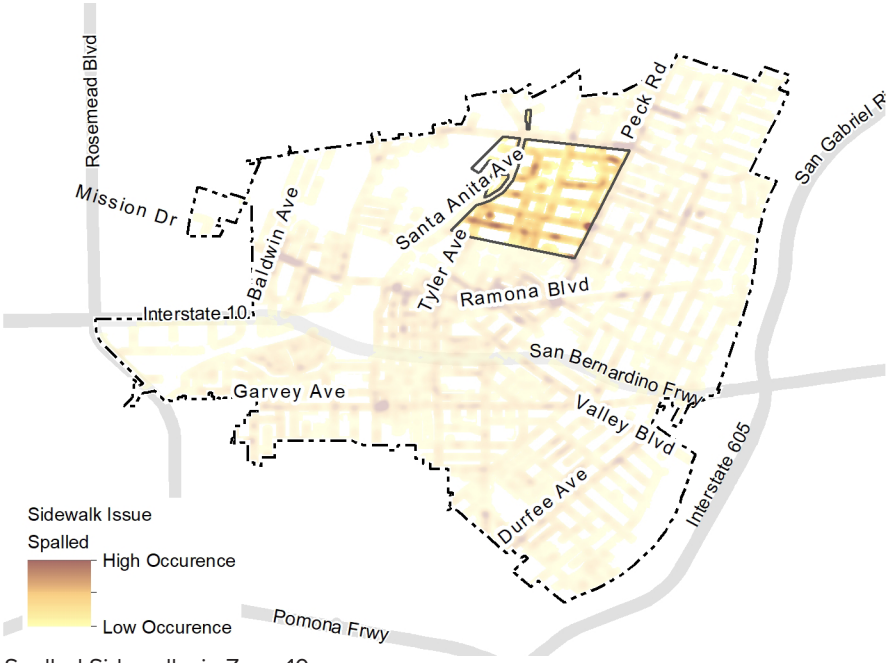
Spalled Sidewalks in Zone 9

TABLE B-12: Zone 10 Issues



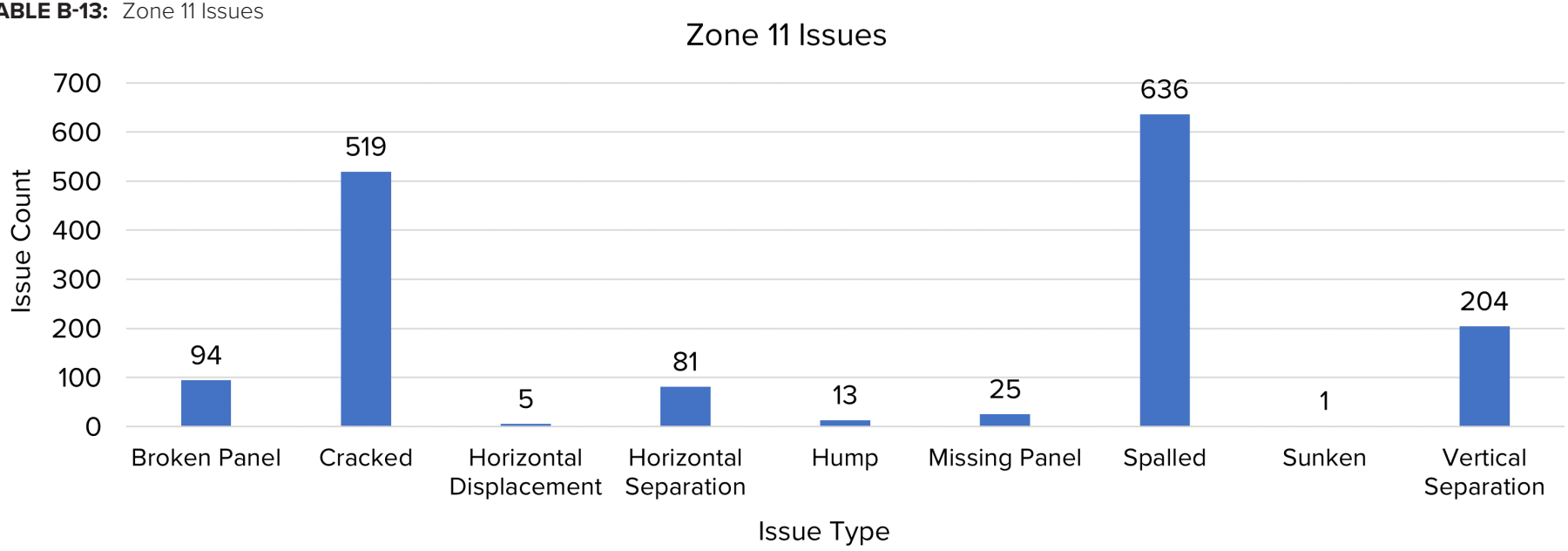


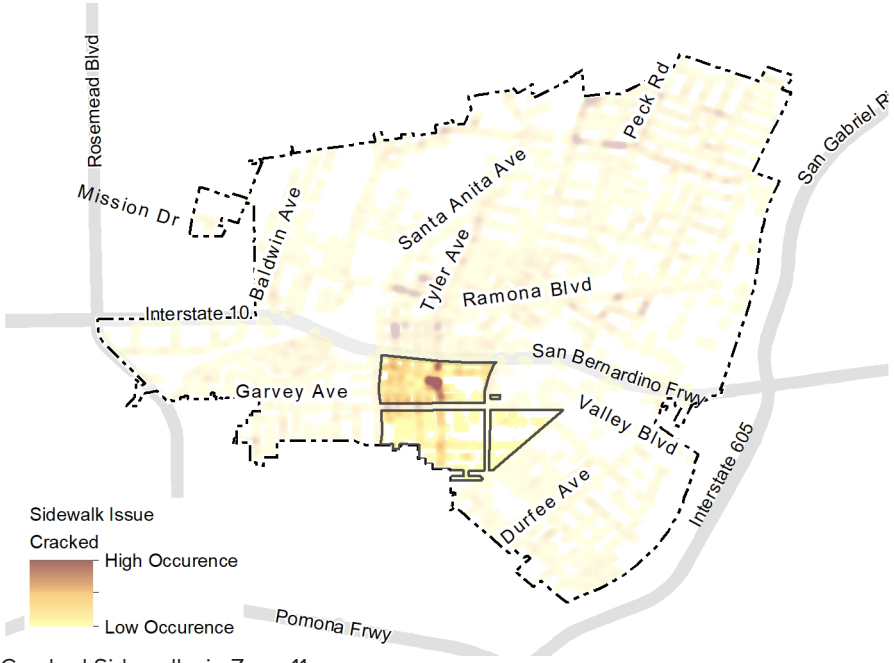
Cracked Sidewalks in Zone 10



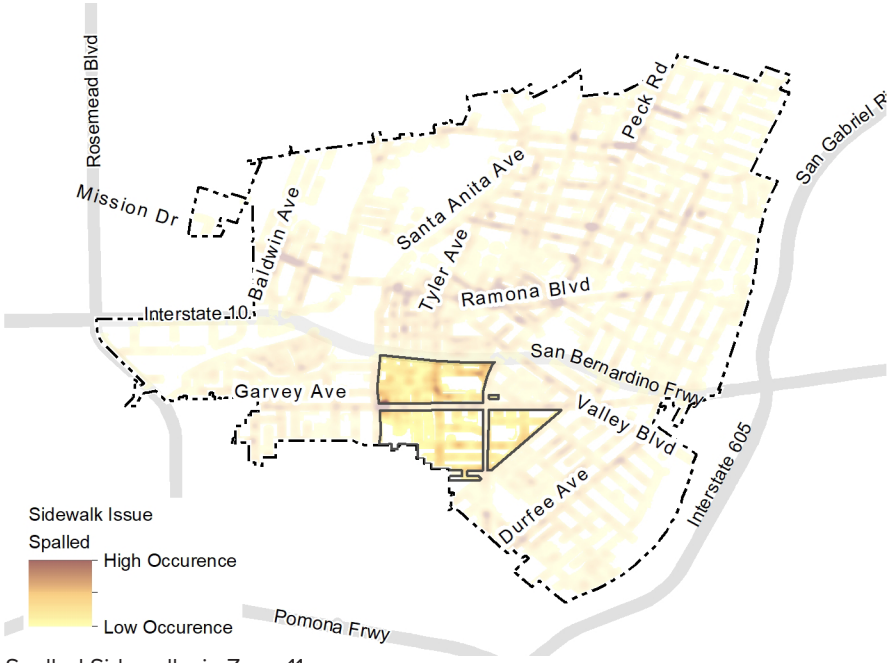
Spalled Sidewalks in Zone 10

TABLE B-13: Zone 11 Issues



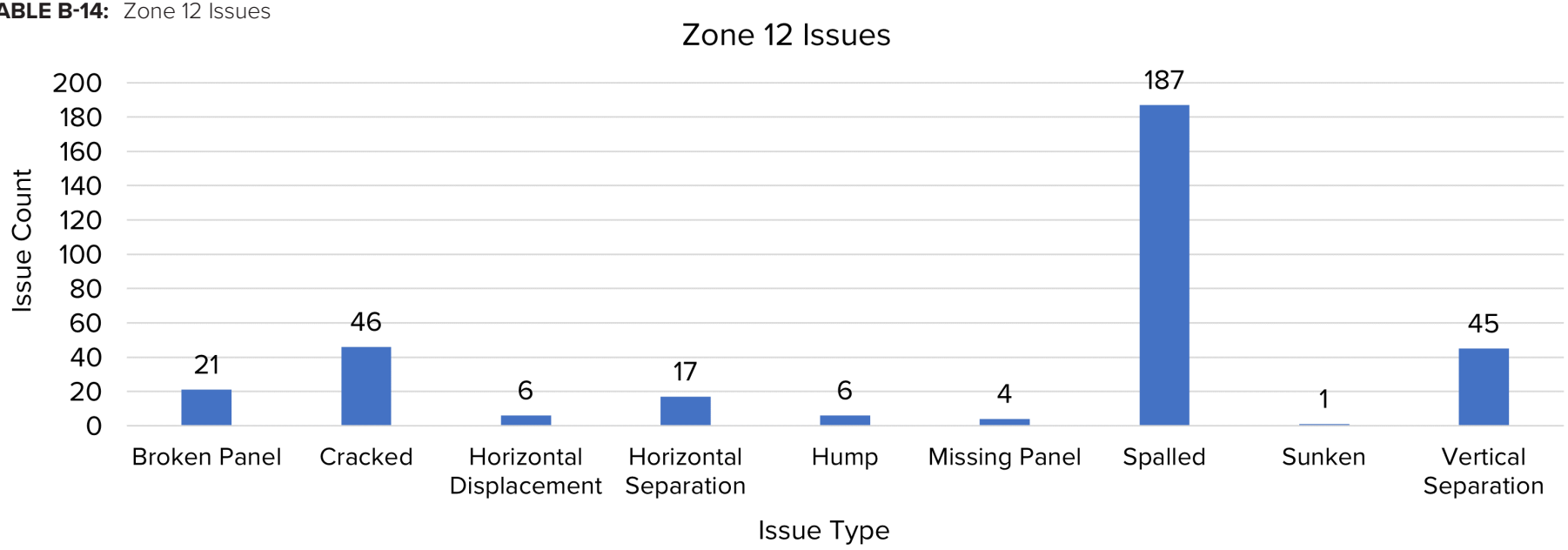


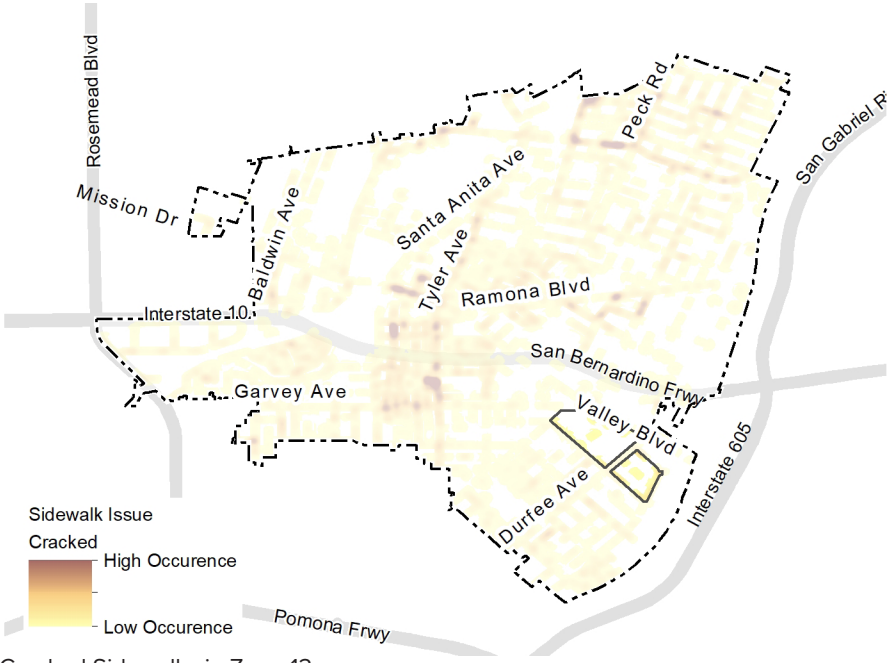
Cracked Sidewalks in Zone 11



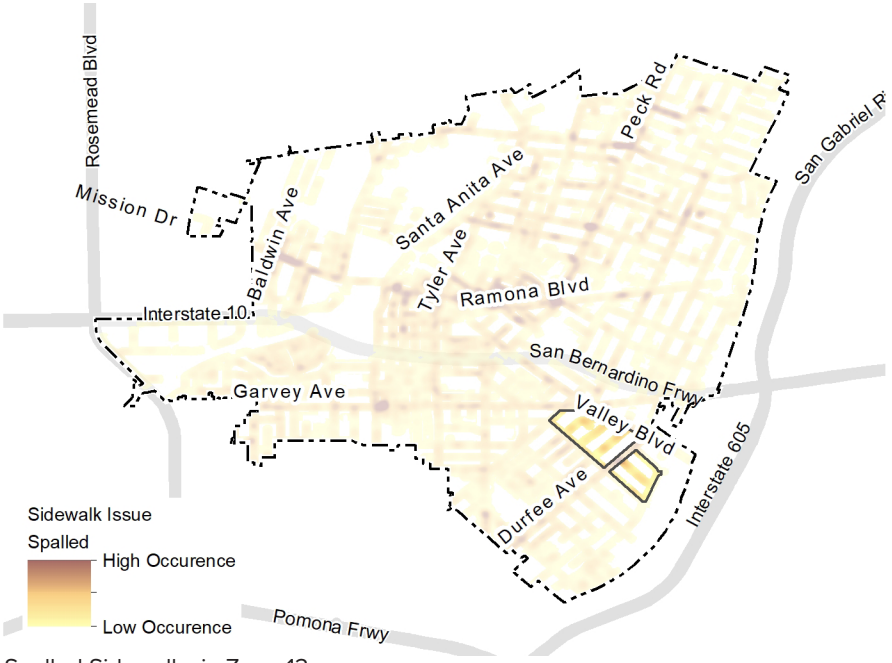
Spalled Sidewalks in Zone 11

TABLE B-14: Zone 12 Issues



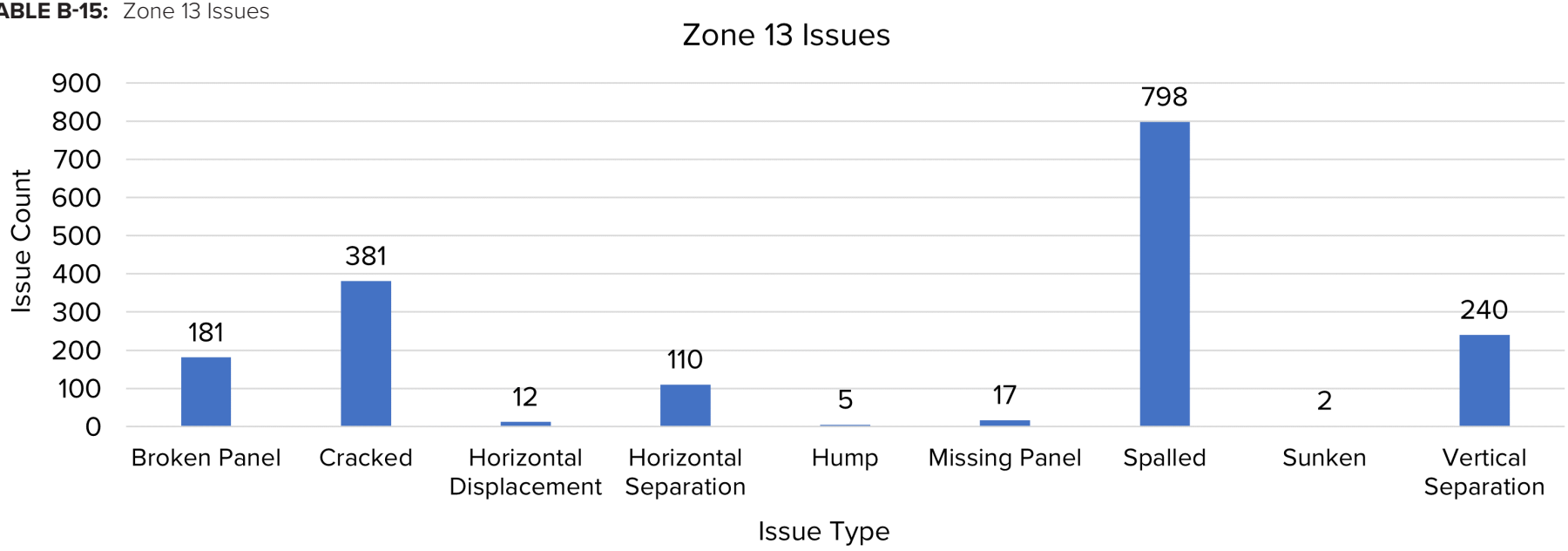


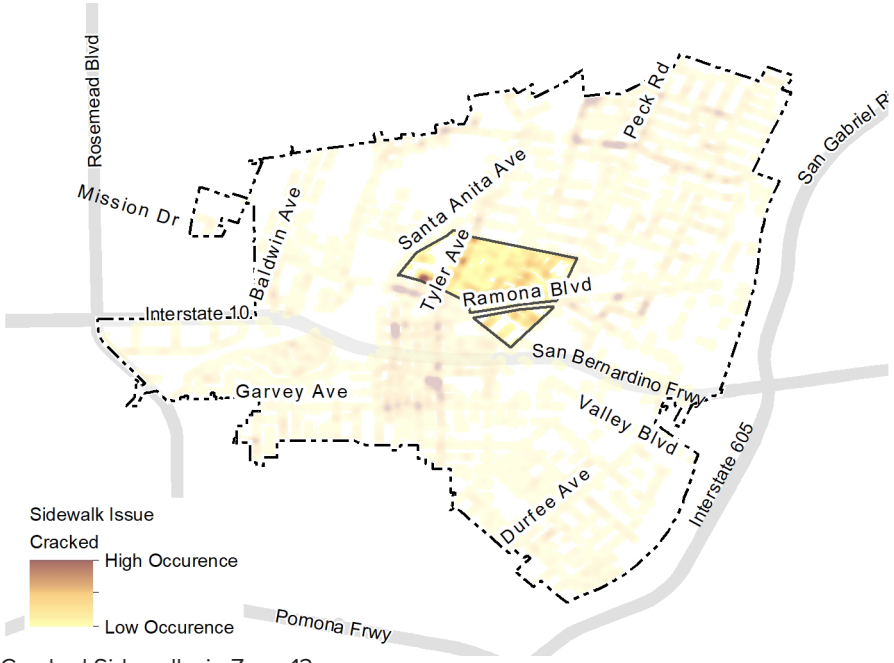
Cracked Sidewalks in Zone 12



Spalled Sidewalks in Zone 12

TABLE B-15: Zone 13 Issues

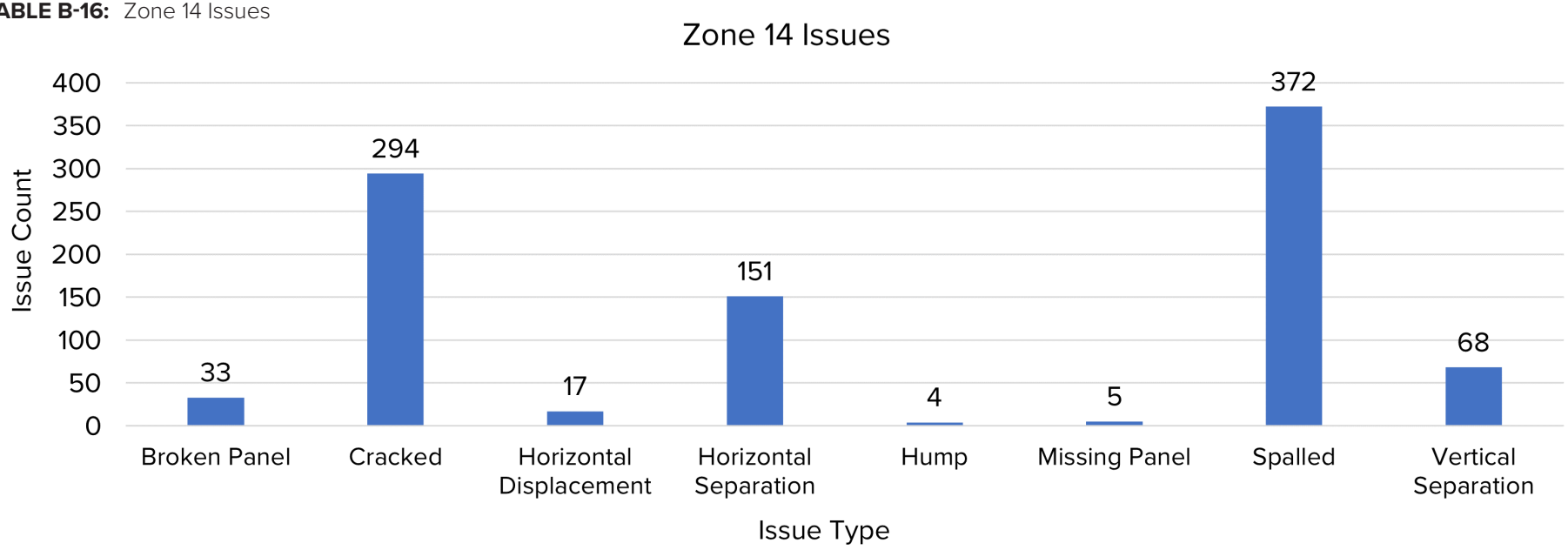




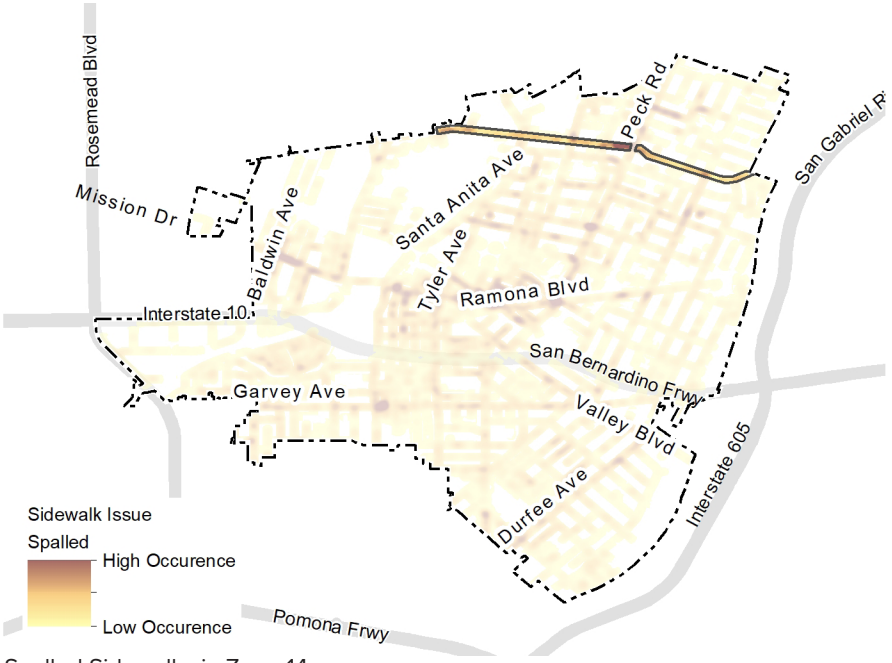
Cracked Sidewalks in Zone 13

Spalled Sidewalks in Zone 13

TABLE B-16: Zone 14 Issues

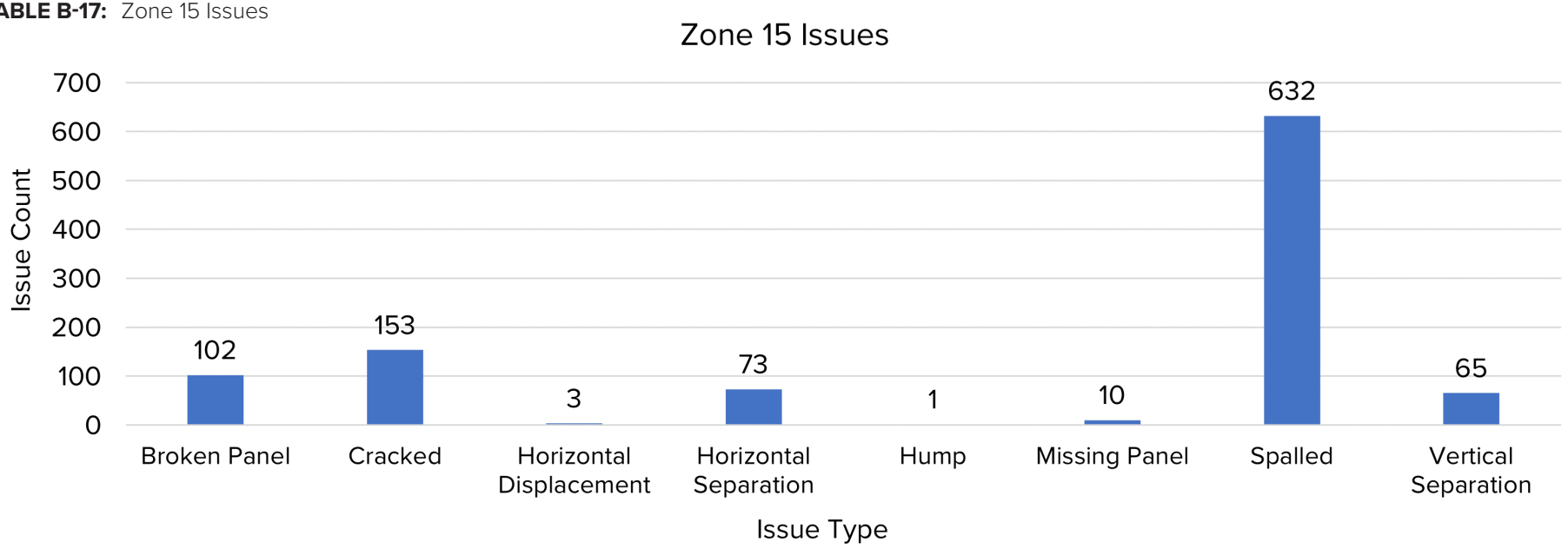


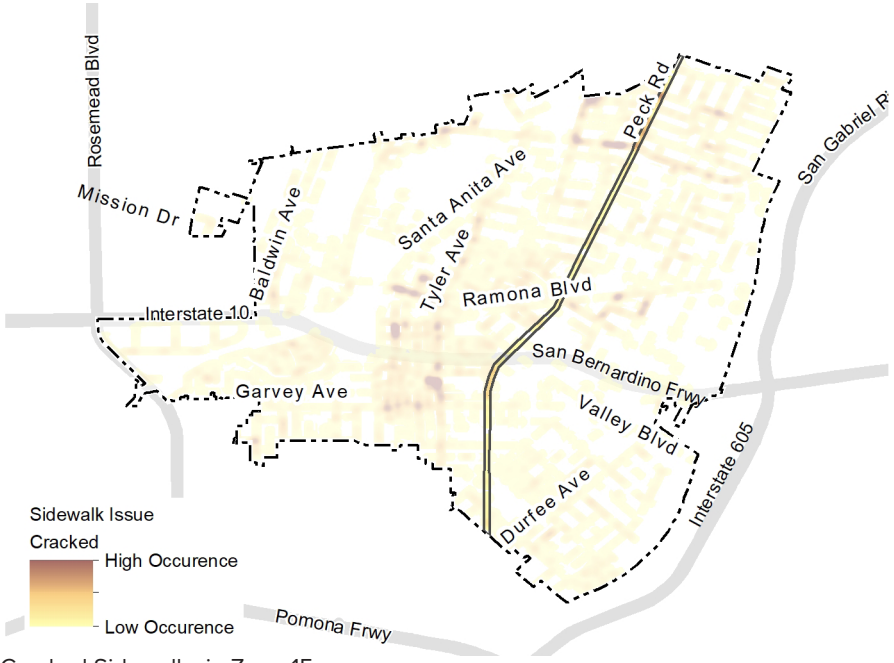
Cracked Sidewalks in Zone 14



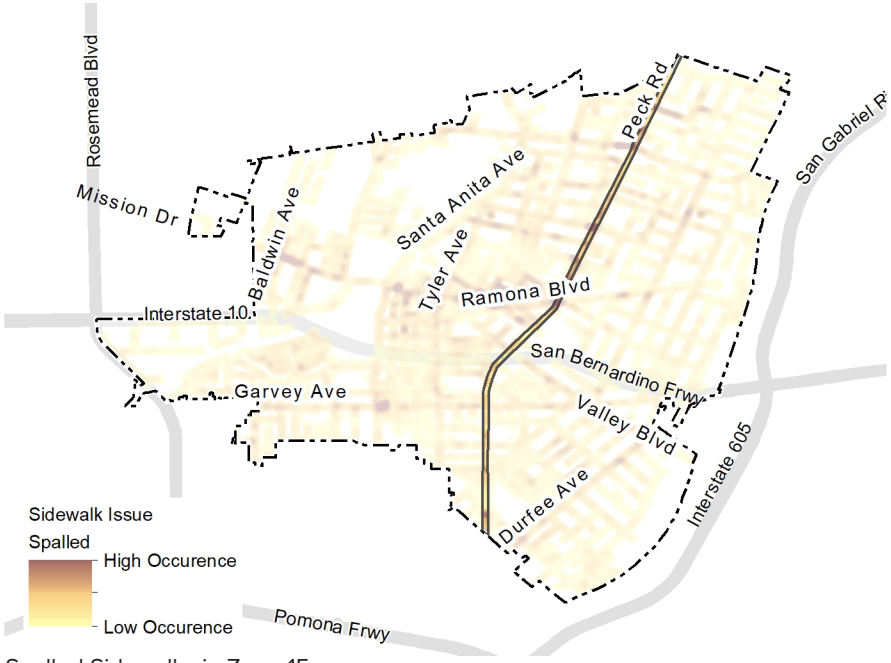
Spalled Sidewalks in Zone 14

TABLE B-17: Zone 15 Issues



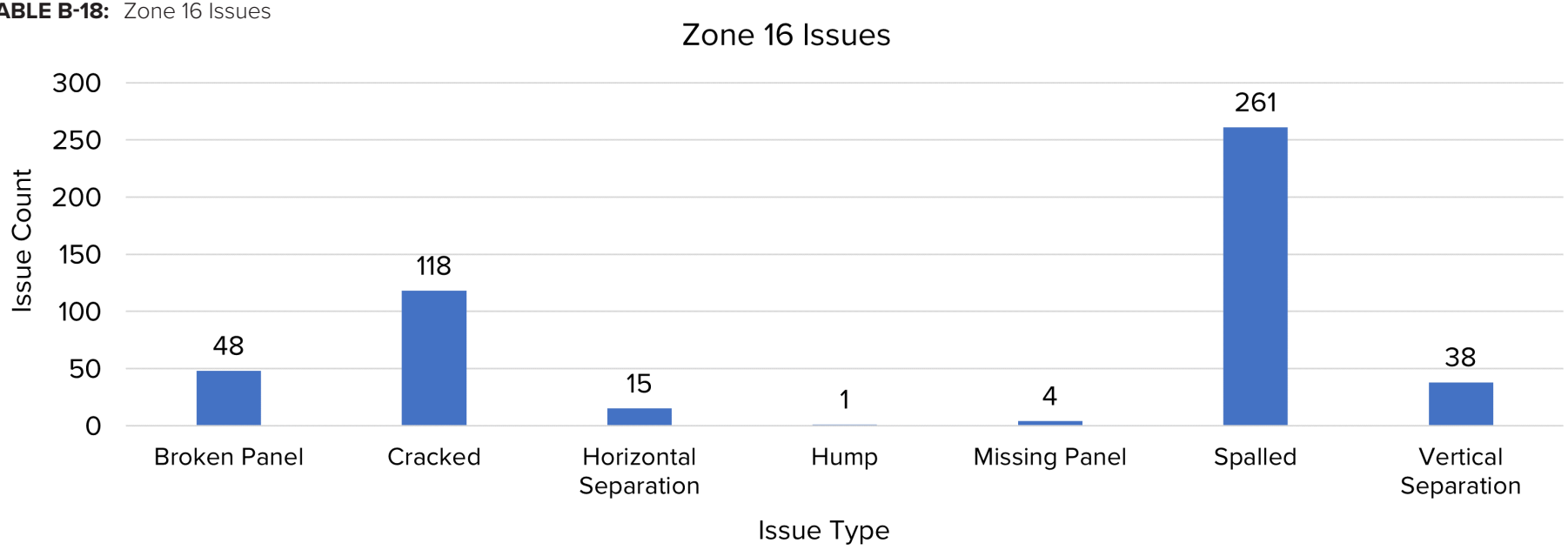


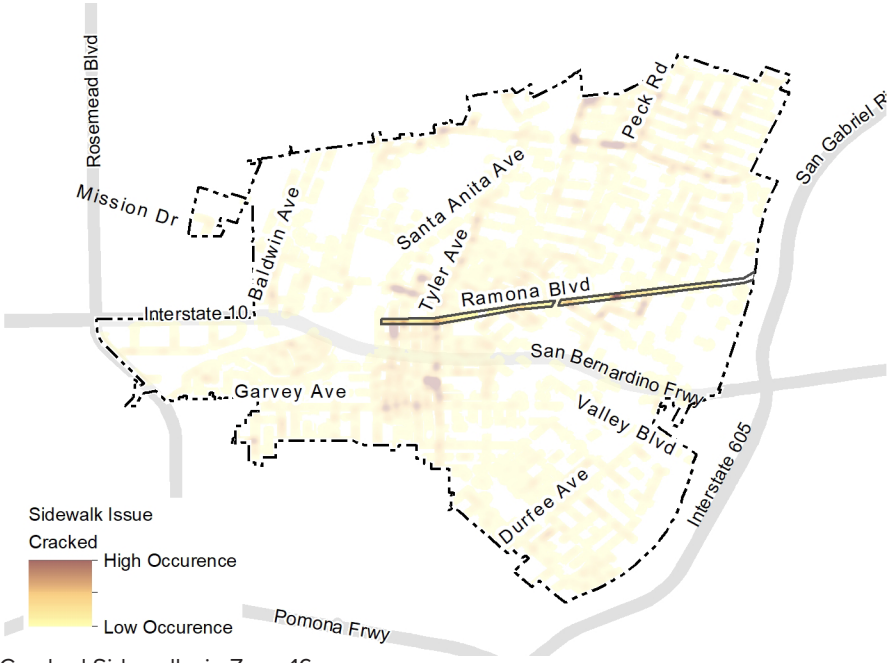
Cracked Sidewalks in Zone 15



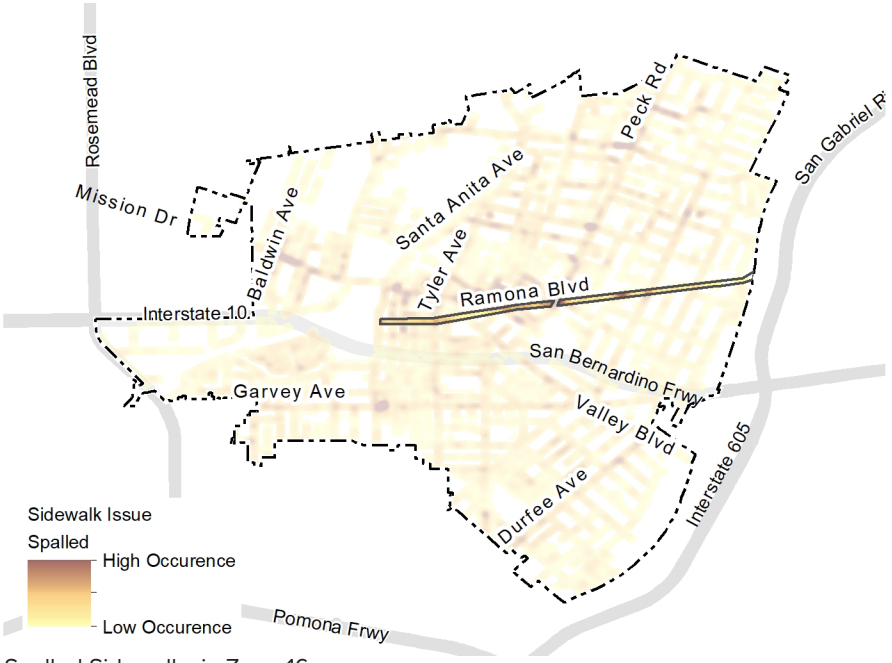
Spalled Sidewalks in Zone 15

TABLE B-18: Zone 16 Issues



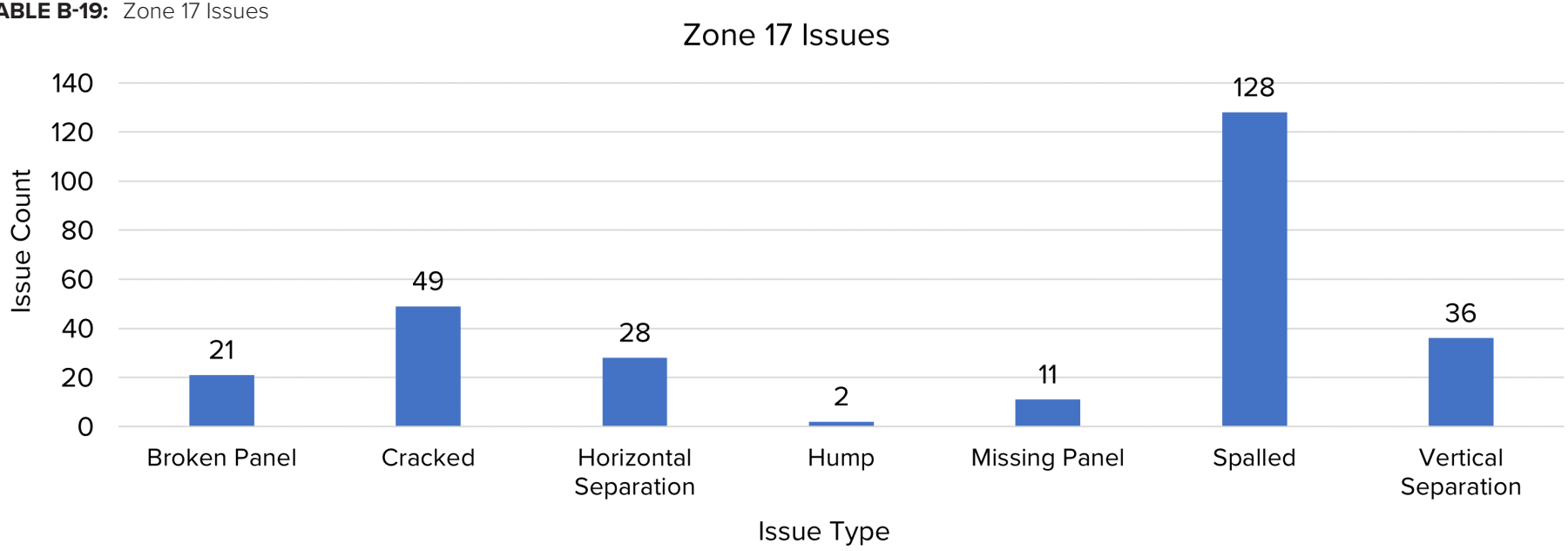


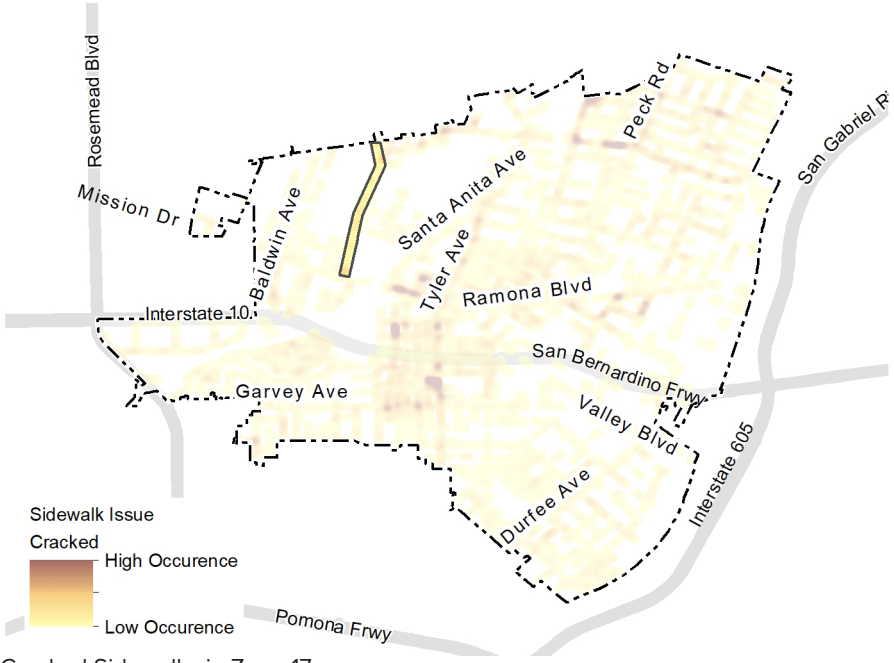
Cracked Sidewalks in Zone 16



Spalled Sidewalks in Zone 16

TABLE B-19: Zone 17 Issues

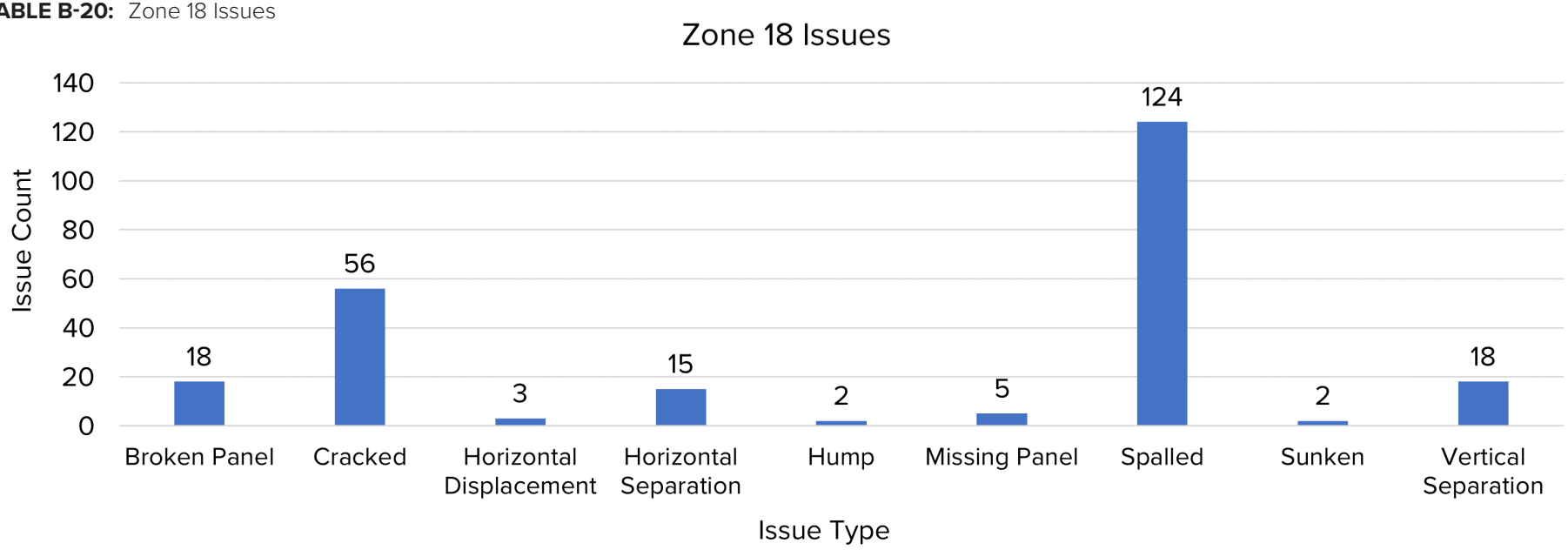


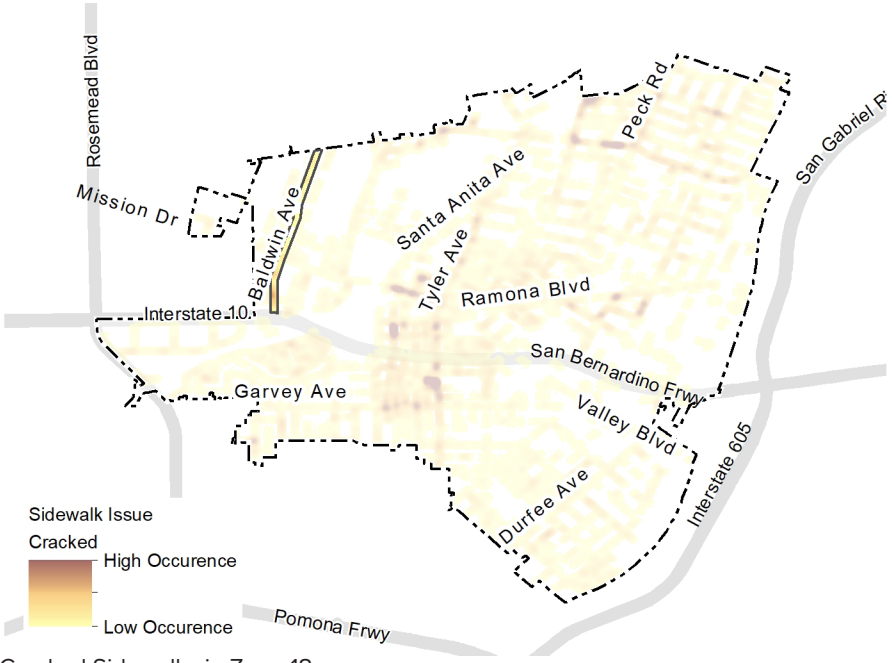


Cracked Sidewalks in Zone 17

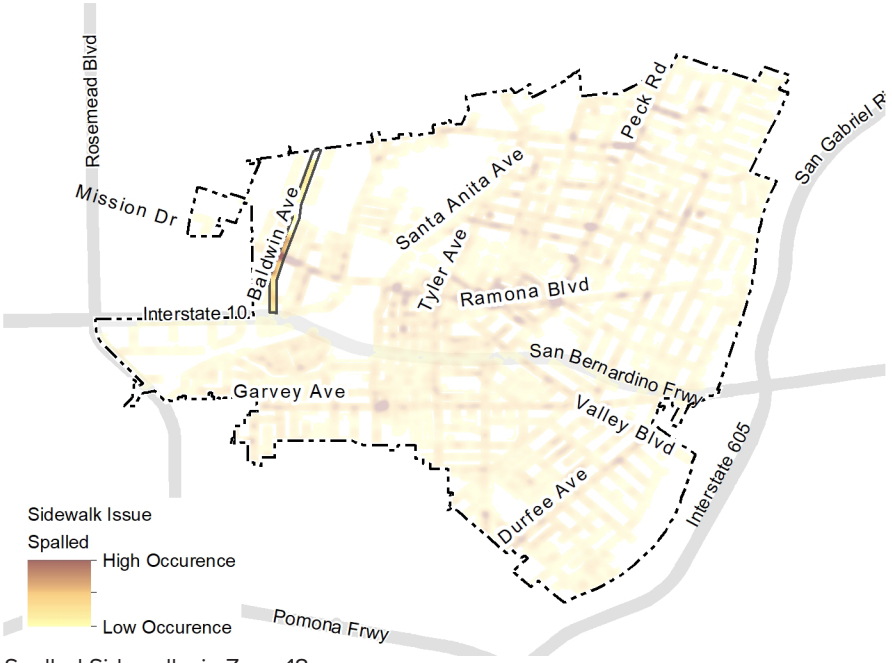
Spalled Sidewalks in Zone 17

TABLE B-20: Zone 18 Issues



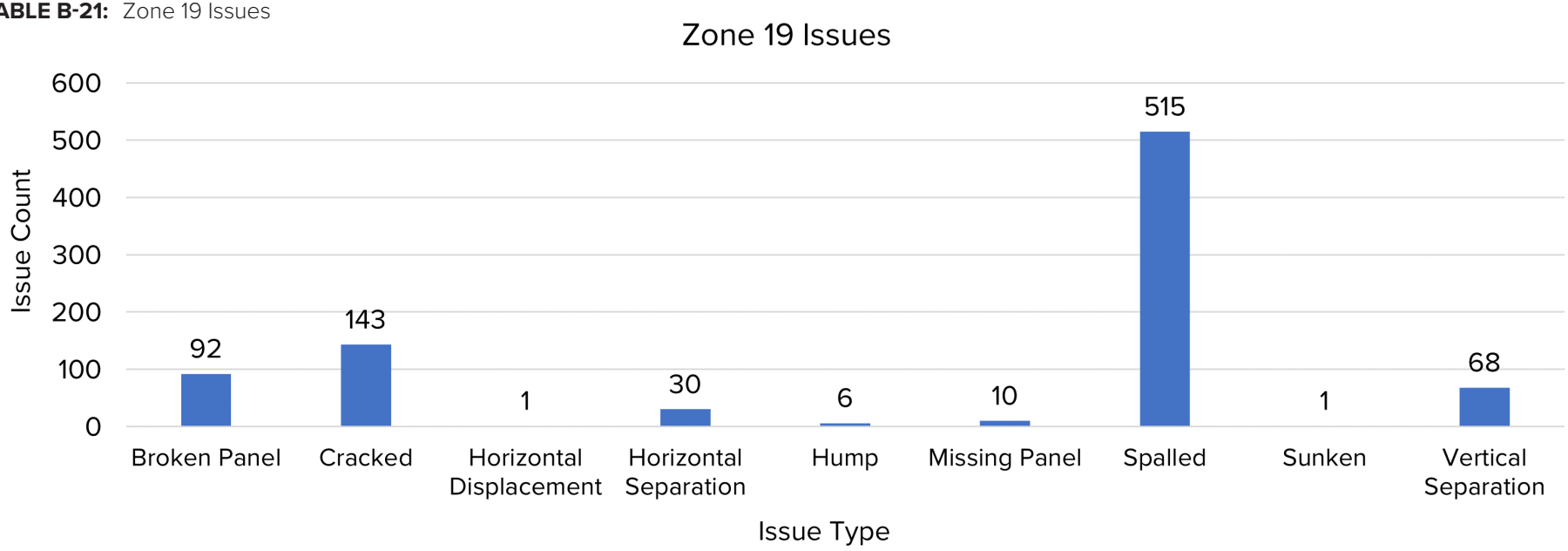


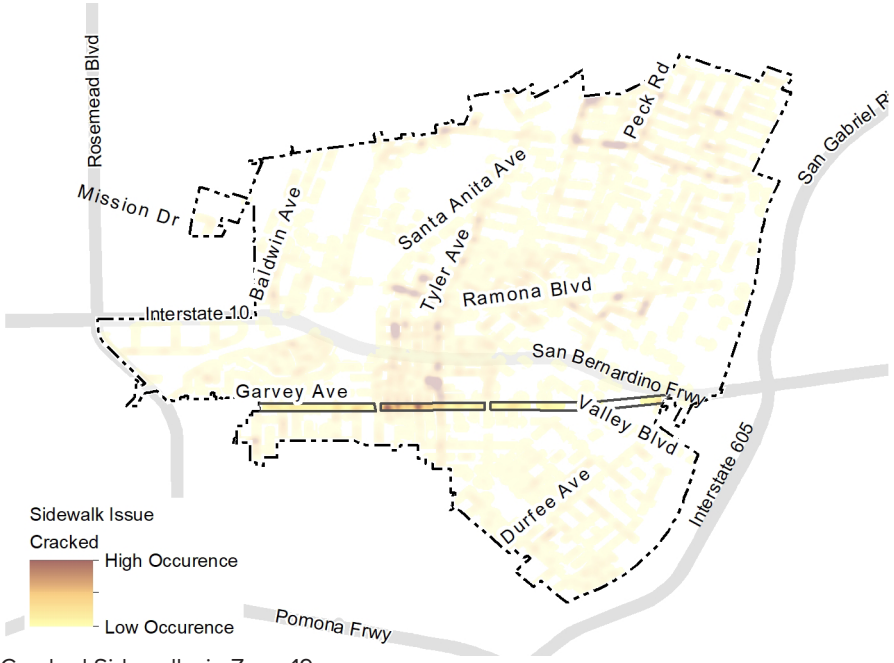
Cracked Sidewalks in Zone 18



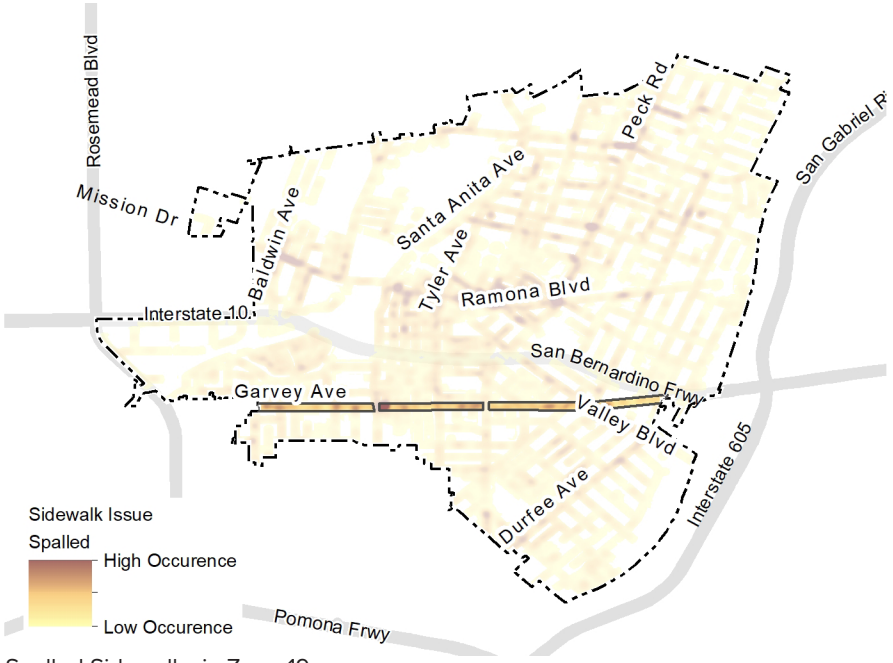
Spalled Sidewalks in Zone 18

TABLE B-21: Zone 19 Issues



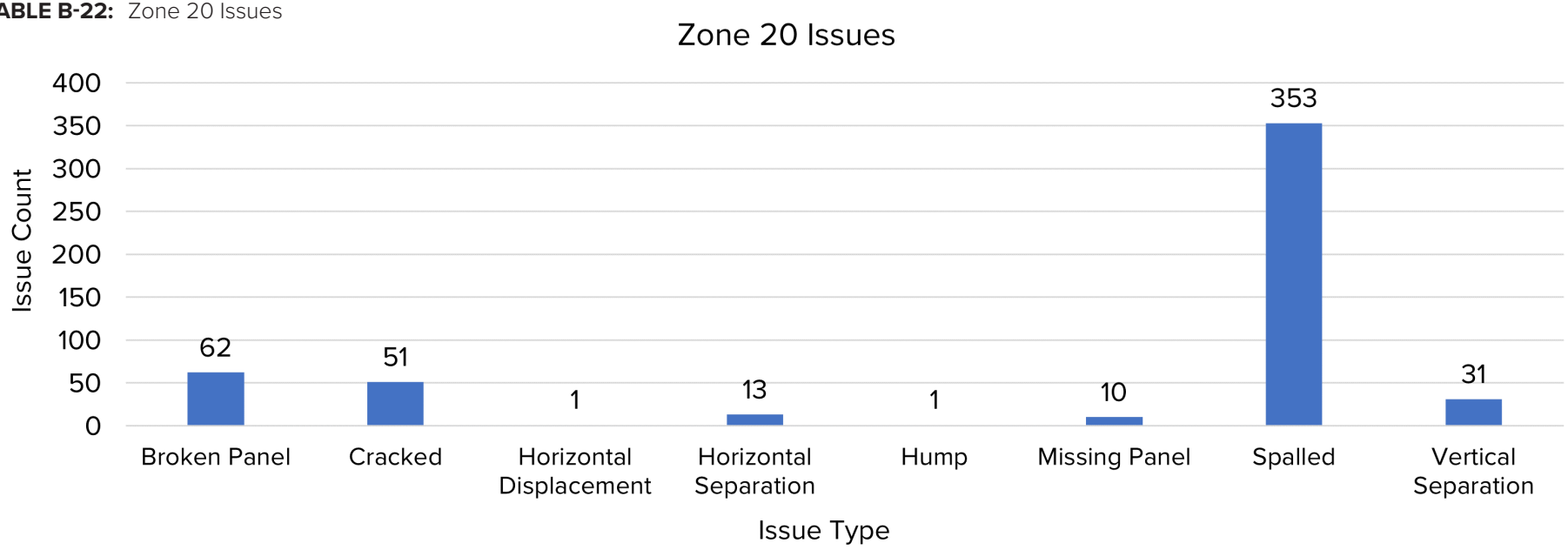


Cracked Sidewalks in Zone 19

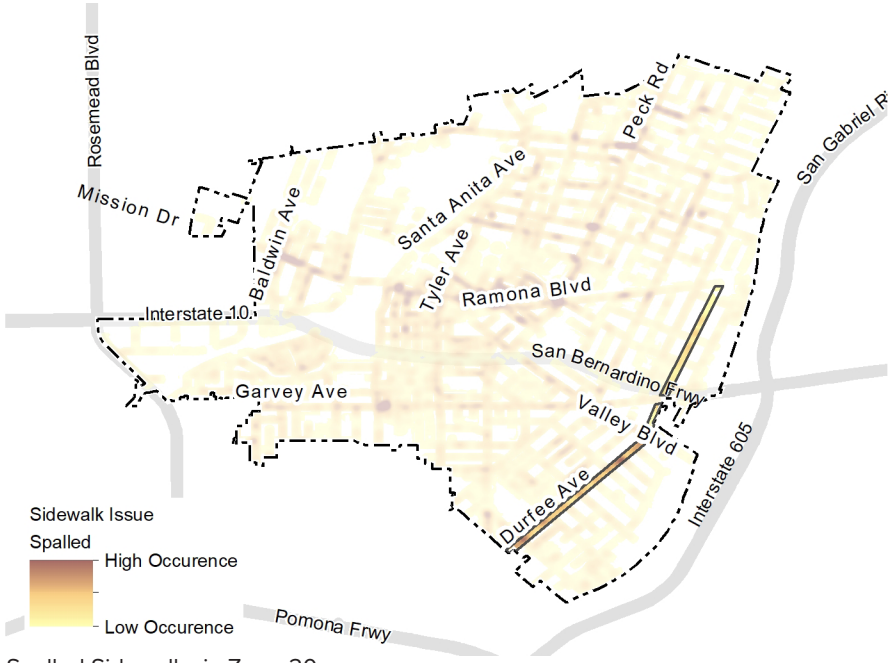


Spalled Sidewalks in Zone 19

TABLE B-22: Zone 20 Issues

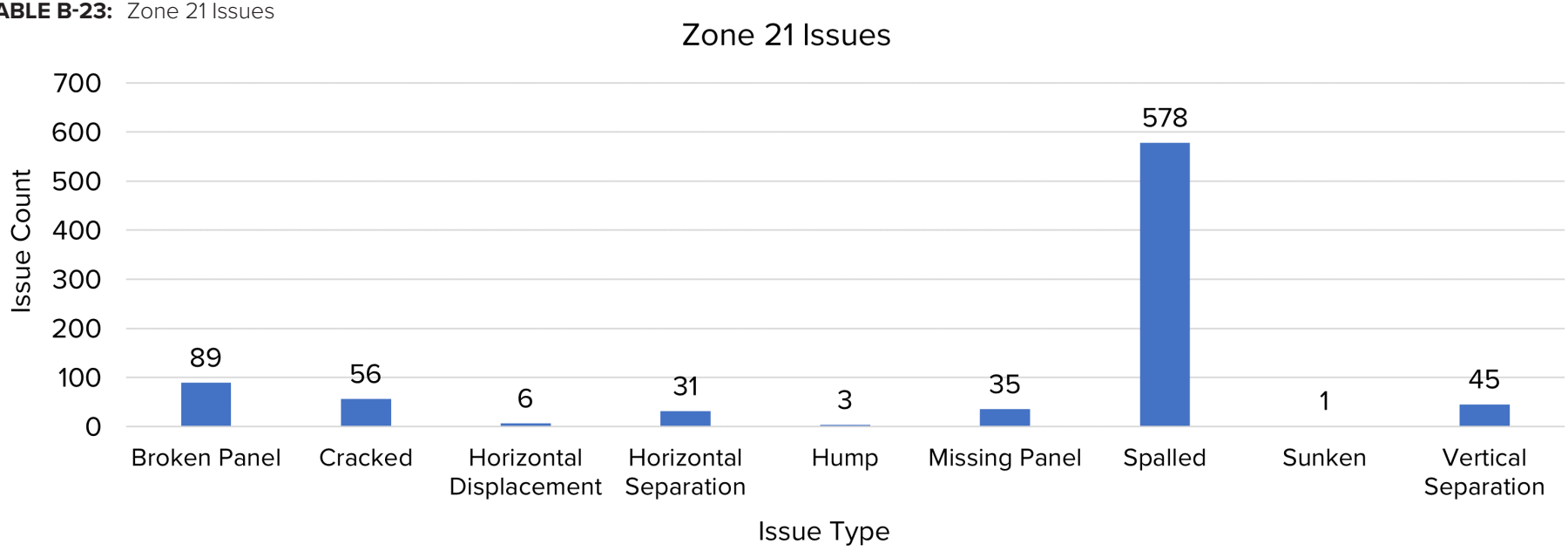


Broken Panel Sidewalks in Zone 20



Spalled Sidewalks in Zone 20

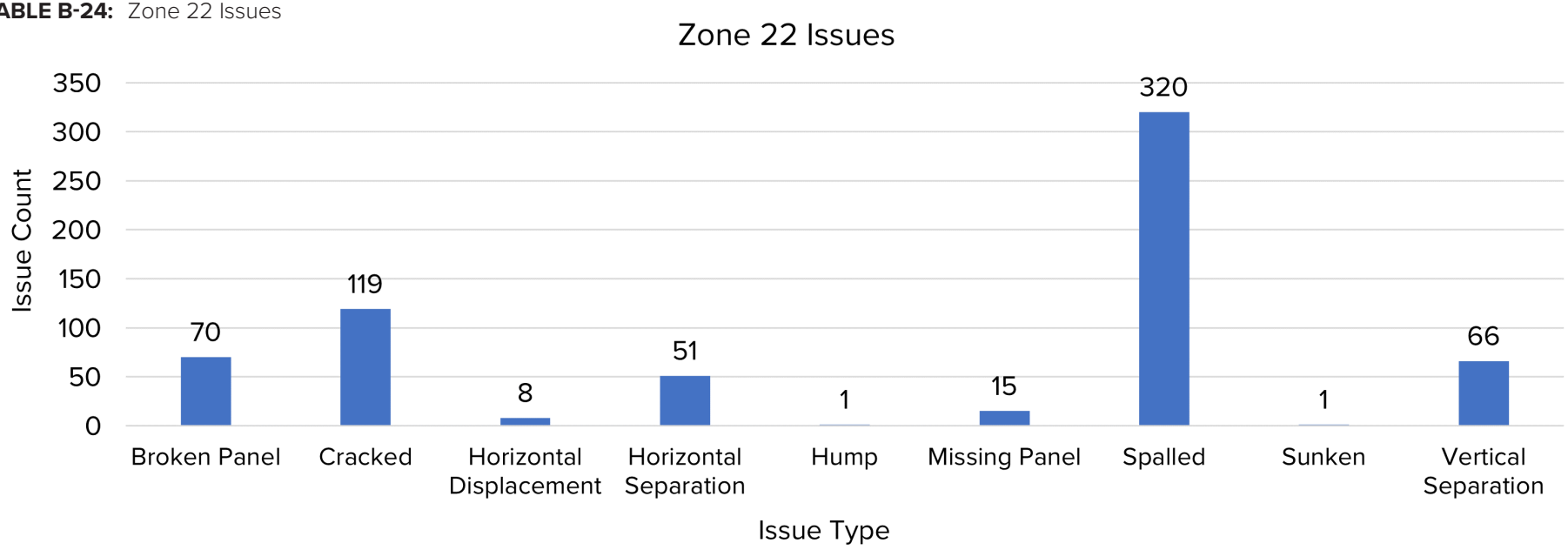
TABLE B-23: Zone 21 Issues

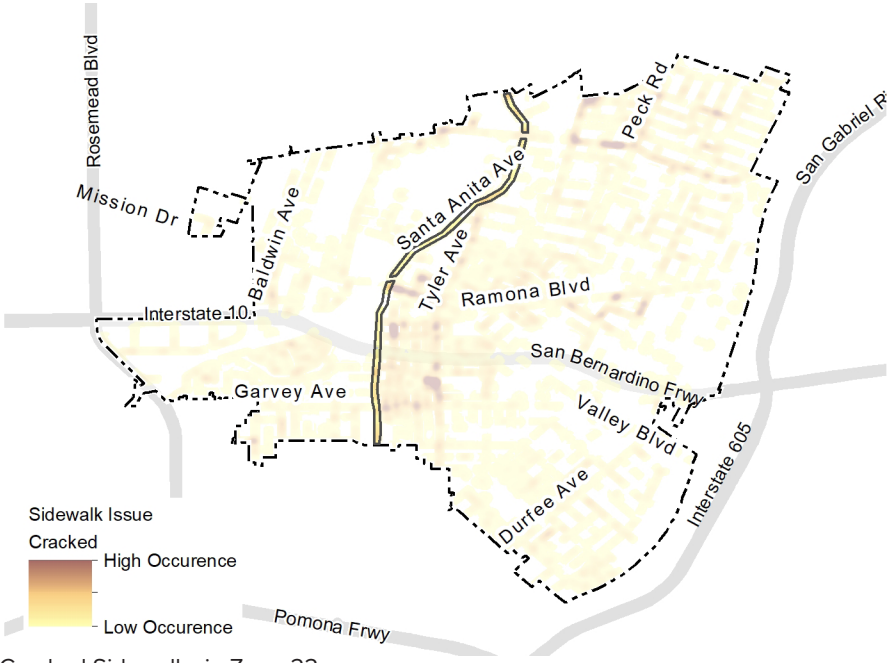


Broken Panel Sidewalks in Zone 21

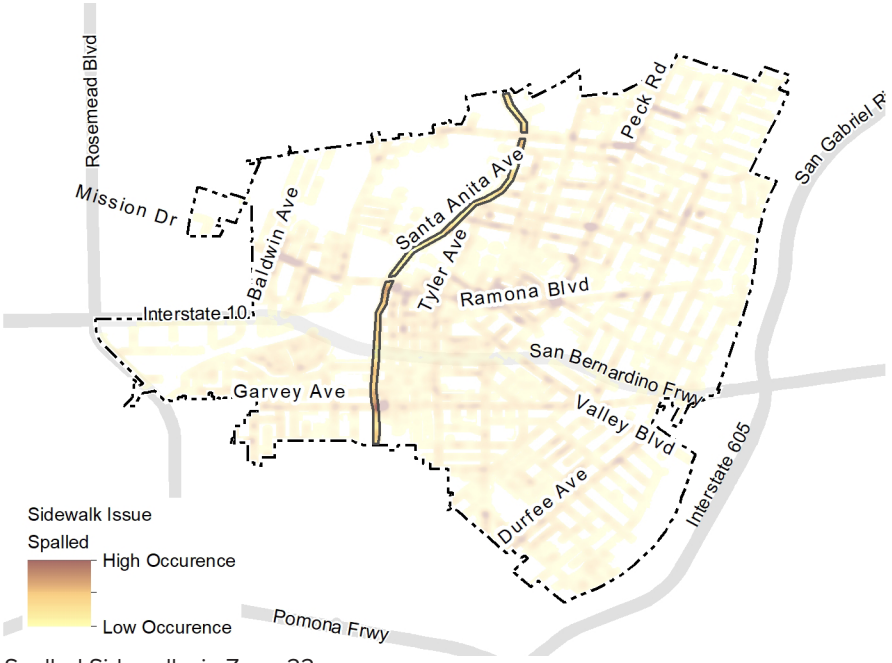
Spalled Sidewalks in Zone 21

TABLE B-24: Zone 22 Issues





Cracked Sidewalks in Zone 22



Spalled Sidewalks in Zone 22

Appendix C
CURB RAMPS

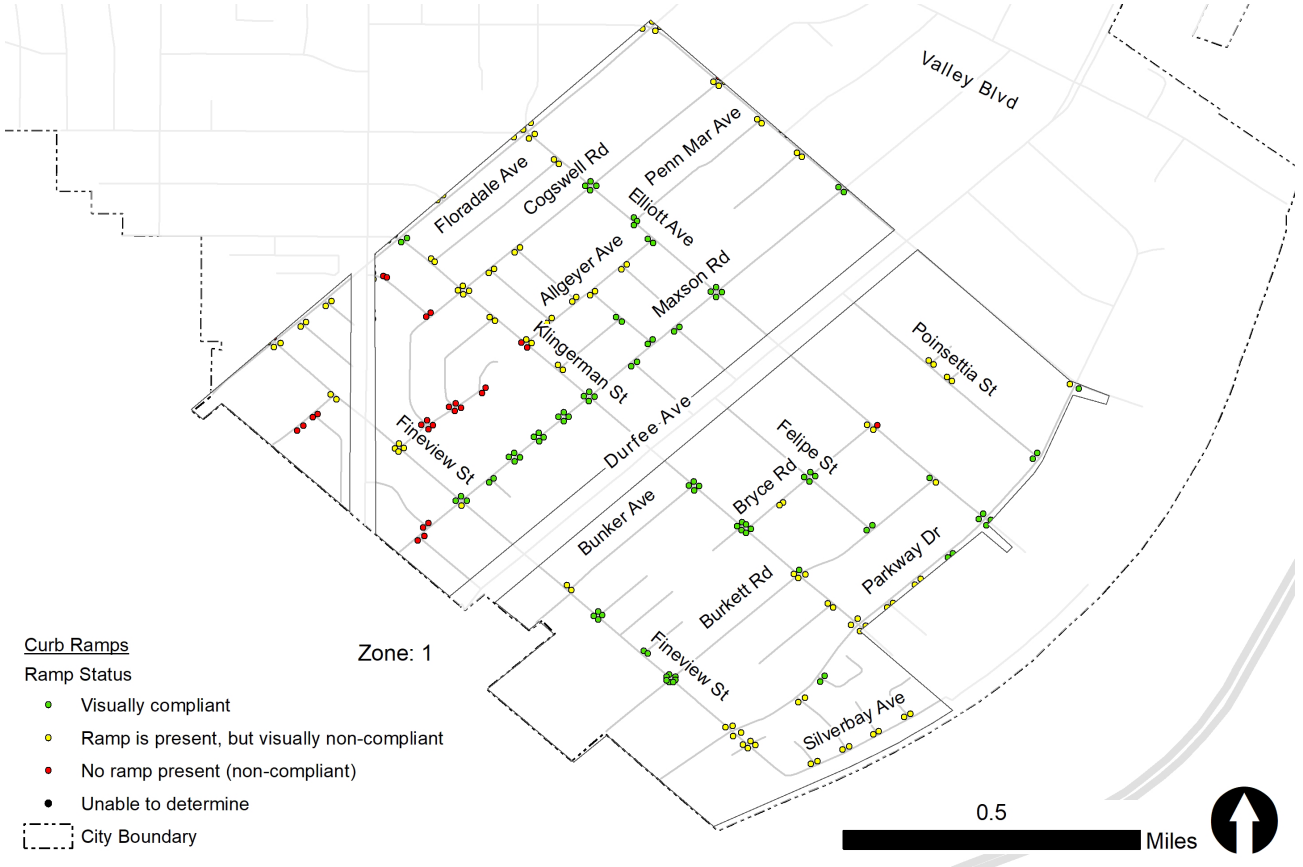


FIGURE C-1: Zone 1 Curb Ramps

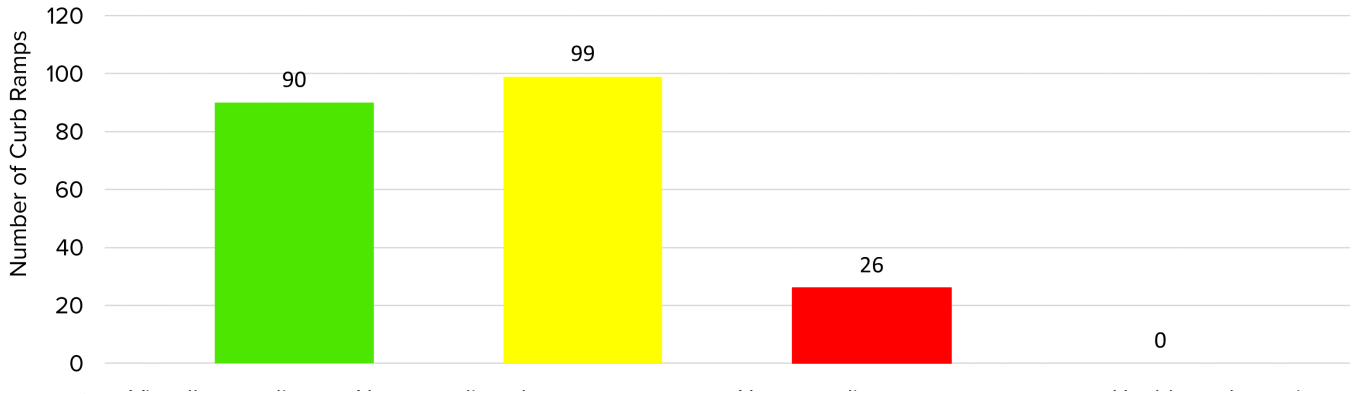


TABLE C-1: Zone 1 Maintenance

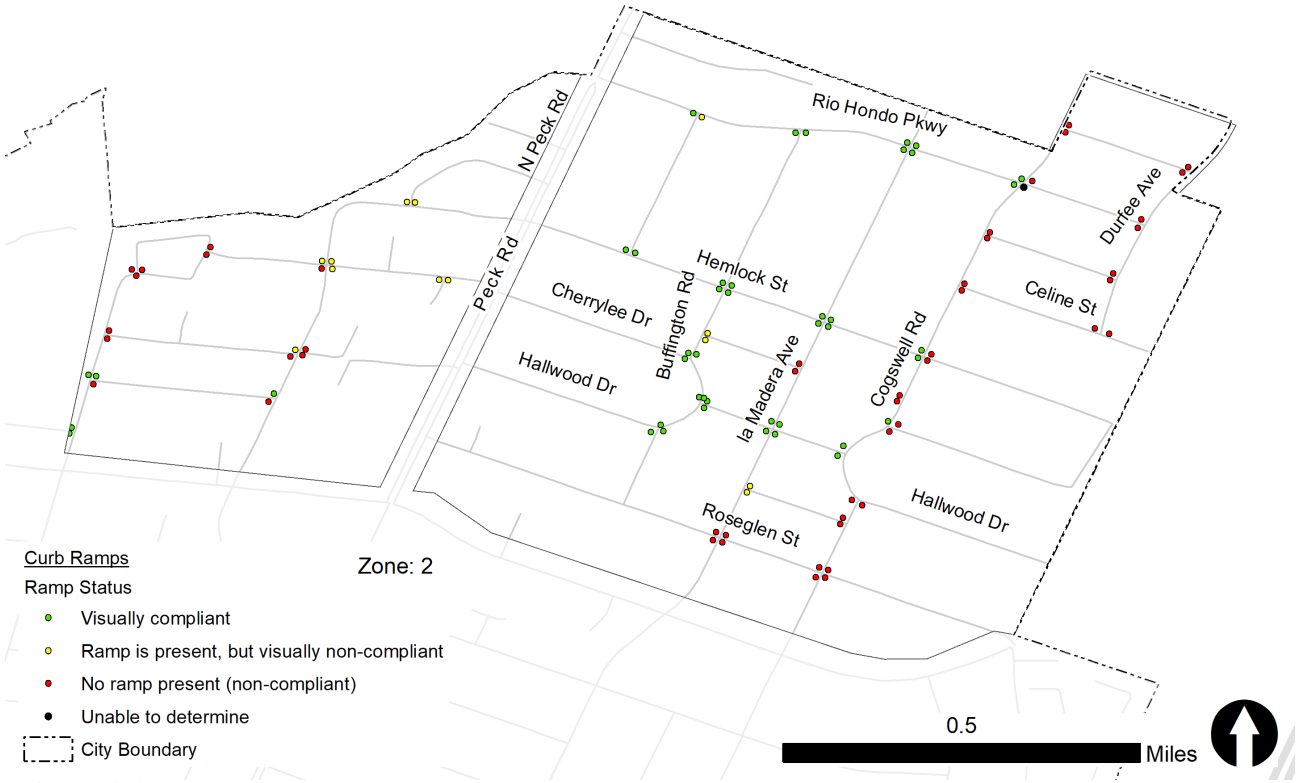


FIGURE C-2: Zone 2 Curb Ramps

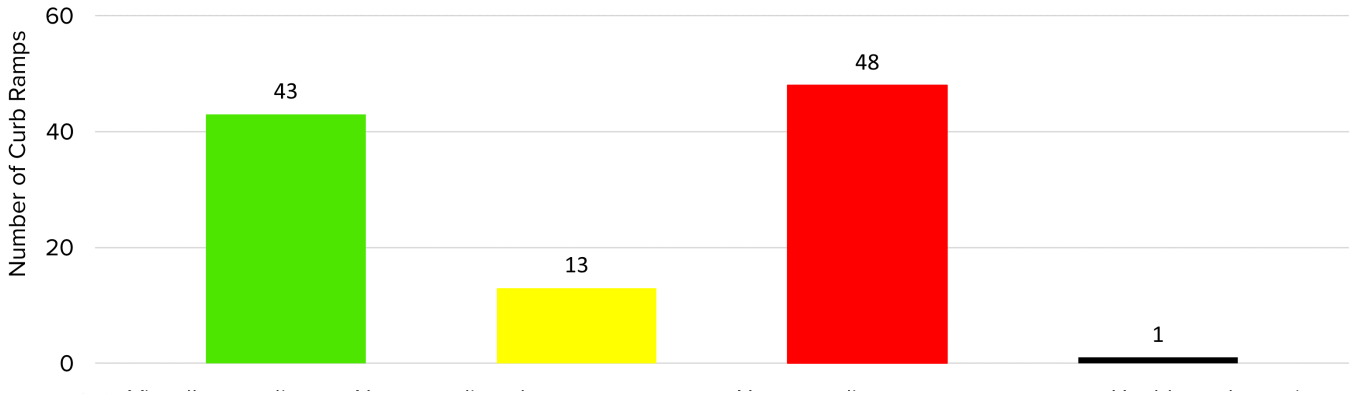


TABLE C-2: Zone 2 Maintenance

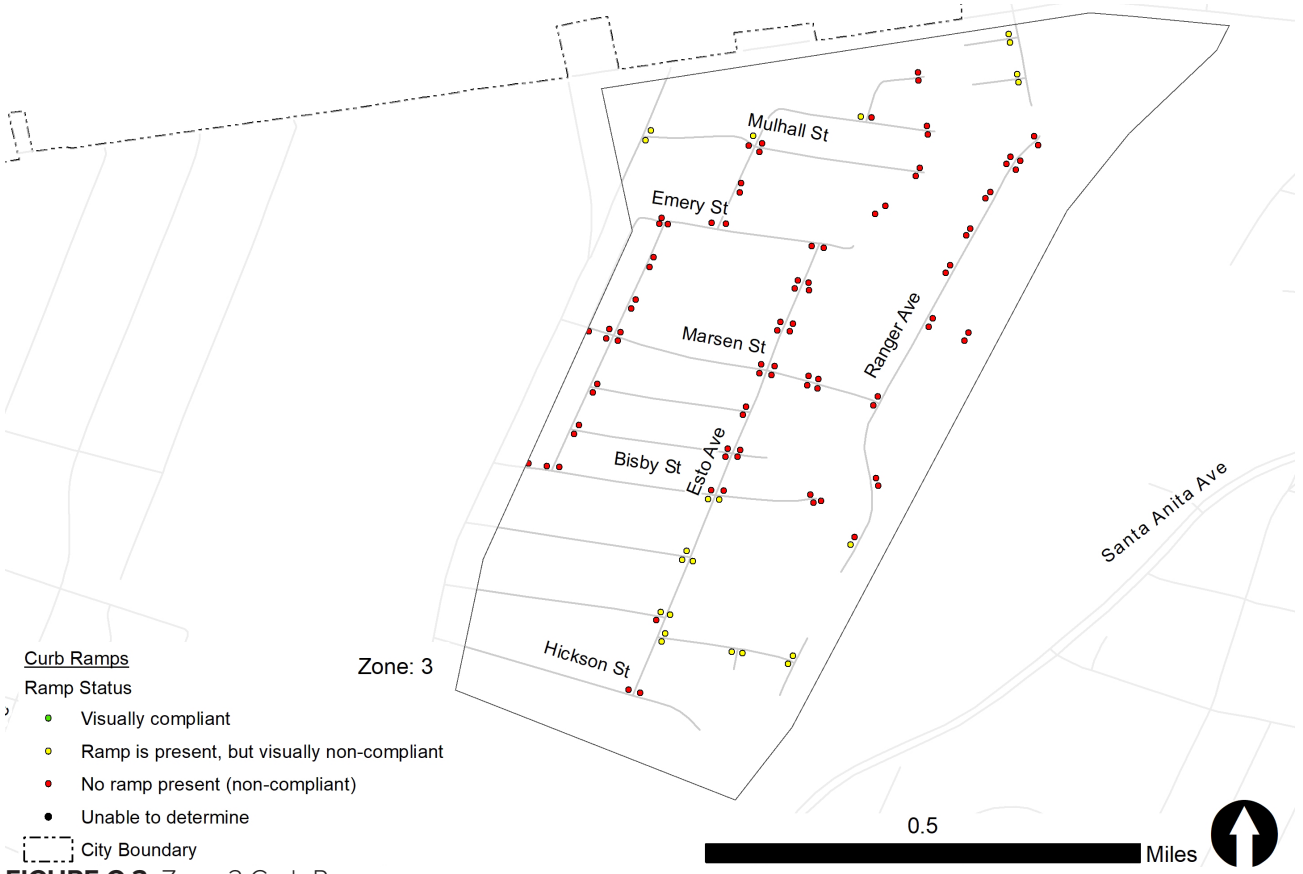


FIGURE C-3: Zone 3 Curb Ramps

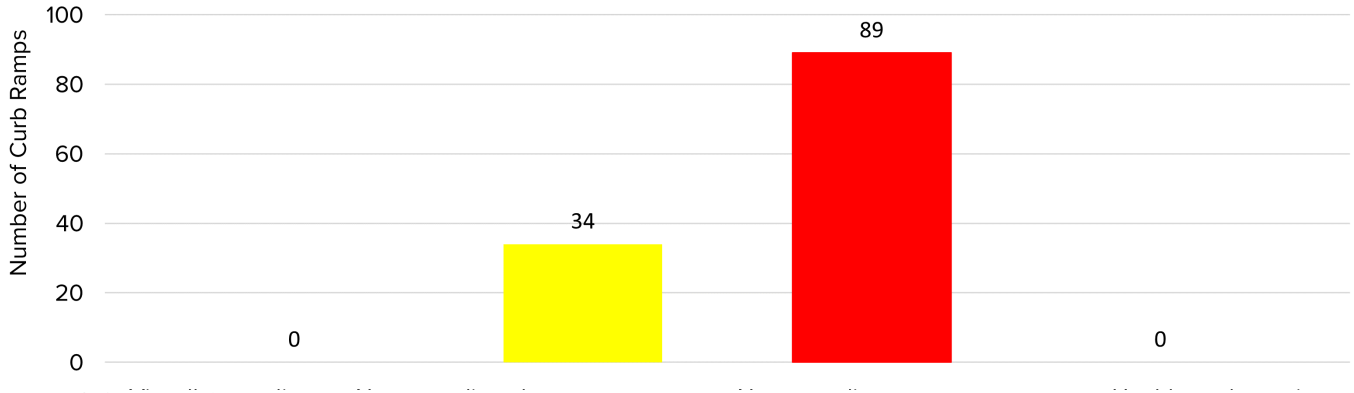


TABLE C-3: Zone 3 Maintenance

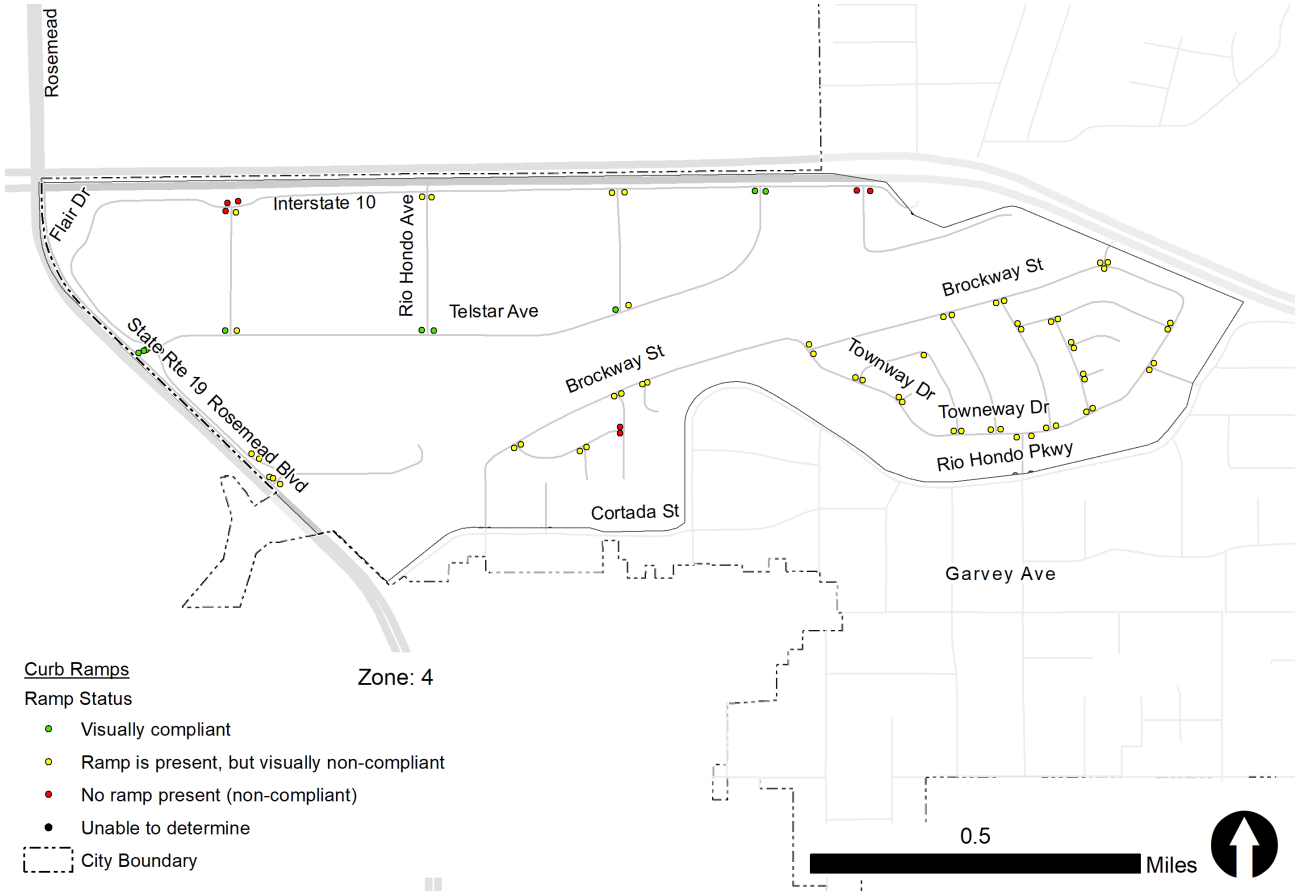


FIGURE C-4: Zone 4 Curb Ramps

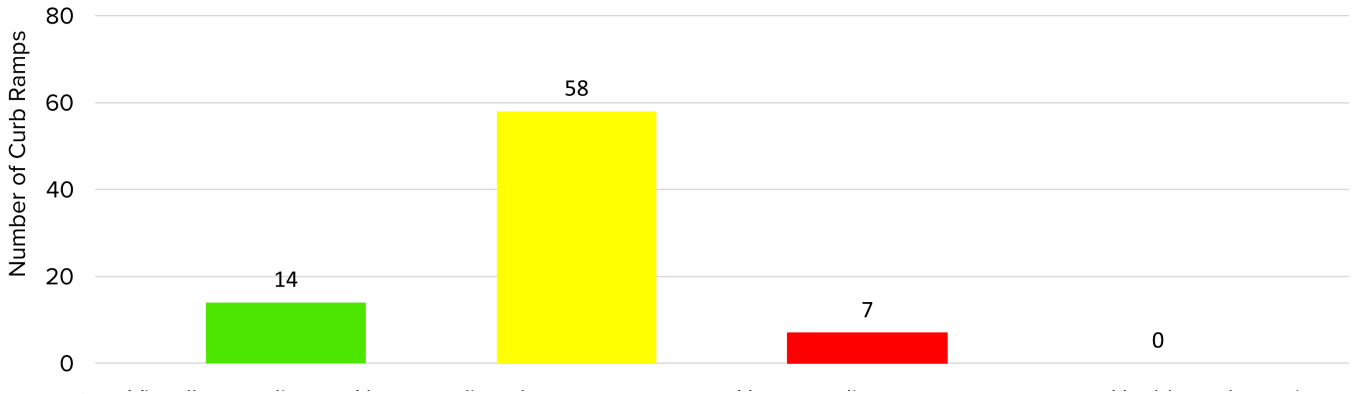


TABLE C-4: Zone 4 Maintenance

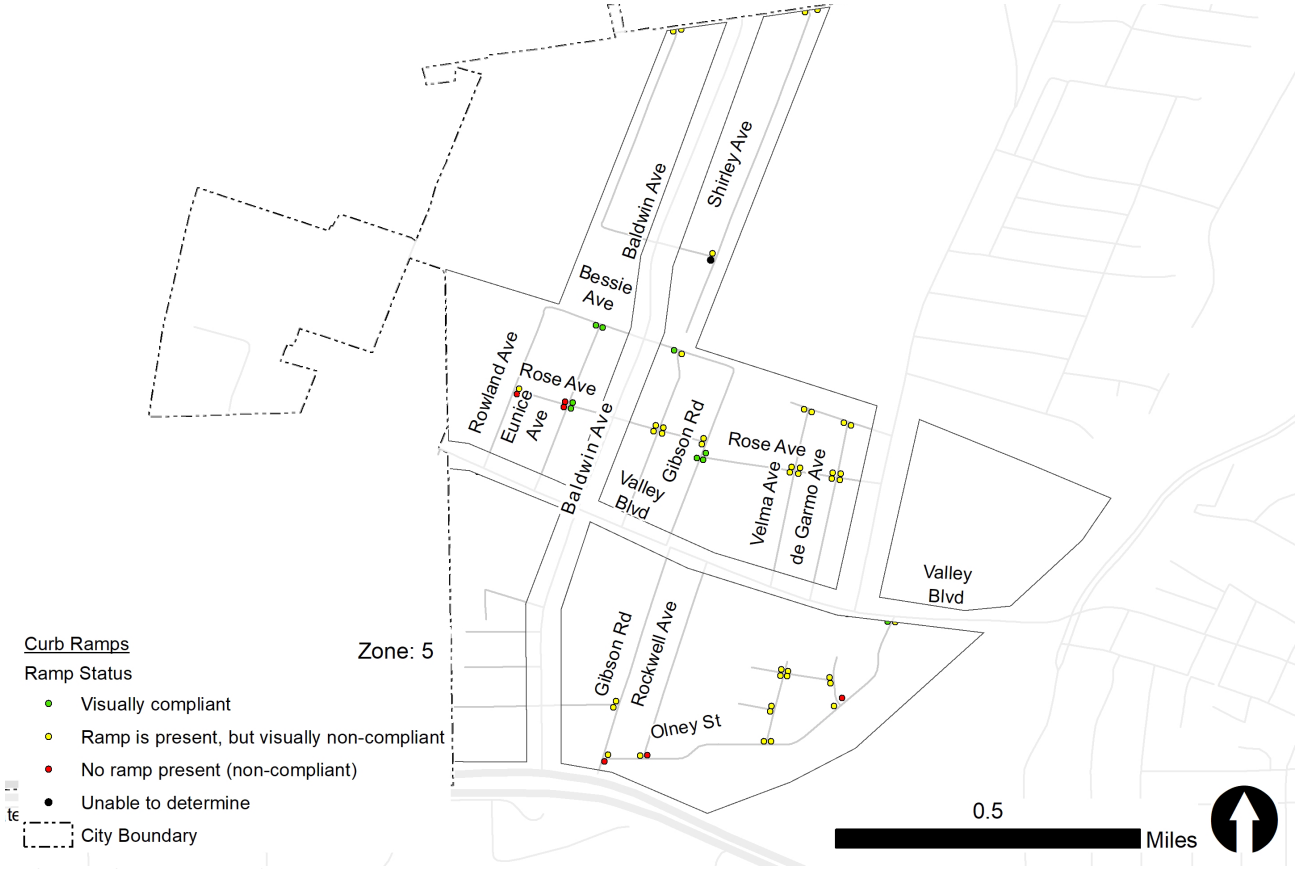


FIGURE C-5: Zone 5 Curb Ramps

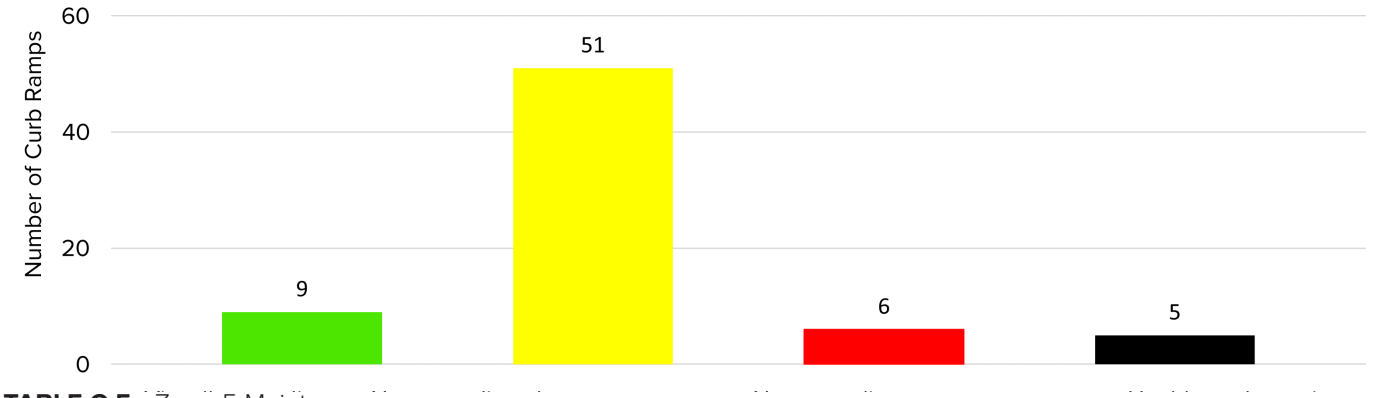


TABLE C-5: Zone 5 Maintenance

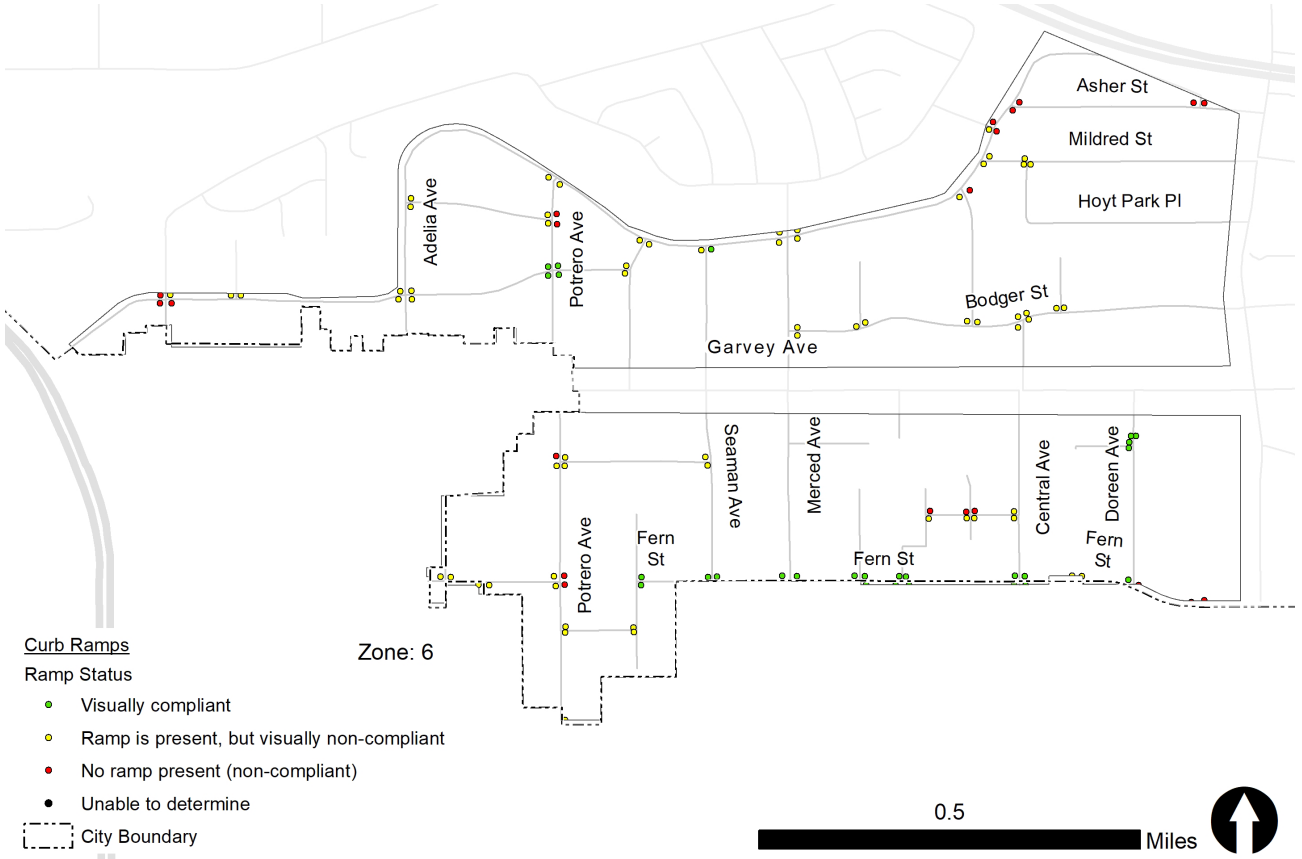


FIGURE C-6: Zone 6 Curb Ramps

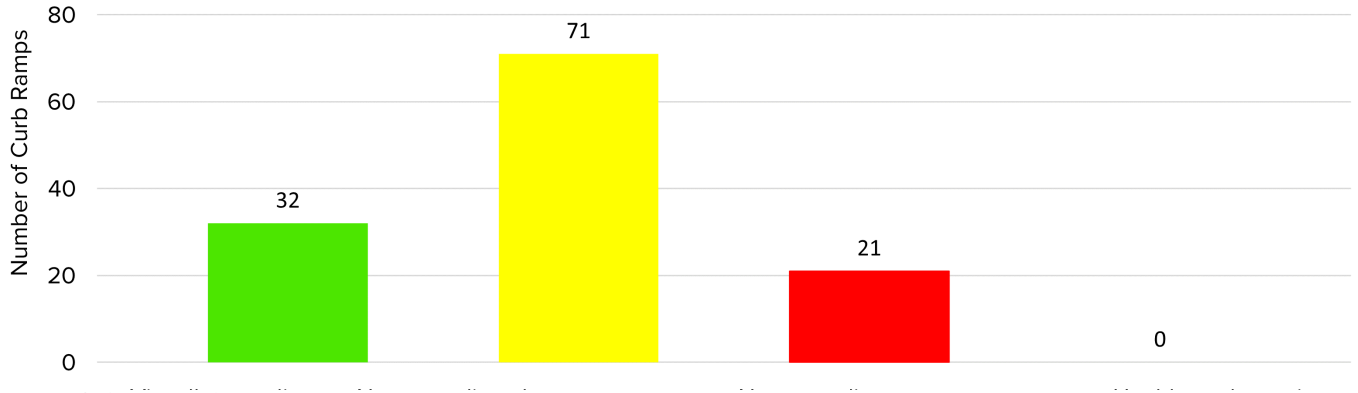


TABLE C-6: Zone 6 Maintenance

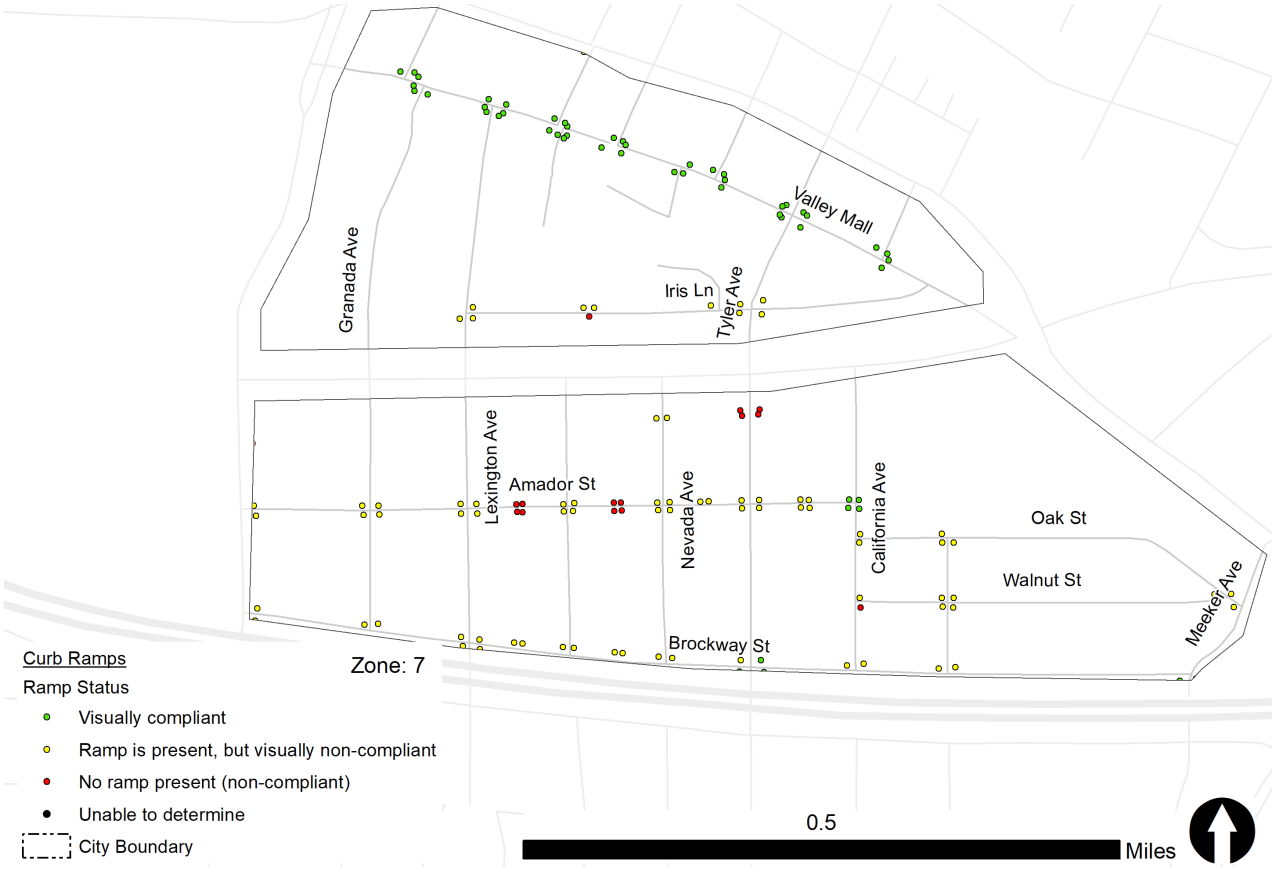


FIGURE C-7: Zone 7 Curb Ramps

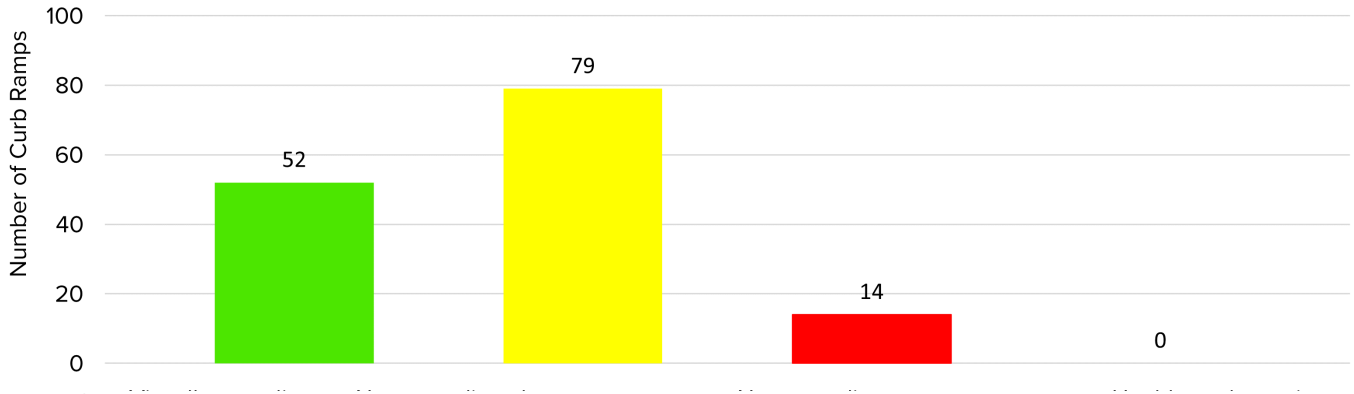


TABLE C-7: Zone 7 Maintenance

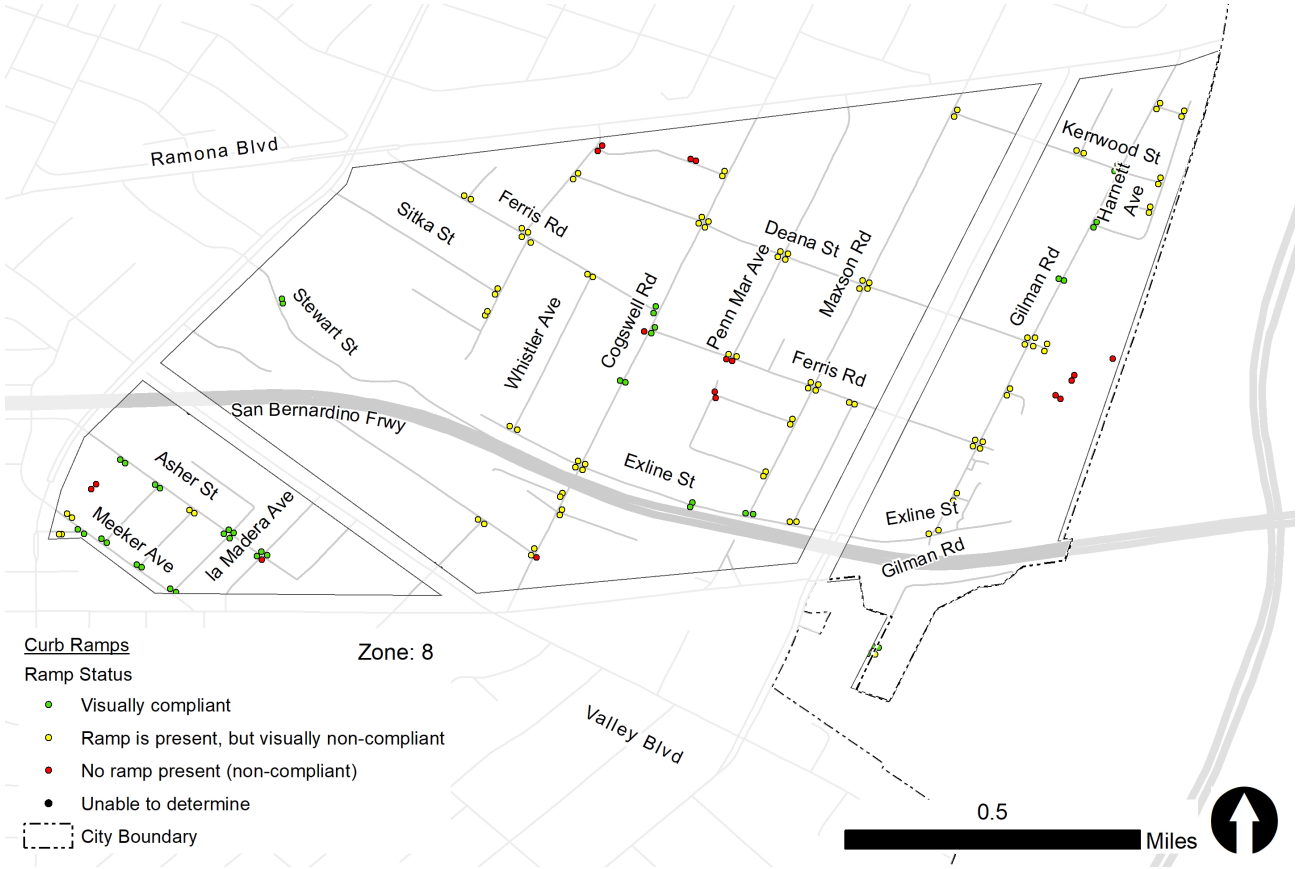


FIGURE C-8: Zone 8 Curb Ramps

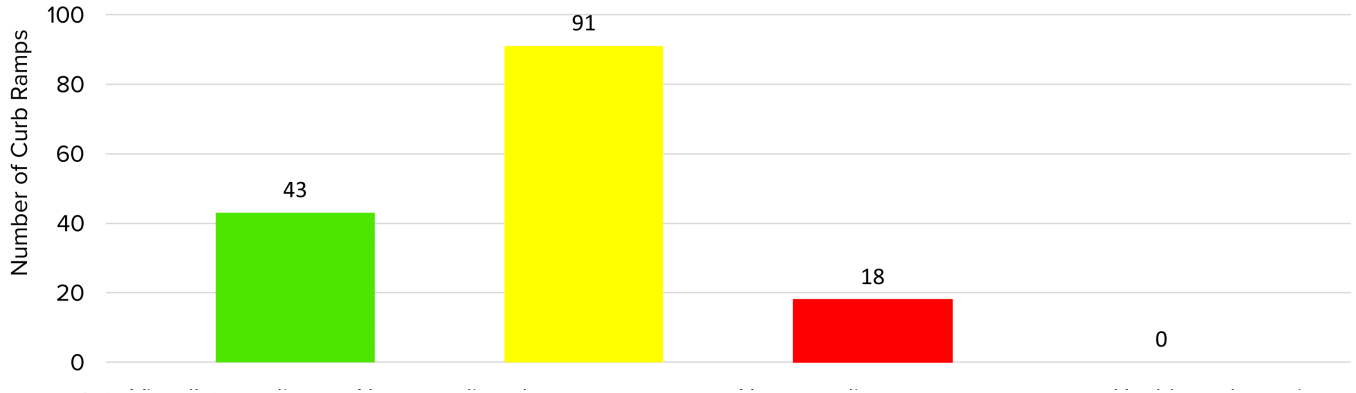


TABLE C-8: Zone 8 Maintenance

FIGURE C-9: Zone 9 Curb Ramps

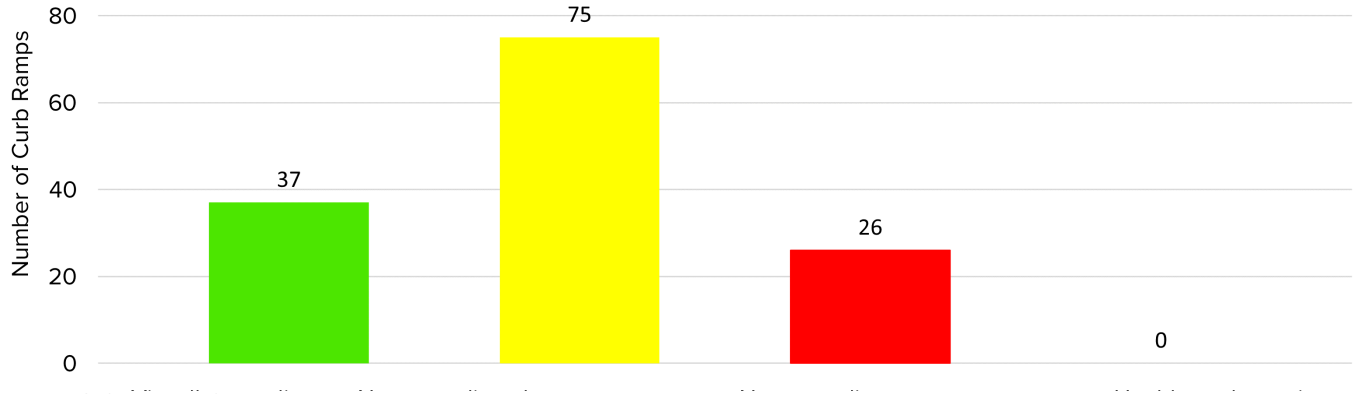


TABLE C-9: Zone 9 Maintenance

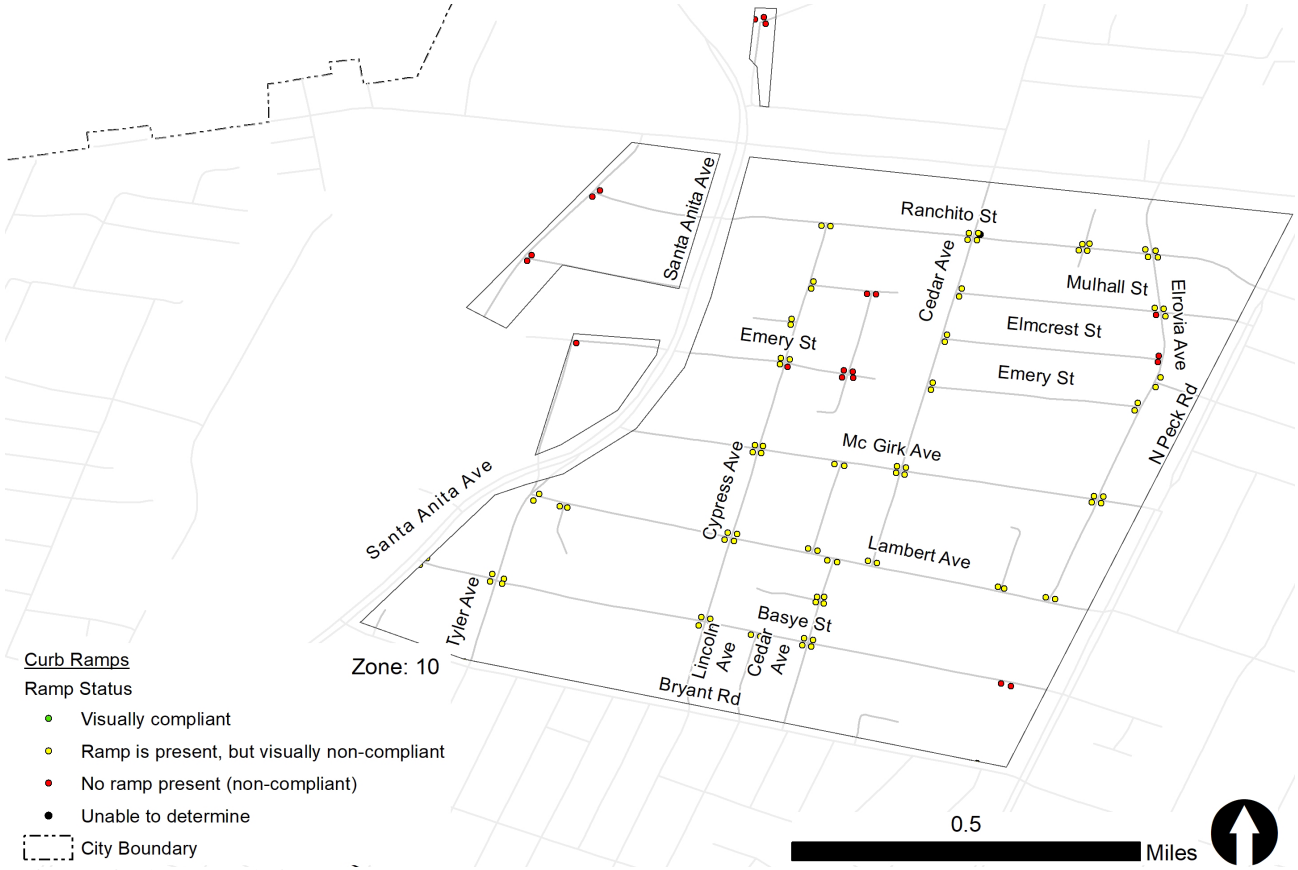


FIGURE C-10: Zone 10 Curb Ramps

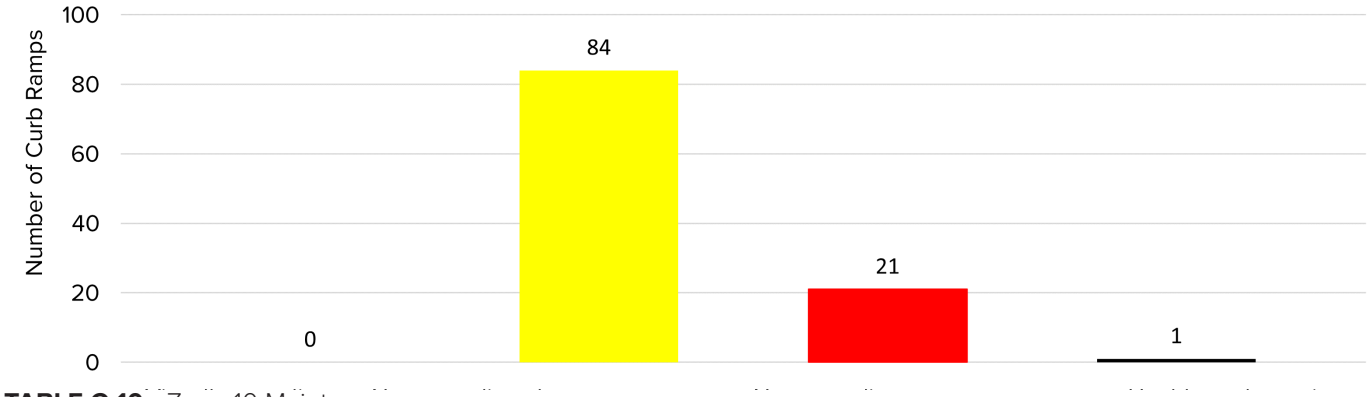


TABLE C-10: Zone 10 Maintenance

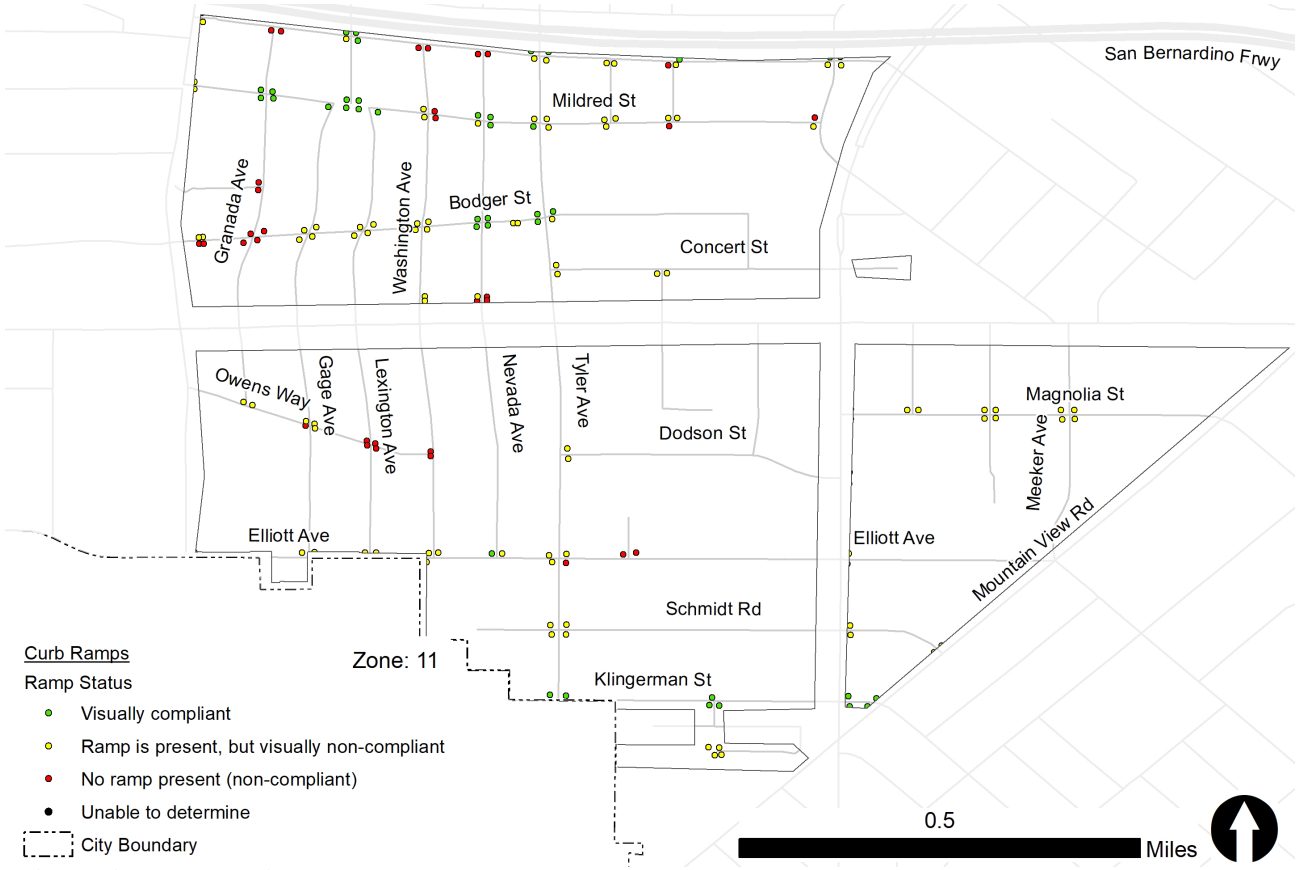


FIGURE C-11: Zone 11 Curb Ramps

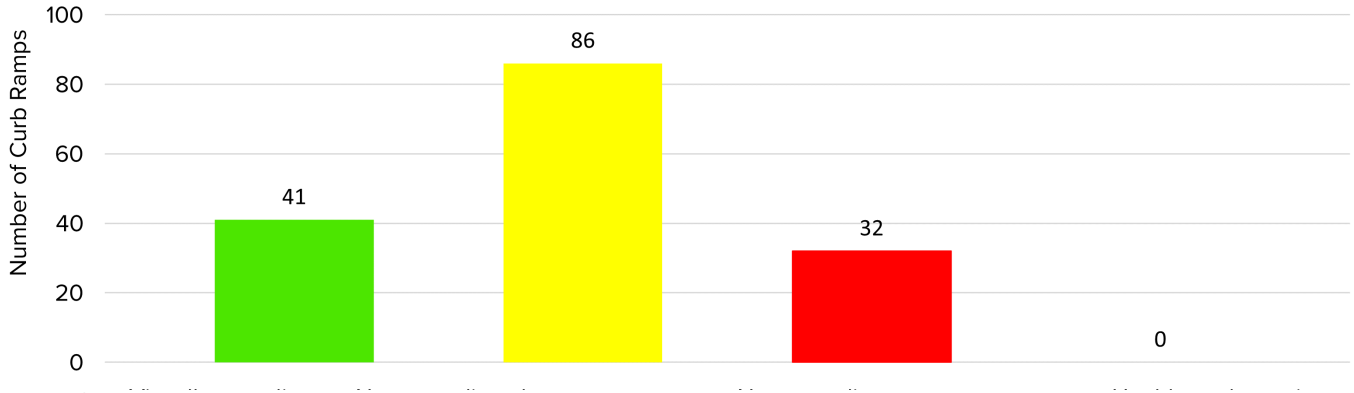


TABLE C-11: Zone 11 Maintenance

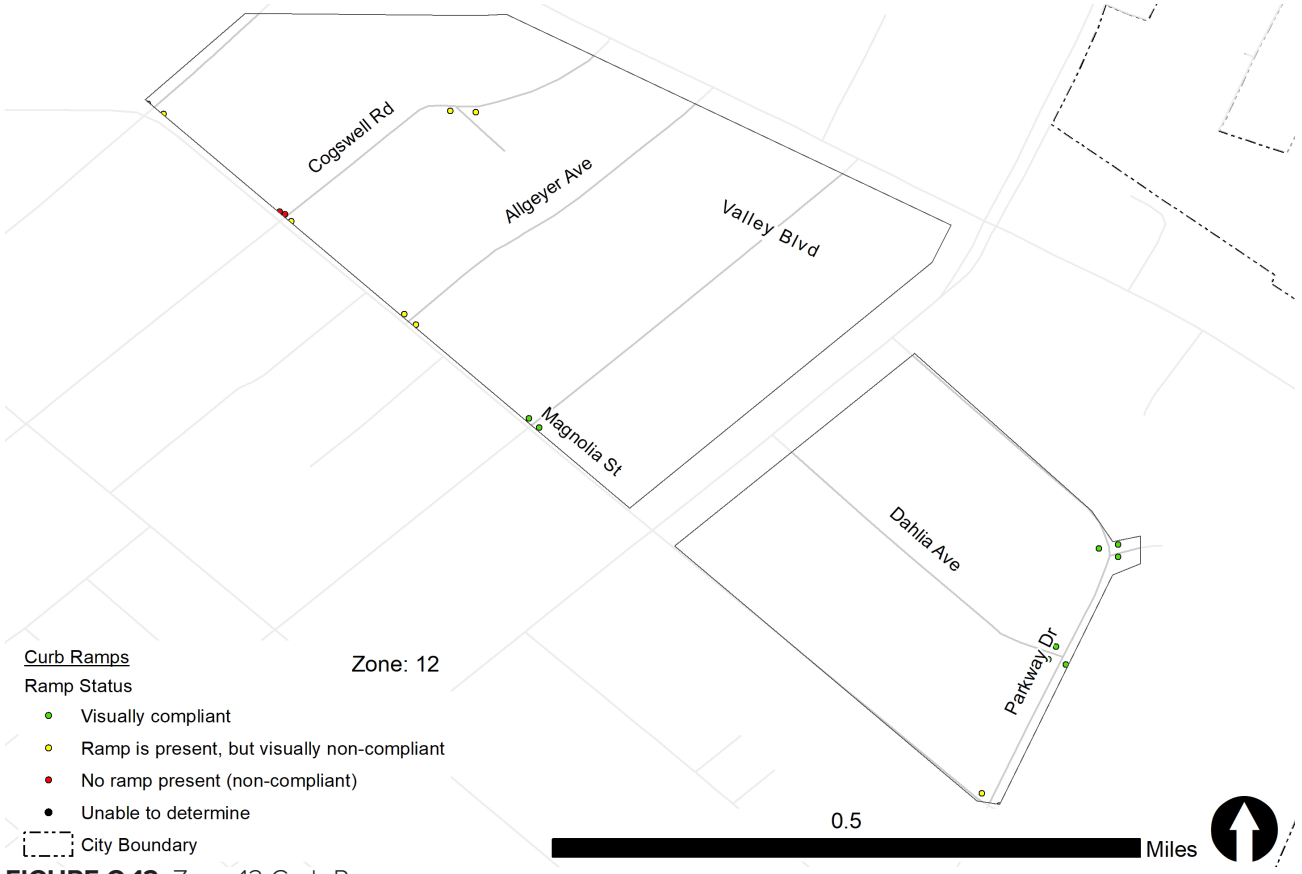


FIGURE C-12: Zone 12 Curb Ramps

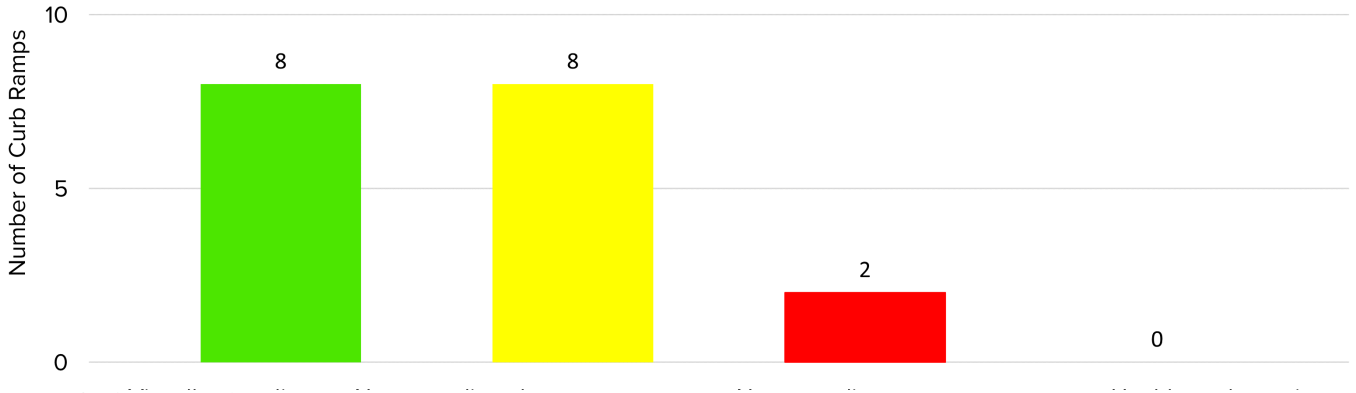


TABLE C-12: Zone 12 Maintenance

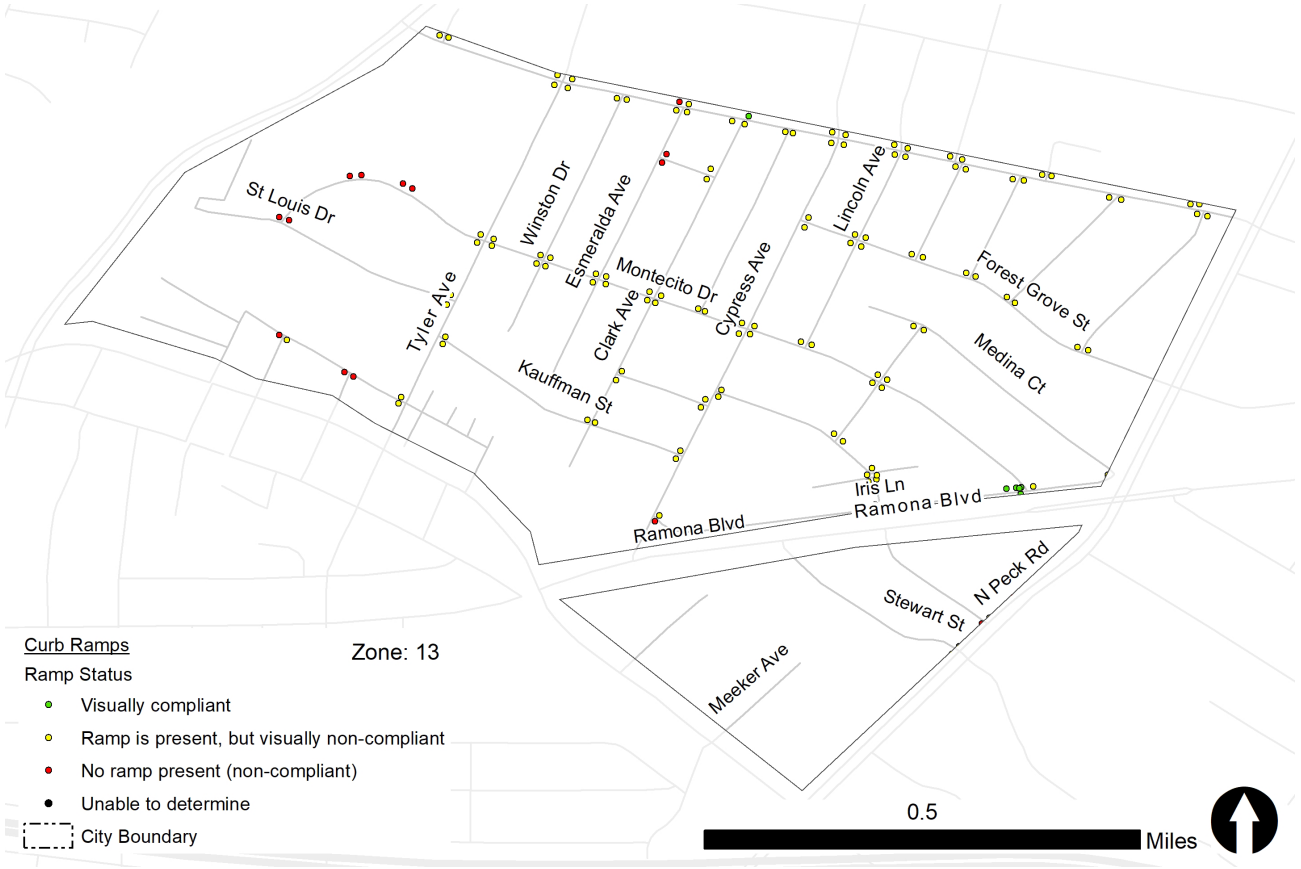


FIGURE C-13: Zone 13 Curb Ramps

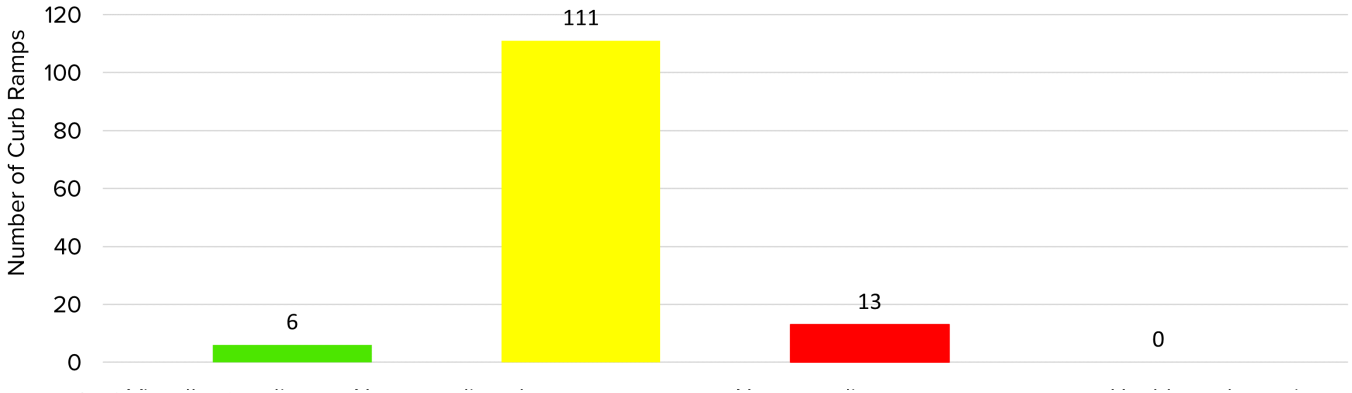


TABLE C-13: Zone 13 Maintenance

FIGURE C-14: Zone 14 Curb Ramps

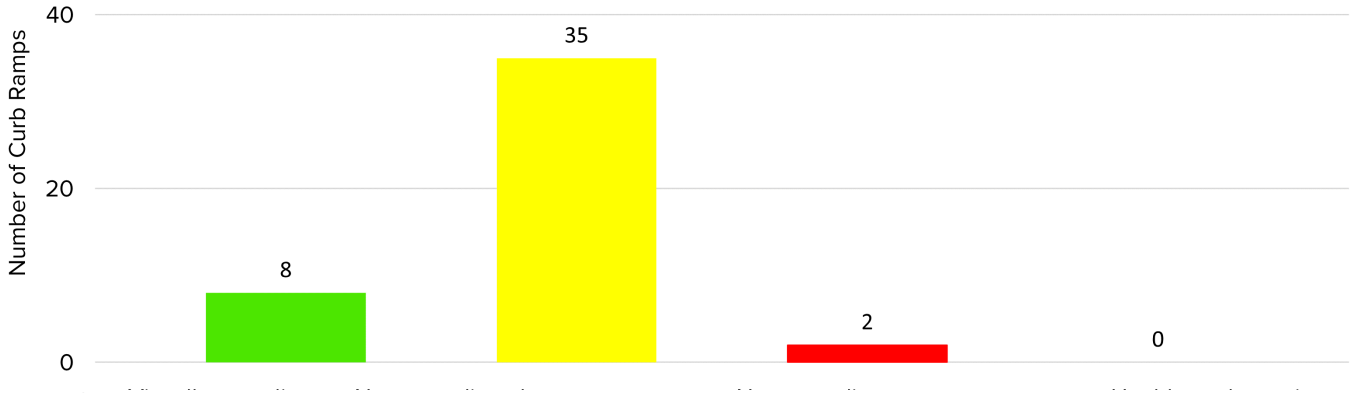


TABLE C-14: Zone 14 Maintenance

FIGURE C-15: Zone 15 Curb Ramps

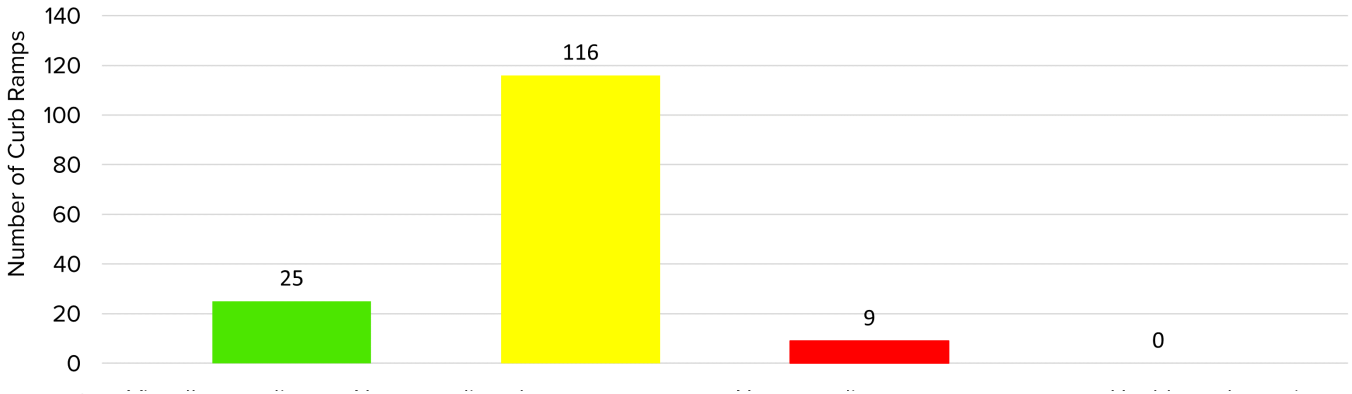


TABLE C-15: Zone 15 Maintenance

FIGURE C-16: Zone 16 Curb Ramps

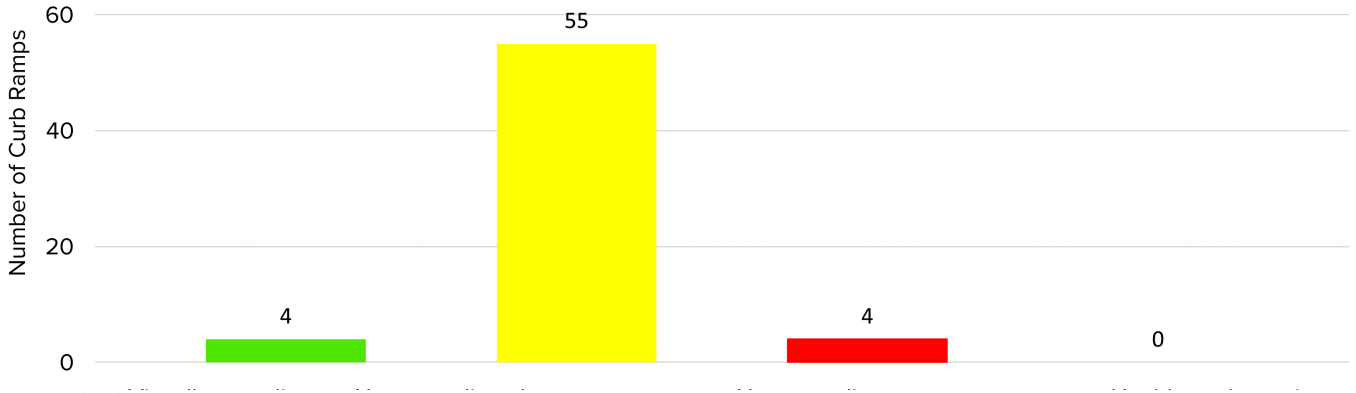


TABLE C-16: Zone 16 Maintenance

FIGURE C-17: Zone 17 Curb Ramps

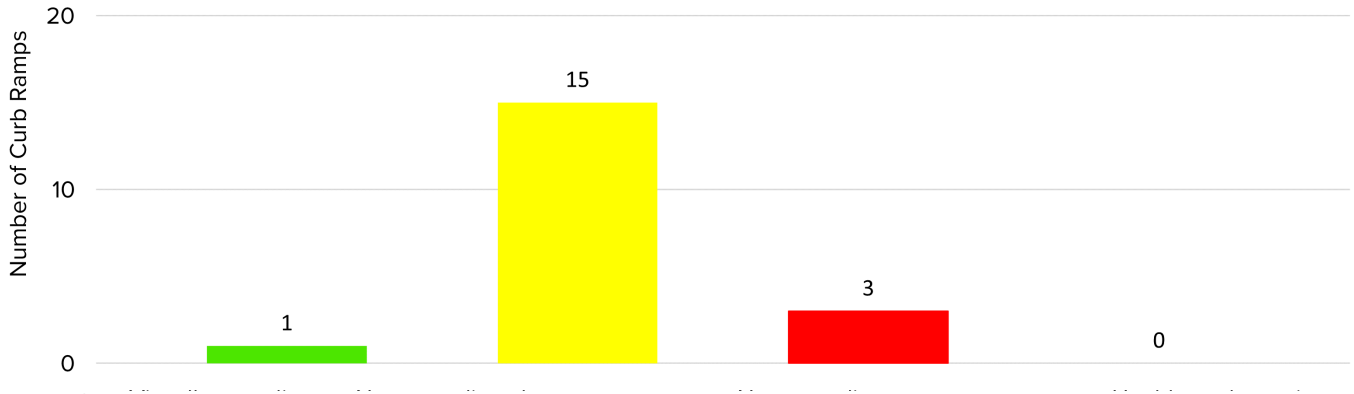


TABLE C-17: Zone 17 Maintenance

FIGURE C-18: Zone 18 Curb Ramps

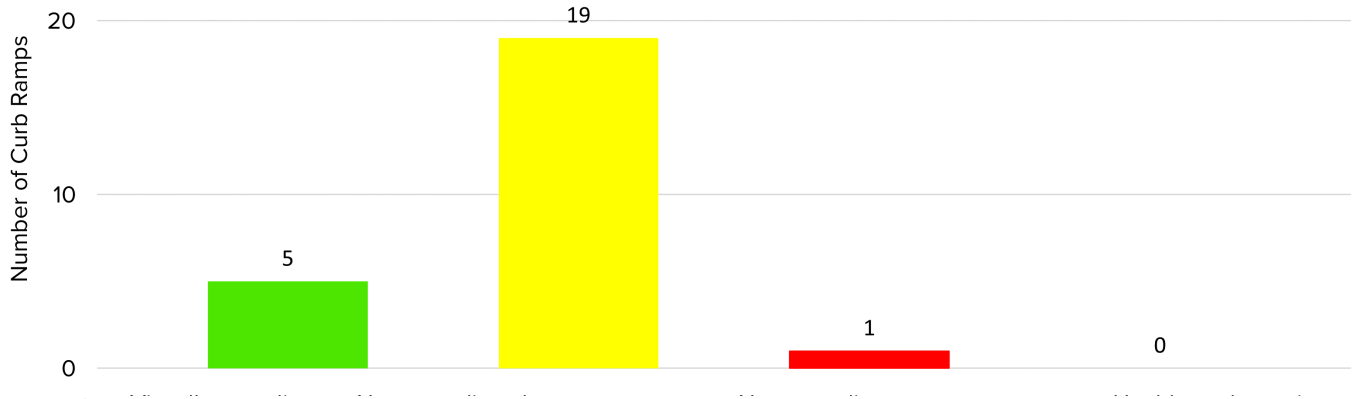


TABLE C-18: Zone 18 Maintenance

FIGURE C-19: Zone 19 Curb Ramps

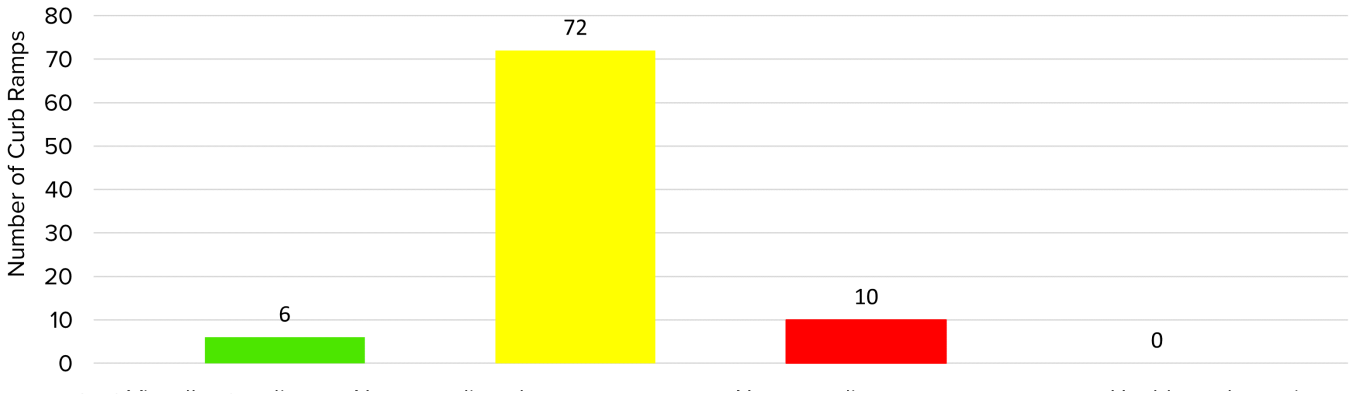


TABLE C-19: Zone 19 Maintenance

FIGURE C-20: Zone 20 Curb Ramps

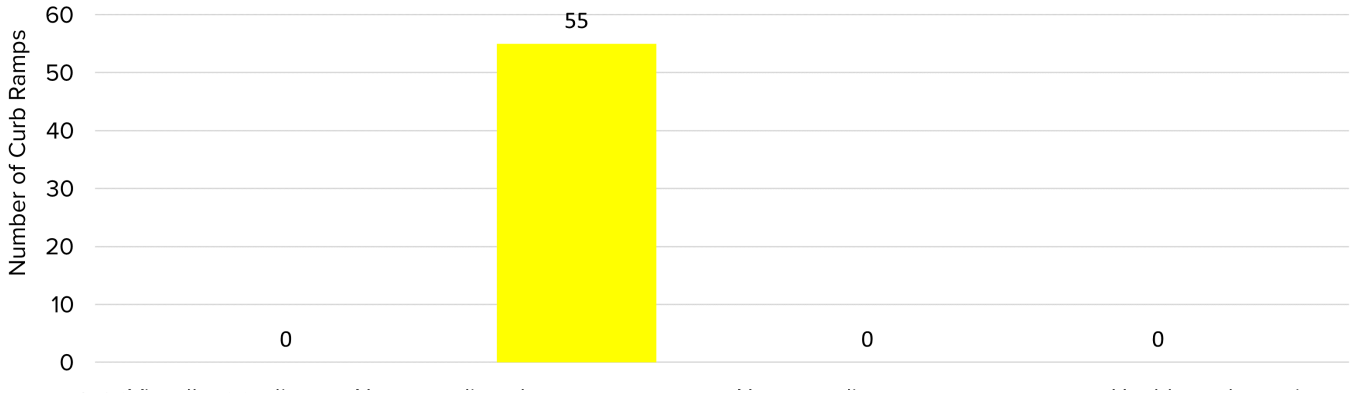


TABLE C-20: Zone 20 Maintenance

FIGURE C-21: Zone 21 Curb Ramps

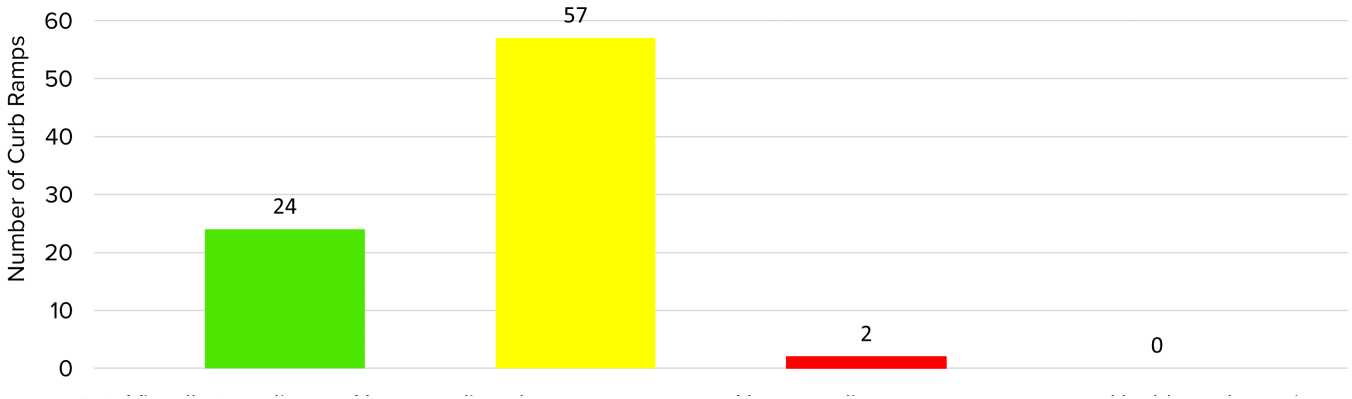


TABLE C-21: Zone 21 Maintenance

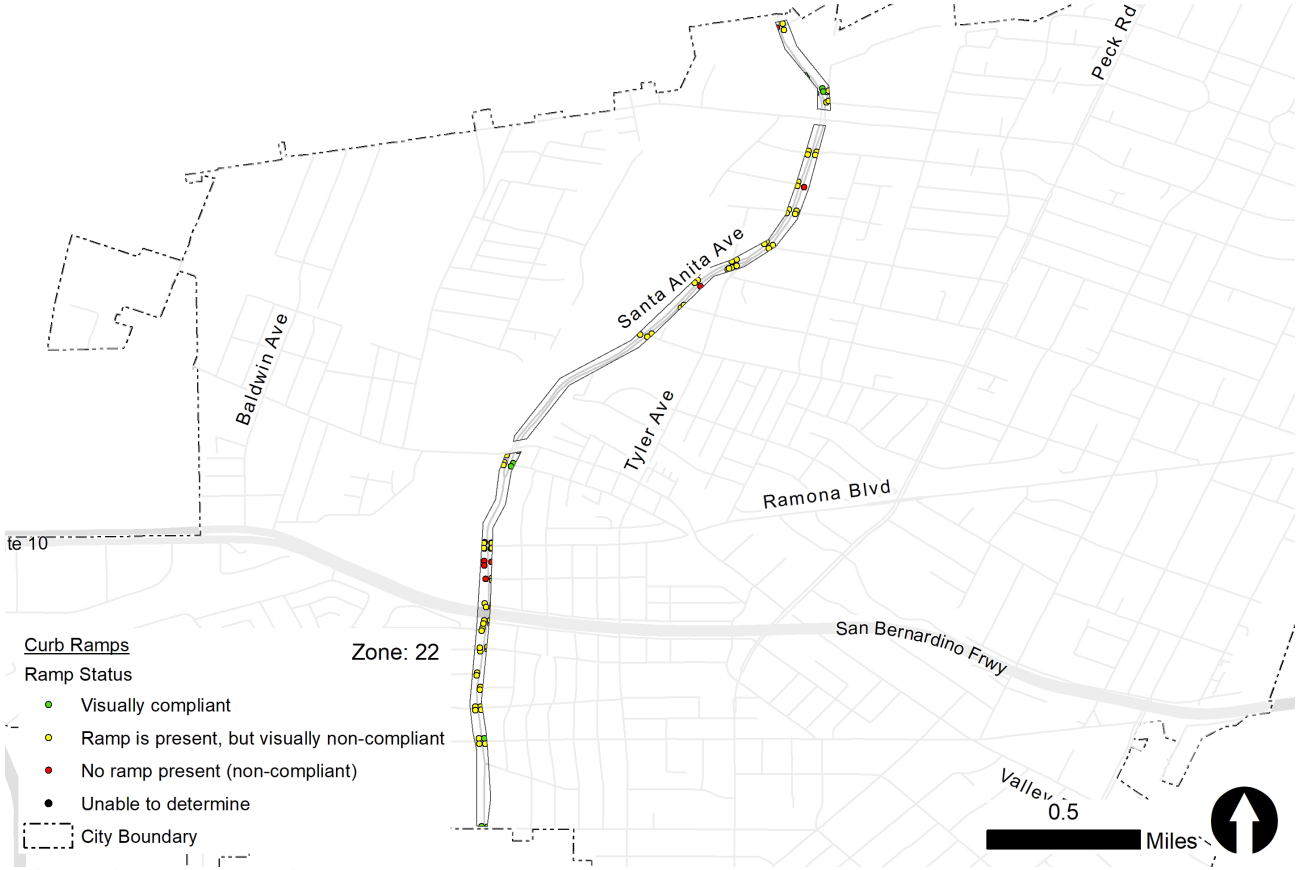


FIGURE C-22: Zone 22 Curb Ramps

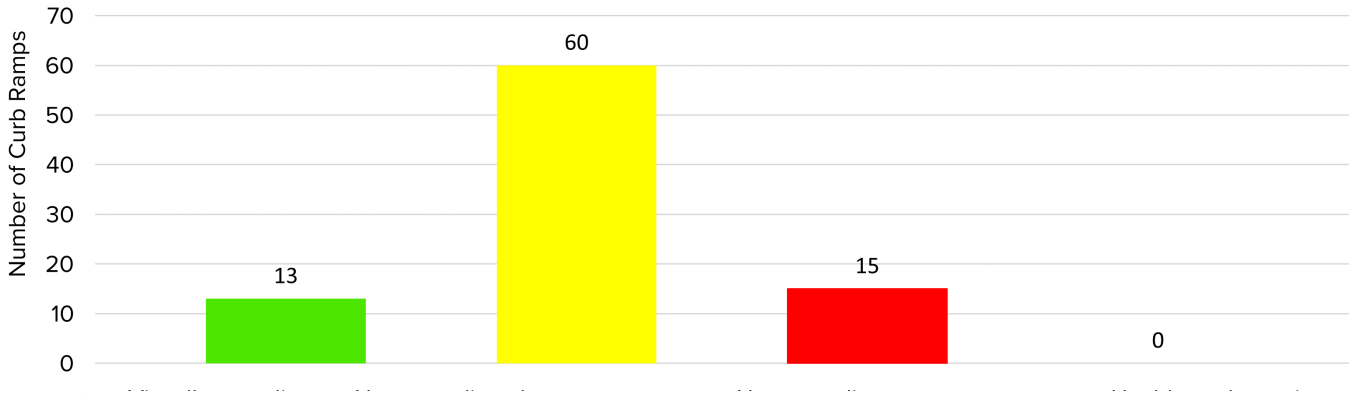


TABLE C-22: Zone 22 Maintenance