SBCTA Comprehensive Sidewalk Connectivity Plan – Phase II

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Introduction

The purpose of this study is to expand on the county-wide sidewalk inventory that aimed at establishing an inventory baseline for pedestrian infrastructure. Phase II of the Comprehensive Sidewalk Connectivity Plan set out to collect, analyze, and deploy a more refined, detailed inventory of pedestrian infrastructure to help agencies identify sidewalk gaps, pedestrian obstructions, and infrastructure deficiencies. More importantly, this study's intent is to support each agency's ongoing efforts to ensure compliance with the Americans with Disabilities Act (ADA) as it relates to pedestrian facilities within the public right-of-way.

The results of this study include a comprehensive pedestrian infrastructure database that is inclusive of sidewalks and curb ramps, with slope measurements, obstruction notes, and other attributes, traffic lines, tree centroids and canopy, off-street parking, and bike facilities extracted from high resolution aerial imagery, and supplemental data including transit facilities, schools and parks, and population and employment data. Additionally, all results were compiled into both a public- and local-facing ePlan developed as Esri Story Maps.

This report summarizes the data collection methodology, inventory process, agency engagement and inputs, and contents of the public- and local-facing ePlans.

Inventory Methodology and Engagement

Sidewalk and Curb Ramp Inventory

Agency Allocation

A subset of the 17,000 miles of sidewalk (approximately 6,800 of existing sidewalk) inventoried in Phase I and curb ramps were systematically surveyed for compliance with state, local, and Federal accessibility standards. Phase II called for 750 miles of existing sidewalk to be inventoried County-wide. These 750 miles of existing sidewalk are inclusive of 360 miles of existing sidewalk that was inventoried in Phase I as part of the detailed pedestrian obstruction inventory, and 390 miles of existing sidewalk that was not included in the Phase I inventory.

The Phase II sidewalk inventory allocation was based on a per capita approach to proportionately divide the 750 miles of sidewalk across each agency within the County. Population data was based on the 2019 American Community Survey 5-Year Estimates. Sidewalks were then selected in high pedestrian demand areas using a variety of trip generator datasets that included:

- Schools
- Transit Stops
- Population Density
- Employment Density

Once the initial sidewalk inventory allocation was complete, the project team developed an interactive web map (**Figure 1**) that was disseminated to the project advisory group to solicit feedback on the initial subset of sidewalks selected within their jurisdiction. The advisory group and member agencies either confirmed that the allocation was adequate or reallocated to different areas of their jurisdiction.

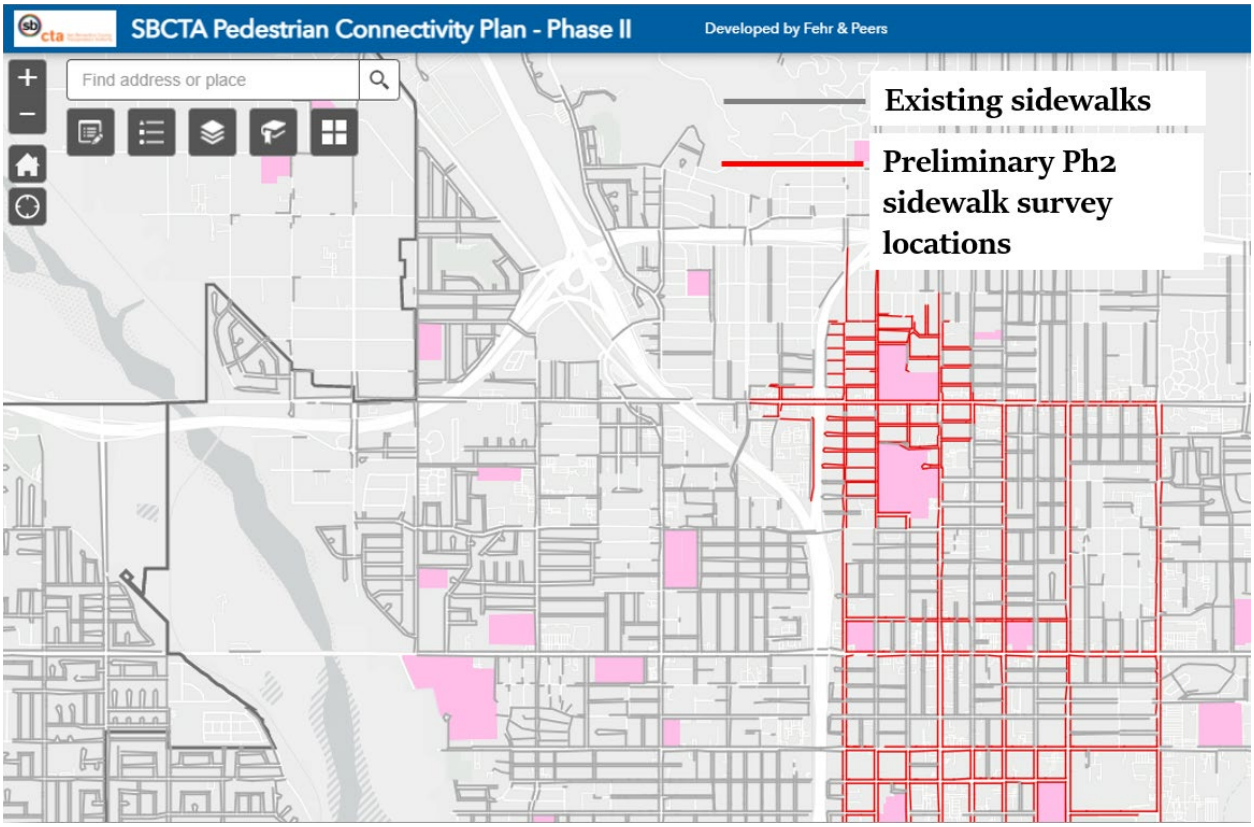

Figure 1: Sidewalk allocation advisory group feedback tool

Data Collection

The data collection team used a proprietary Public Rights of Way Assessment Process (PROWAP) Technology to efficiently and accurately assess the conditions that exist in the sidewalk environment. This field survey technology systematically evaluated the sidewalk surface and automating the process of discovering and documenting changes in level, horizontal openings, upheavals, or other pathway events that may pose a barrier or potential hazard in the sidewalk environment. The PROWAP system provided spatial information about the features discovered, including GPS data, a digital image, and the distance along the stroll path.

In conjunction with the sidewalk inventory, the data collection team surveyed a subset of curb ramps using a proprietary tool to measure the grade and cross slope of each element of the curb ramp. Upon completion of the curb ramp assessment, the spatial output was analyzed and indexed.

High Resolution Aerial Imagery Inventory

To supplement the sidewalk and curb ramp inventory, additional features within proximity to the pedestrian right-of-way were collected by leveraging artificial intelligence technology to extract data from high-resolution imagery. Features that were collected include:

- Road segment length
- Pavement width, curb face or edge of pavement
- Segment for each travel lane
- Presence of on-street bike lanes
- Presence of medians
- Tree canopy
- Tree centroid
- Truncated domes
- Bus shelters

Agency and Stakeholder Engagement

Throughout the project inventory, the project team hosted webinars with member agencies and unincorporated communities and advisory group meetings to provide status updates on the inventory and overall project progress. **Table 1** includes a list of meetings with the advisory group, member agencies, and unincorporated communities. Webinar and advisory group meeting agendas, notes, and participant lists were documented, and follow-up comments and suggestions were addressed and implemented. Subsequently, information on the status of the project and scope of work were regularly posted on the project website which can be found at the link below. The project website was curated as an Esri Story Map hosted on SBCTA's ArcGIS Online (AGOL). Updates to the project website required administrative access to SBCTA's AGOL to make modifications or add content to the website.

Project website link: https://storymaps.arcgis.com/stories/3d2db14441414655841b766872c98ec0

Table 1: Project webinars and meetings with advisory group and project stakeholders

Meeting	Meeting Date
Project Kickoff Meeting	April 29th, 2021
Transportation Technical Advisory Committee (TTAC)	May 3rd, 2021
Stakeholder Webinar	June 29th, 2021
SCAG ATWG	September 9th, 2021
TTAC	November 1st, 2021
TTAC	June 6th, 2022
Public and Specialized Transportation Advisory and Coordination Council (PASTACC)	June 14th, 2022
Planning and Development Technical Forum (PDTF)	July 27th, 2022
TTAC	August 1st, 2022
County Transit Agency Webinar	August 29th, 2022

Inventory Results

Sidewalks and Curb Ramps

The sidewalk and curb ramp inventory were consolidated into a file geodatabase post inventory. All metadata associated with each feature was also included to provide clarity on feature attributes. **Table 2** provides a feature count for each agency. Quality control measures were applied to ground truth the results of the inventory. For example, using the image associated with each sidewalk or curb ramp the project team confirmed whether the attributes of visible features (e.g., detectable warning surfaces or sidewalk obstructions) matched the image.

Table 2: Sidewalk and curb ramp feature counts by agency

Jurisdiction	2019 ACS 5-year Estimates Population	Existing Sidewalk (miles)	Phase II Sidewalk (miles)	Curb Ramps Inventoried
Adelanto	33,660	121	10.9	36
Apple Valley	72,726	74	22.4	75
Barstow	23,899	121	8.8	62
Big Bear Lake	5,241	12	1.1	4
Chino	89,631	361	27.4	186
Chino Hills	80,701	298	27.9	39
Colton	54,580	192	18.3	71
Fontana	210,759	766	71.8	119
Grand Terrace	12,510	43	4.8	49
Hesperia	94,203	127	28.8	65
Highland	55,049	185	18.7	19
Loma Linda	24,184	91	8.5	24
Montclair	39,155	132	13.9	72
Needles	4,965	31	1.4	6
Ontario	176,760	658	60.7	244
Rancho Cucamonga	176,379	711	63.8	108
Redlands	71,198	368	16.8	80
Rialto	103,045	398	36.4	108
San Bernardino	216,089	724	75.4	345
Twentynine Palms	26,147	28	8.3	40

Upland	76,596	343	24.2	65
Victorville	121,902	534	41.3	272
Yucaipa	53,416	146	19.1	46
Yucca Valley	21,622	14	6.1	31
County	304,614	327	96	518
Total	**2,149,031**	**6,803**	**712**	**2,684**

Sidewalk and Curb Ramp Data Attributes

In addition to sidewalk and curb ramp feature location, the inventory included a variety of detailed measurements and attributes including:

- Sidewalks
    - Cross slope
    - Running slope
    - Level change
    - Obstruction types
    - Feature image
- Curb ramps
    - Ramp type
    - Construction phase
    - Detectable Warning Surface (DWS)
    - Running slope
    - Cross slope
    - Flare slopes
    - Feature image

Composite Metrics

To make the data more digestible, a series of composite metrics were developed based purely on the level of physical deficiency detected during the evaluation.

Sidewalk Route Accessibility Index (RAI) - This composite metric takes into account level change, cross slope, running slope, and roughness. It is intended that an RAI of 1 is the threshold between acceptable and unacceptable. However, an RAI can have a rating less than 1 while that segment could be ADA non-compliant for other reasons.

Sidewalk Pavement Score - The condition of a particular segment based on the maximum level change and maximum roughness. The range is from 0-100, with 100 being in excellent condition.

Curb Ramp Compliance - This composite metric takes the following factors into account to assess curb ramp compliance:

- Construction phase (constructed or missing)
- Presence of DWS
- Ramping running slope and cross slope
- Flare running slope

Based on these factors, the following ADA compliance categories are defined:

- Missing: no curb ramp exists
- Non-compliant and requires full reconstruction: ramp slope is non-compliant
- Non-compliant and requires minor repairs: ramp is missing DWS but slopes are compliant
- Compliant: ramp has DWS and slopes are compliant
- Needs further review: needs further field review to determine compliance or non-compliance of ramp

The data collected during this phase of the self-evaluation process can facilitate the agency in developing a pedestrian barrier removal schedule.

At a high level, the RAI is developed to pinpoint where sidewalk and curb ramp deficiencies are most severe, indicating a greater priority to remediate existing access issues. Additionally, the agency can pinpoint sidewalk deficiencies at a more specific scale by looking at ADA compliance using standalone measurements such as cross slope, level change, horizontal clearance, and uplift.

Pinpointing curb ramp deficiencies can be driven by using the curb ramp compliance composite metric. The agency can also identify curb ramp deficiencies at a more specific scale by looking at compliance using standalone measurements and factors such as ramp running and cross slope, flare running slope, and presence of DWS.

Additionally, to enable the ability to for agencies to update their sidewalk and curb ramp data as deficiencies are remediated in the future each dataset has an overwrite ability where users can manually update the sidewalk RAI or curb ramp compliance and provide an update date.

Other Potential Prioritization Metrics

Although the sidewalk and curb ramp data indicate priority and highlights deficiencies, the agency can adopt additional strategies for developing a schedule for prioritizing the removal of pedestrian barriers. Below are some additional factors that the agency can consider:

- Gaps in the existing sidewalk network
- Age of the facility
- Proximity to high pedestrian demand land uses (schools, transit stops, commercial districts, etc.)

High-Resolution Aerial Imagery Data

Features extracted through the high-resolution aerial imagery extraction pipeline were consolidated into a file geodatabase alongside the sidewalk and curb ramp inventory. All metadata associated with each feature was also included to provide clarity on what feature attributes represent.

Public- and Local-Facing ePlans

The project plans adopted a two-pronged approach that developed both a public-facing and local-facing plan. Each plan was developed as an "ePlan" using Esri Story Maps designed to enable the ability to engage deeply with geospatial data while providing a detailed narrative about the project processes and data collection effort.

Public-Facing ePlan

The Public-Facing ePlan was initially developed as part of Phase I of this project, under the Active San Bernardino Open Data Portal which is hosted and managed within SCBTA's AGOL. This ePlan contains content related to biking, walking, and taking transit in San Bernardino County as well as Safe Routes to School Planning and community demographics and environment characteristics.

Phase II expanded on the contents of Phase I within Public-Facing ePlan by providing a detailed overview of the sidewalk and curb ramp inventory methodology and an interactive web map to allow users to visualize where data was collected within each jurisdiction (**Figure 2**).

The Public-Facing ePlan and its underlying components (web maps and web applications) can be modified and updated with administrative access to SBCTA's AGOL. If updates to the underlying data called by one or more web maps or web applications within the ePlan are needed, the existing service hosted on SBCTA's GIS Server would need to be overwritten. The changes would then be reflected within the respective components of the ePlan.

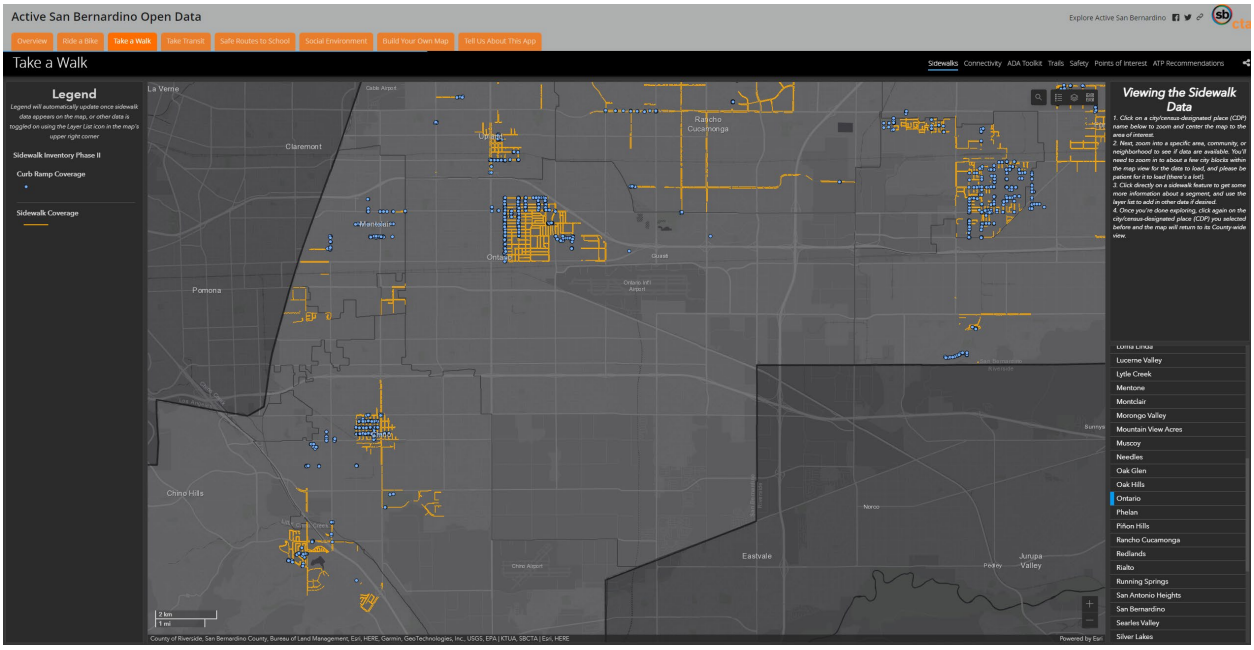

Figure 2: Public-Facing ePlan interactive web map

Local-Facing ePlan

The Local-Facing ePlan was developed as a means for each member agency to fully engage with the data inventory. Each member agency was provided private access to a custom ePlan that contains information specifically related to their jurisdiction that includes a high-level sidewalk and curb ramp data snapshot, guidance on ADA Transition Planning, a full menu of feature attributes and what they represent (described in the Inventory Results section above), an interactive web application, and a sample schedule for barrier removal. Each Local-Facing ePlan is hosted within SBCTA's ArcGIS Portal which is under the Enterprise subscription. A Portal Group was created for each member agency which allowed for agencies to only access their own Local-Facing ePlan. Updates and modifications to the ePlans can be done similarly to the Public-Facing ePlan. The Local-Facing ePlans underwent multiple revisions per comments from the advisory group and staff from the respective member agency.

Sidewalk and Curb Ramp Data Snapshots

The sidewalk and curb ramp data snapshots provide a high level overview of the inventory results for each jurisdiction which includes a breakdown of sidewalk priority and ADA compliance, and curb ramp compliance and type. **Figures 3** and **4** show an example of the sidewalk and curb ramp data snapshots.

Metric		Sidewalk Inventoried (Miles)	Percent of Inventoried Sidewalk
Sidewalk Inventoried		712.5	NA
Sidewalk Priority	Very Low (<0.75)	642.8	90.2%
	Low (0.75-1)	41.2	5.8%
	Medium (1-3)	25.5	3.6%
	High (3-5)	1.6	0.2%
	Very High (5+)	1.0	0.1%
Pavement Score	Low (<1)	707.3	99.3%
	Medium (1-3)	4.4	0.6%
	High (3+)	0.4	0.1%
Level Change	Acceptable (<0.25 in.)	516.5	72.5%
	Acceptable if has appropriate bevel (0.25 - 0.5 in)	168.4	23.6%
	Unacceptable (>0.5 in.)	27.2	3.8%
Non-Compliant Cross Slope (%)		236.7	33.2%
Non-Compliant Running Slope (%)		87.1	12.2%

Figure 3: Local-Facing ePlan sidewalk data snapshot

Metric		Curb Ramp Count	Percent of Inventoried Curb Ramps
Curb Ramps Inventoried		2684	NA
Ramp Compliance	Curb ramp is compliant	280	10.4%
	Curb ramp requires minor repairs (installation of DWS)	131	4.9%
	Curb ramp requires full reconstruction	1617	60.2%
	Missing curb ramp	521	19.4%
	Broken curb ramp	1	0.0%
	Needs Further Review	134	5.0%
Curb Ramp Type (Caltrans)	Case A	1141	42.5%
	Case A Median	2	0.1%
	Case B Median	15	0.6%
	Case C	836	31.1%
	Case F	110	4.1%
	Other	580	21.6%

Figure 4: Local-Facing ePlan curb ramp data snapshot

The sidewalk, curb ramp, and high-resolution aerial imagery inventory results were displayed in an interactive web application (**Figure 5**) that allows agency staff to specifically pinpoint pedestrian infrastructure deficiencies.

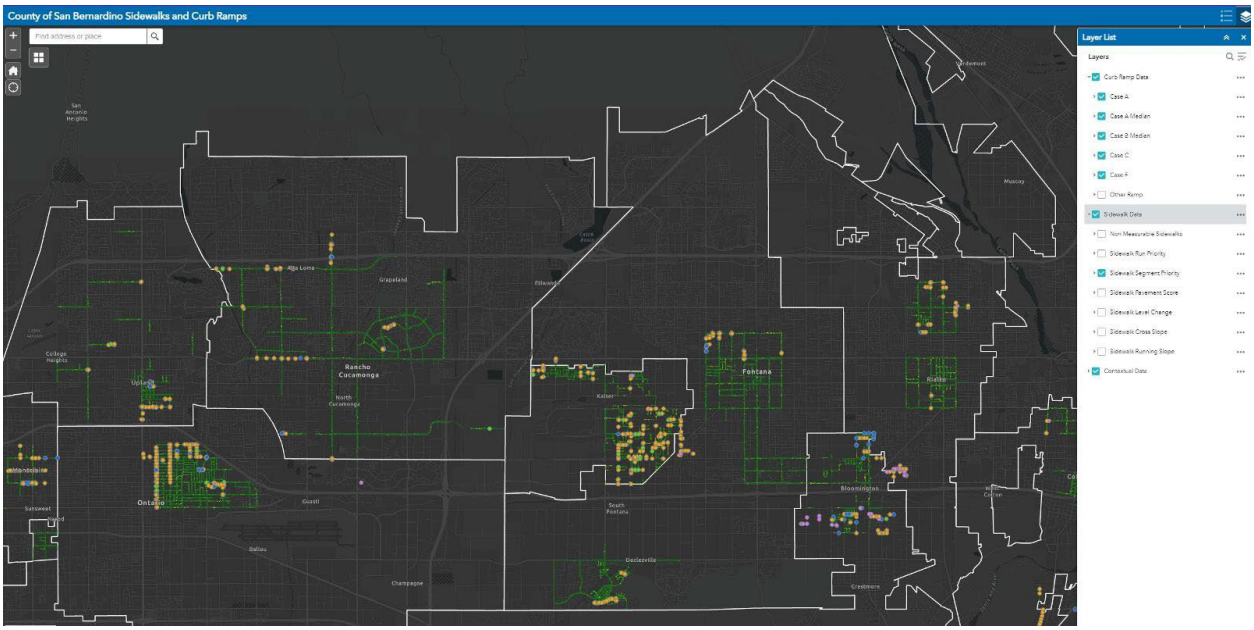

Figure 5: Local-Facing ePlan sidewalk and curb ramp data web application

ADA Transition Plan Guidance

The ADA is one of the most comprehensive pieces of civil right legislation that prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to participate in the mainstream of life – to enjoy employment opportunities, purchase goods and services, and participate in State and local government programs and services. It is required that all public agencies adopt a transition plan. This section of the ePlan outlines the components needed to implement an ADA Transition Plan. It provides an overview of the following:

- Designating an ADA Coordinator:
- Providing Public Notice
- Developing a Grievance Procedure
- Conducting a Self-Evaluation
- Implementing a Transition Plan

Additionally, creating a schedule for removing pedestrian barriers along the facilities in the public right-of-way requires a clear understanding of citywide deficiencies, a prioritized list of improvements, cost estimates for improvements, and an available annual budget to implement improvements. Each ePlan

includes a sample ADA Transition Plan schedule for each agency to work from when implementing their own Transition Plan.