UC Berkeley
Research Reports

Title
Bridging the Gap: Enhancing Access to the San Francisco Bay Trail

Permalink
https://escholarship.org/uc/item/3cs7n1fg

Author
Arusei, Edgar

Publication Date
2025-05-01

eScholarship.org Powered by the California Digital Library
University of California



UC Berkeley
Institute of
Transportation Studies

BRIDGING THE GAP

Enhancing Access to the San Francisco Bay Trail

Author Edgar Arusei, University of California, Berkeley

Advisor Zachary Lamb, University of California, Berkeley

May 2025

UCB-ITS-PSR-2025-05

Pacific Southwest Region UTC
University Transportation Center

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. UCB-ITS-PSR-2025-05	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle Bridging the Gap: Enhancing Access to the San Francisco Bay Trail		5. Report Date May 2024
		6. Performing Organization Code: ITS Berkeley
7. Author(s) Edgar Arusei		8. Performing Organization Report No. N/A
9. Performing Organization Name and Address Institute of Transportation Studies (ITS Berkeley) University of California, Berkeley 109 McLaughlin Hall MC1720 Berkeley CA 94720-1720		10. Work Unit No. N/A
		11. Contract or Grant No. USDOT Grant 69A3551747109
12. Sponsoring Agency Name and Address U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology 1200 New Jersey Avenue, SE, Washington, DC 20590		13. Type of Report and Period Whitepaper (August 2023 - May 2024)
		14. Sponsoring Agency Code USDOT OST-R
15. Supplementary Notes		

16. Abstract

This study investigates first- and last-mile connectivity to existing segments of the San Francisco Bay Trail (SFBT) in historically underserved Bay Area communities, with a detailed case study in Richmond, California. Although 70 percent of the 350-mile trail network is complete, physical barriers, freeways, freight rail lines, industrial zones, and insufficient pedestrian and bicycle infrastructure prevent low-income and minority neighborhoods from accessing the trail safely and directly. Employing a mixed-methods framework, a comprehensive literature review was first conducted to synthesize evidence on greenway benefits and equity frameworks. A regional GIS analysis was then performed to identify spatial disconnects between trail alignments and MTC Equity Priority Communities and BCDC Communities of Concern. Stakeholder interviews and community feedback from the MTC's Bay Trail Equity Strategy Initiative were also synthesized. Six connector corridors in Richmond were subsequently selected for standardized field audits, which scored sidewalk continuity, bicycle facilities, crossing conditions, signage, lighting, and land-use context at both segment and intersection scales.

Findings reveal pervasive "hostile edge" conditions, high-speed traffic without buffers, missing or narrow sidewalks, under-designed crossings, blank industrial frontages, fragmented bike lanes, and absent wayfinding, that disproportionately impact low-resource areas. Based on these insights, a phased toolkit of interventions was developed, spanning immediate low-cost measures, mid-term infrastructure upgrades, and long-term investments, to guide agencies in advancing equitable trail access across the Bay Area.

17. Key Words Bikeways, Pedestrian areas, Greenways, Accessibility, Underserved communities, Built environment	18. Distribution Statement No restrictions		
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 101	22. Price N/A

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized.

About the Pacific Southwest Region University Transportation Center

The Pacific Southwest Region University Transportation Center (UTC) is the Region 9 University Transportation Center funded under the US Department of Transportation's University Transportation Centers Program. Established in 2016, the Pacific Southwest Region UTC (PSR) is led by the University of Southern California and includes the following partners: California State University, Long Beach, Northern Arizona University, Pima Community College, University of California, Berkeley, University of California, Davis, University of California, Irvine, University of California, Los Angeles, University of Hawaii, and University of Nevada, Las Vegas.

The Pacific Southwest Region UTC conducts an integrated, multidisciplinary program of research, education and technology transfer aimed at *improving the mobility of people and goods throughout the region.* The program is organized around four themes: 1) technology to address transportation problems and improve mobility; 2) improving mobility for vulnerable populations; 3) Improving resilience and protecting the environment; and 4) managing mobility in high growth areas.

US Department of Transportation Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated in the interest of information exchange. The report is funded, partially or entirely, by a grant from the US Department of Transportation's University Transportation Centers Program. However, the US Government assumes no liability for the contents or use thereof.

Disclosure

This research took place at the University of California, Berkeley from September 2024 to May 2025 and was supported by a grant under the Pacific Southwest Region University Transportation Center research program in the amount of $7,500.

Bridging the gap:
Enhancing access to the San Francisco Bay Trail.

By:

Edgar Arusei

PROFESSIONAL REPORT

Submitted in partial satisfaction of the requirements of the degree

of

MASTER OF CITY PLANNING

in the

Department of City and Regional Planning

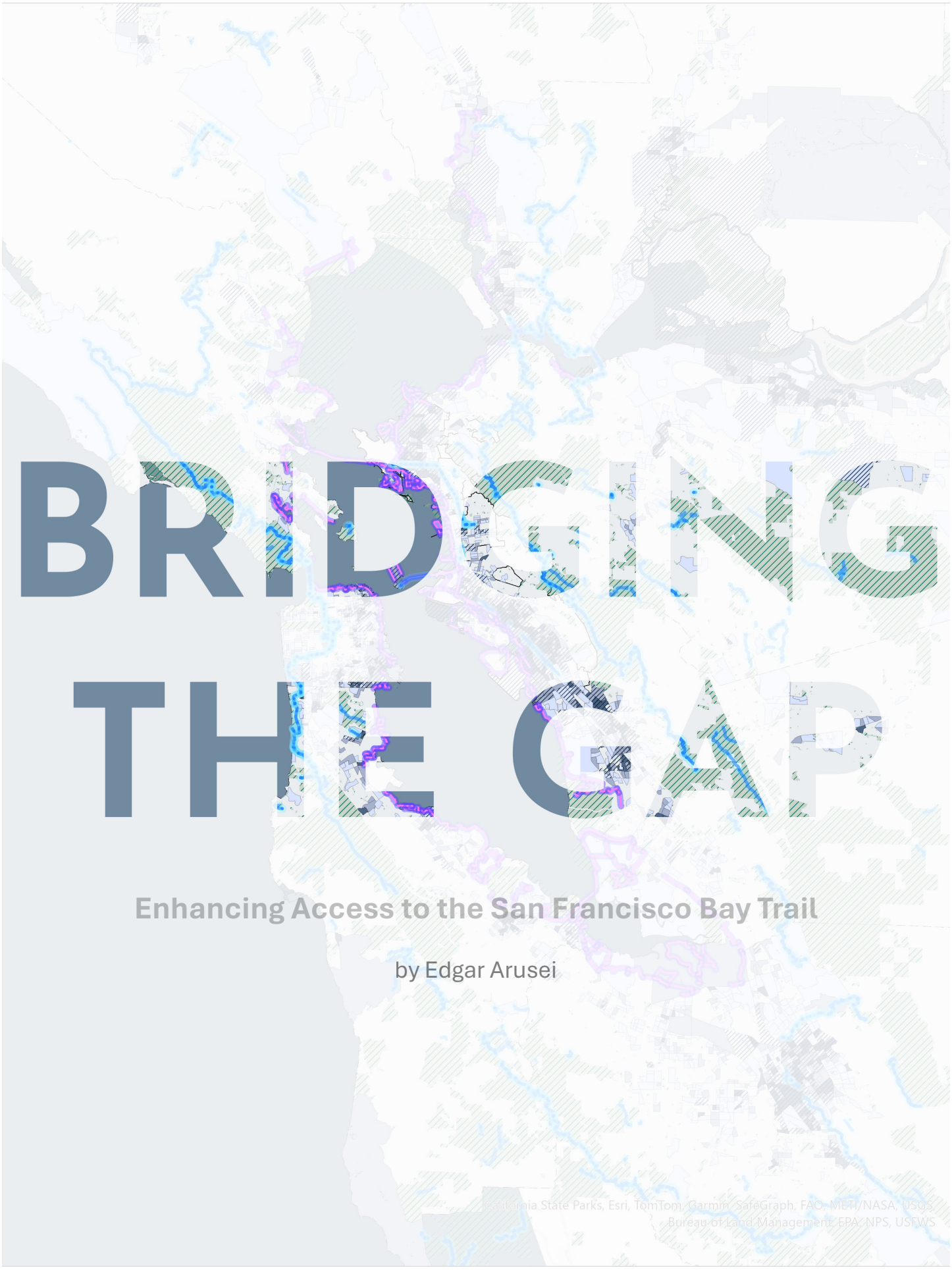
of the

UNIVERSITY OF CALIFORNIA, BERKELEY

APPROVED

- Zachary Lamb
- Daniel A. Rodriguez

Date: Spring 2025



BRIDGING THE GAP

Enhancing Access to the San Francisco Bay Trail

by Edgar Arusei

Acknowledgments

I would like to thank my entire family, especially my mother, Joyce Jepkangor Jepkirui Toroitich Arusei, for her unwavering support. I am also grateful to Zachary Lamb and Daniel Rodriguez for their thoughtful feedback and insightful guidance, and to Mallika Gupta for her inspiration, HELP, and encouragement. Finally, I extend my thanks to all my friends and classmates for their support.

Table of Contents

05 Executive Summary
09 Introduction & Literature Review

10 Introduction
11 Brief History and Definitions
11 Benefits of Urban Greenways and Multi-use Trails
13 Equitable Mobility and Access
14 Barriers to Equitable Urban Green Way and Multi-use Trail Access

25 Methodology

26 Regional Scale
26 Citywide
26 Site level

31 Site Analysis

32 Regional Scale
33 Bay Trail Gaps and Challenges
35 Access, Equity and Underserved Communities
38 Richmond-Oakland Corridor Analysis
40 City Analysis: Richmond, Ca
42 Audit Sites Analysis
48 Site 1: Harbor Way South
54 Site 2: Marina Way South
62 Site 3: Marina Bay Parkway
70 Site 4 & 5: Bay Avenue and Meade Street
78 Site 6: Central Avenue
88 Discussion
91 Recommendations
96 Conclusion
97 Appendix



Lecretia Edwards Shoreline Park

A section of the Bay Trail going through the shoreline park at the Richmond Marina.

Executive Summary

Executive Summary

The San Francisco Bay Trail (SFBT) is a 350-mile network circling the Bay, envisioned to connect communities to jobs, recreation, and the waterfront. Despite 70% completion, first- and last-mile gaps leave historically underserved neighborhoods, particularly those cut off by freeways, rail lines, and industrial zones, without safe, direct access (MTC BTGCIP, 2024). The Metropolitan Transportation Commission (MTC) prioritizes closing physical gaps in the network through its Bay Trail Gap Closure Implementation Plan (BTGCIP) while also working with various partners to enhance equitable access to existing segments. Both efforts require significant resources and collaboration across agencies and community groups.

Recognizing that gap closure has already been widely studied, this research investigates the benefits of improving first- and last-mile connectivity to existing Bay Trail segments, with a focus on underserved communities in select Bay Area cities: Richmond, Albany, Berkeley, Emeryville, and Oakland, within Alameda and Contra Costa counties. The Richmond–Oakland corridor specifically illustrates inequities in access: low-income, majority-minority areas in Richmond and West Oakland are barricaded from the shoreline by high-speed arterials and freight rail, with only a few multi-lane roads offering hazardous crossings. Addressing these barriers is essential to realize the Bay Trail's promise of equitable, sustainable mobility. This study investigates how to strengthen first- and last-mile connections to existing Bay Trail segments, focusing on Equity Priority Communities. By diagnosing local street-level obstacles and co-developing practical design and policy interventions, the project aims to guide replicable improvements across the Bay Area.

The study undertook a mixed-methods approach, including a literature review, geospatial analysis, on-site observations, and secondary data analysis of community feedback about the Bay Trail. First, the literature review was conducted to synthesize evidence on greenway benefits, equity frameworks, and the MTC's Gap Closure Plan (MTC BTGCIP, 2024) alongside its Equity Strategy (MTC Equity Strategy, 2023). Then, ArcGIS was used to overlay trail alignment, regional employment and transit hubs, and Equity Priority Communities to identify spatial disconnects. This stage was supported by a secondary data analysis of stakeholder interviews and community input from the MTC Bay Trail Equity Strategy Initiative, to capture lived experiences and perceptions of safety. This process helped identify six key Richmond–El Cerrito corridors for the study. Finally, the six corridors underwent standardized field audits to assess quality of sidewalks, bike lanes, crossings, signage, lighting, and land-use context, which were scored to ascertain a rating for each segment and intersection along each corridor.

Across all six Bay Trail access corridors, users face hostile and unsafe conditions characterized by high traffic exposure on multi-lane arterials and freeway ramps with no buffers or marked bike lanes, and critically under-designed intersections lacking marked crosswalks, refuge islands, or traffic controls. Large, single-use parcels and blank, industrial frontages create unwelcoming "moats" with no eyes on the street, while fragmented sidewalks and bike lanes force abrupt detours or risky mid-block crossings. Maintenance and cleanliness issues, uneven or broken pavement, overgrown vegetation, and debris, compound these barriers, especially in lower-traffic, industrial stretches. The near-total absence of shade, seating, lighting, and other comfort amenities further discourages use, as do persistent noise and pollution near highways and rail. Finally, inconsistent or missing way-finding signage leaves users uncertain of the route, undermining the Bay Trail's legibility and its promise of safe, equitable access for all.

Recommended improvements for the project range over time and investment. Immediate, low-cost fixes include installing high-visibility crosswalks, yield-to-pedestrian signs, and pavement markings at critical intersections to create safer riding connections. Deploying way-finding signage from transit hubs to trail-heads and scheduling routine sidewalk and bike-lane maintenance can also help improve pedestrian and biking experience urgently. Mid-Term Infrastructure Investments include completing missing sidewalk segments, building protected bike lanes, and introducing targeted traffic calming strategies such as curb extensions, refuge islands, especially on four-lane arterials. Interventions like street trees and seating for shade and comfort can also help build a more comfortable and enjoyable riding or walking experience over time.

Recommended longer-range investments include building grade-separated pedestrian/bike crossings (overpasses or underpasses) at freeway and rail choke-points and securing dedicated funding for corridor upkeep and maintenance. Finally, ensuring equitable access to the Bay Trail requires dedicated, long-term policy actions which integrate focuses, equity-driven improvements into local general plans and capital programs.

Next steps for this study include developing conceptual design prototypes for priority Richmond corridors, illustrating safer crosswalk designs, traffic-calming streetscapes, and a highway overpass option. These visualizations will demonstrate tangible "last-mile" solutions and help mobilize stakeholders towards implementation.



The Bay Trail

A section of the trail in Richmond goes through a wetland park. This section connects Central Avenue and Point Isabel to the Richmond Marina .

Introduction & Literature Review

Introduction

The San Francisco Bay Trail (SFBT) spans over 350 miles of walking and cycling paths, serving as a vital component of the Bay Area's active transportation network by promoting recreation, sustainable mobility, and access to community resources. However, many underserved communities lack adequate first- and last-mile access to completed sections of the trail. The Metropolitan Transportation Commission (MTC) prioritizes closing physical gaps in the network through its Bay Trail Gap Closure Implementation Plan (BTGCIP) while also working with various partners to enhance equitable access to existing segments. Both efforts require significant resources and collaboration across agencies and community groups.

Recognizing that gap closure has already been widely studied, this research investigates the benefits of improving first- and last-mile connectivity to existing Bay Trail segments, with a focus on underserved communities in select Bay Area cities: Richmond, Albany, Berkeley, Emeryville, and Oakland, within Alameda and Contra Costa counties.

Using a mixed-methods approach, including a literature review, geospatial analysis, on-site observations, stakeholder interviews, and community feedback from MTC's Bay Trail Equity Strategy Initiative, this study identifies barriers to access and explores design strategies and policy interventions. Expected outcomes include a toolkit of design strategies and policy recommendations to enhance connectivity for underserved communities (equity-priority areas and communities of concern), aligning with regional goals for sustainable transportation and environmental justice. This project aspires to provide practical solutions that can inform similar efforts in other regions, contributing to the broader discourse on equitable and sustainable mobility.

This research is divided into six parts:

1. **Literature Review:** This section frames the problem by tracing the evolution of urban greenways and multi-use trails in both scholarship and practice. It provides key definitions, summarizes documented benefits, and identifies the barriers that prevent equitable trail access.
2. **Methodology:** This section describes the mixed-methods approach: a regional GIS analysis to locate trail gaps and equity-priority areas, followed by a focused case-study audit of six connector corridors in Richmond. Each route is ranked using a "Supportiveness Index" derived from field-collected data.
3. **Site Analysis:** Building on the methods, the physical, social, and institutional factors shaping access is mapped. Layers include underserved neighborhoods, transit nodes, high-injury corridors, land-use patterns, and canopy cover—revealing where barriers cluster and where targeted investments can advance equity.
4. **Bay Trail Access Route Audit:** This section documents and discusses the results from each of the 6 access routes. For each of the six corridors, on-the-ground audits produce segment scores for sidewalk quality, bike infrastructure, traffic exposure, environmental comfort, and user perception; and intersection scores for crossing safety, exposure, design, and maintenance.
5. **Discussion:** This narrative integrates quantitative scores and qualitative observations to interpret the spatial distribution of access barriers—from inland underserved neighborhoods to the shoreline Bay Trail.
6. **Recommendations:** This section concludes with a tiered set of proposals: immediate, low-cost fixes; mid-term infrastructure investments; and long-range policy reforms—each geared toward transforming identified barriers into equitable, fully supportive corridors.

Brief History and Definitions

Urban greenways and multi-use trails are a relatively modern concept that draw on earlier ideas of linear parks and parkway systems by landscape architecture and planning pioneers such as Frederick Law Olmsted. The Greenway movement, as was referred to in its infancy, gained momentum in the late 20th century. A key moment was the U.S. President's Commission on Americans Outdoors (1987), which advocated creating interconnected green corridors or "greenways" nationwide and inspired widespread planning efforts in the 1990s. Charles Little's Greenways for America (1990) is considered one of the most influential books in this development, further popularizing the term. Little (1990) provides an initial outline and guidelines for the greenway, listing types that were adopted by professionals and governments.

Greenways have been defined in different ways by different scholars. Fabos (1995) defined greenways broadly as "corridors of various widths, linked together in a network in much the same way as our networks of highways and railroad-a giant circulating system" for natural and human use. The author categorized greenways into three major types based on primary goals:

- Ecological greenways that conserve natural corridors and systems.
- Recreational greenways are primarily for exercise and leisure use.
- Culturally significant greenways that preserve historical heritage and provide scenic, educational, and economic benefits.

Shafer, Lee, and Turner (2000) complement this definition by describing greenways as "multiple-objective, open-space corridors that perform natural functions while offering desirable aesthetic qualities to humans as they recreate or commute along trails." This highlights that greenways serve both environmental purposes and human needs, such as recreation and transportation. In practice and most cases, greenways often re-purpose underutilized land uses such as abandoned railways, riverbanks, or utility corridors, into linear open spaces that connect parks and communities (Balharry and Runte, 1988).

The modern greenway movement thus integrates established landscape planning ideas, such as parks, trails, and conservation corridors, into a holistic concept focused on linear connectivity and multi-functionality (Fabos, 1995).

By the early 2000s, cities worldwide were adopting greenway plans as a strategy for sustainable urban development (Fabos, 1995). In recent research, urban greenways are referred to as linear green corridors or trails that run through cities and other urban areas, providing public access for use (Coutts, 2008; Corning, Mowatt, and Chancellor, 2012; Hellmund and Smith, 2006; Theeba Paneerchelvam et al., 2020). They are often also called urban trails or multi-use trails when designed for walking, cycling, and other non-motorized forms of transportation (Shafer, Lee, and Turner, 2000).

These corridors vary in form. They range from river-walks and rail trails to landscaped bike paths, but share the core idea of linking destinations and green spaces through continuous public paved and unpaved pathways. They have also become important in bridging transportation gaps by providing alternative routes for pedestrians and cyclists (American Trails, 2025).

Benefits of Urban Greenways and Multi-use Trails

Urban greenways and multi-use trails have emerged as vital components of sustainable cities, offering a range of benefits. These benefits span public health, well-being, environmental quality, social cohesion, economic outcomes, and transportation connectivity.

Defined broadly as "corridors of benefits" (Moore and Shafer, 2001) Multi-use trails often combine passive and active recreational space with active transportation routes. They pass through urban landscapes connecting people to parks, neighborhoods, and nature (Shafer, Lee, and Turner, 2000; Corning, Mowatt, and Chancellor, 2012; American Trails, 2025). However, as later sections will discuss, realizing these benefits for all groups requires equitable access and inclusive planning.

Physical and Mental Health

Urban greenways and multi-use trails significantly encourage active lifestyles by providing accessible and attractive environments for physical activity. Studies consistently show that trails increase physical activity levels among residents in the surrounding area. Evenson, Herring, and Huston (2005) reported substantial increases in activity following the development of new trails, particularly among residents who previously had limited access to recreational spaces. Similarly, Abildso et al. (2007) found that proximity to trails directly correlated with increased physical activity, underscoring the trail's role in combating sedentary lifestyles. Coutts (2008) further highlighted that ease of access to greenways has a positive influence on residents' daily physical activity.

Beyond physical health, urban greenways can have a profound impact on mental health and quality of life. Shafer et al. (2000) emphasized how trails provide vital psychological benefits by serving as relaxation and stress relief spaces. Lindsey et al. (2001) noted that well-designed trails enhance overall well-being by incorporating features such as safety and aesthetic appeal, which significantly contribute to user satisfaction and community health.

Trails are also critical for promoting mobility and active living among older adults. Kemperman and Timmermans (2009) found trails particularly beneficial for aging populations, supporting sustained independence and physical mobility. Chudyk et al. (2015) reinforced that trail access notably influences the travel behaviors and activity patterns of seniors, demonstrating the importance of targeted urban design interventions to encourage mobility for all.

Environmental and Ecological

Urban greenways make a significant contribution to environmental sustainability through effective landscape management and enhanced climate resilience. Hellmund and Smith (2006) describe greenways as crucial urban infrastructure, capable of preserving biodiversity, managing storm water, and enhancing ecosystem services. Schwarz, Flink, and Searns (1995) as quoted by Henderson similarly emphasize greenways' role in connecting habitats, promoting ecological health, and supporting urban wildlife.

Greenways also serve as effective green infrastructure, mitigating climate risks. The ESA Report identifies greenways as essential tools for urban climate adaptation, particularly in coastal areas, through flood mitigation, shoreline stabilization, and the reduction of urban heat islands (RAAPP, 2021). Vegetated trails help lower urban temperatures, manage storm water, and increase urban ecological resilience.

Social and Community

Urban trails significantly enhance community cohesion and social interaction. Keith et al. (2018) demonstrated that trails can act as platforms for social integration, especially beneficial in diverse and underserved communities. Gobster (2002) supports this view, describing greenways as community social spaces that promote interaction and collective engagement.

However, the social dynamics around trails are complex and shaped by racial identity and community perception. Coutts and Miles (2011) identify racial disparities in greenway usage, critique traditional racialized narratives around outdoor spaces, and advocate for greater inclusivity in greenway planning. Solecki and Welch (1995) argue that the term "Greenwalls" may imply that greenways can act as barriers or dividers between neighborhoods, potentially reinforcing social or racial segregation. As a result, to plan and program for equitable trail use, authors like Cronan, Shinew, and Stodolska (2008) emphasize the importance of culturally sensitive outreach and programming.

Economic Development

Greenways have notable economic impacts, influencing property values and local economies. Crompton and Nicholls (2019) document increases in residential property values near trails, which have a positive impact on local tax revenues and economic revitalization. Additionally, trails stimulate local business activities. Krizek and Johnson (2006) confirm that proximity to trails increases foot and bicycle traffic to nearby retail establishments, boosting local commerce and economic vitality.

Qi and Lindsey (2024), however, caution that trails can also drive gentrification, highlighting the importance of equitable planning to mitigate displacement risks. Studies from across North America including cities like Detroit, Atlanta, and Chicago have shown distinct correlations between the introduction of greenways or similar landscape features, and the consequent increase in land costs, market-driven displacement, and a shift in the racial and economic profiles of residents and businesses (Immergluck and Balan, 2017; Rigolon and Németh, 2018; Draus et al., 2020).

Transportation and Mobility

Greenways can integrate into multi-modal urban transport networks, addressing critical first and last-mile connectivity gaps. In the Federal Highway Administration (FHWA) report, "Advancing Trails to Support Multi-modal Networks" (2022) the authors highlight the roles of greenways as essential links in broader mobility networks, thereby enhancing transit access and supporting active transportation. Rogers et al. (2023) argue that trails significantly improve connectivity to transit hubs, and by extension, services and amenities, make urban transportation systems more efficient and accessible.

From an equity standpoint, trails are critical in achieving transportation justice. Baquero et al. (2024) emphasize the importance of mobility justice frameworks to ensure equitable trail access, advocating for infrastructure that prioritizes historically underserved communities. Similarly, Kent and Karner (2019) argue that trail planning should explicitly focus on low-income neighborhoods to address historical mobility disparities, thereby enhancing equitable transportation opportunities for marginalized populations.

Equitable Mobility and Access

While urban greenways and multi-use trails offer substantial benefits in physical and mental health, environmental sustainability, social cohesion, economic development, and mobility, these advantages are not equally distributed across urban populations.

'Access' can have varied meanings in the context of urban trails and greenways. Broadly, access may refer to the ability to reach, use, or benefit from a resource or opportunity. Gobster (2002) emphasizes that physical access includes proximity, transportation options, and the presence of physical barriers like fences or roads that separate communities from parks. He further notes that individuals from marginalized racial groups often live farther from high-quality parks and face greater challenges in physically accessing them. However, he also emphasizes that perceptions of safety, belonging, and negative social dynamics which cause perceived or actual exclusion of racial minorities can also act as psychological barriers to access (ibid). In addition to racial minorities, individuals from low-income communities or those with disabilities also tend to be physically constrained due to lack of transportation options, and socially-constrained by fear of crime or discrimination, lack of social support, and feeling 'out of place,' which reduces their accessibility to green spaces (Scott & Munson, 1994).

In order for access to be considered equitable, it must be characterized by fair and inclusive opportunities for all individuals, regardless of their race, income, or location, to utilize public amenities and transportation options (Baquero et al., 2024). However, despite academic recognition of racial and income-based exclusion at green spaces, equitable access remains a significant urban challenge, with cumulative impacts (Lochan Aristide, Kollaard, and Dogra, 2025; Lawson and Headwaters Economics, 2016; Lindsey, Maraj, and Kuan, 2001). For individuals from underserved, low-income, and minority communities, having limited access to quality parks and recreational spaces may exacerbate health disparities and social isolation (Finney, 2014; Cutts et al., 2009; Cronan, Shinew, and Stodolska, 2008). Concurrently, these same populations often suffer from inadequate transportation

infrastructure, relying disproportionately on active transportation modes such as walking and cycling, not by choice but by necessity (Hsing-I Liu and Shi, 2018; Mehl, 2018). Active transportation infrastructure in lower-income neighborhoods is typically of poorer quality, often characterized by inadequate pedestrian pathways, unsafe crossings, limited lighting, concerns over perceived safety, and higher rates of traffic injuries (Theeba Paneerchelvam et al., 2020; Akpinar, 2016; Wolch et al., 2010). Trails, by design and conceptually, are designed to go through neighborhoods, connecting open spaces and recreational amenities.

Thus, achieving equitable access involves addressing interconnected issues of spatial inequity, transportation injustice, and systemic underinvestment, necessitating inclusive trail design, management, and comprehensive green space policies (Rigolon and Christensen, 2023; Keith et al., 2018).

Barriers to Equitable Urban Green Way and Multi-use Trail Access

Improving access to urban trails enhances access to services, amenities, and resources such as parks, shoreline areas, transportation networks, and schools, particularly for low-income and racial minority populations (Mehl, 2018). However, multiple barriers exist across different contexts, ranging from physical and spatial constraints to perceptual and cultural factors (JEDI Task Force, 2020; Keith et al., 2018). These barriers to trail access, including safety concerns, cultural mismatches in design, and systemic underinvestment in minority neighborhoods, will be explored in the following sections.

Physical and Spatial Barriers

Condition and Quality of Infrastructure

Inadequate pedestrian and cycling infrastructure near urban trails significantly restricts access. Missing or poorly maintained sidewalks, insufficient bike lanes, unsafe crossings, and inadequate lighting often reduce potential users, especially from underserved neighborhoods (Baquero et al., 2024; Chen et al., 2019; Kent and Karner, 2019; Lindsey et al., 2008; Evenson, Herring, and Huston, 2005). Residents consistently emphasize the need for improvements, such as better lighting, smoother pavement, clearer crosswalks, and accessible curb cuts, to feel secure when using local trails (Baquero et al., 2024; Abildso et al., 2007).

Trail maintenance has a significant impact on trail use, particularly in low-income communities where deferred maintenance results in deteriorating conditions, including cracked sidewalk, potholes, debris, and overgrown vegetation. These conditions negatively affect user satisfaction and discourage frequent use The absence of basic amenities such as clearly marked trail-heads, benches, water fountains, restrooms, and informative signage further reduces usability, disproportionately impacting families, older adults, and persons with disabilities (Lindsey et al., 2008; Gobster, 2002). Without consistently maintained, adequately lit, and supportive infrastructure, urban trails remain physically inaccessible and uninviting, perpetuating inequitable access.

Connectivity and Proximity to Key Destinations

Effective connectivity to critical everyday destinations, such as parks, schools, transit hubs, and commercial areas, is essential for trails to serve practical transportation needs rather than just recreational purposes. Trails with weak or nonexistent connections to destinations remain significantly underutilized, particularly by lower-income and transit-dependent communities with low or no car ownership (Mu and Wang, 2024; Rogers et al. 2023; Chen et al., 2019; Shafer et al., 2000).

Scott Shafer's study highlights the weak integration of Texas greenways with local shopping and transit systems, which limits their utility and usage (Shafer, Lee, and Turner, 2000). Similarly, Chen et al. (2019) found that although trail users in Cincinnati expressed interest in commuting by walking or cycling, approximately 89% used trails predominantly for recreation, reflecting significant connectivity gaps to key centers. Furthermore, research indicates that adding targeted trail connections between residential areas, employment centers, and public transit significantly boosts active commuting and utilitarian trail use (American Trails, 2025; Rogers et al., 2023; Evenson, Herring, and Huston, 2005).

In addition to this, Chudyk et al. (2015), in their paper "Destinations Matter," underscore how critical destination proximity is for trail usage among older adults, further emphasizing that poor connectivity disproportionately excludes specific demographic groups. In Cincinnati, the average distance of 1.4 miles from trails to bus stops significantly exceeds comfortable walking thresholds, effectively marginalizing transit-dependent populations (Chen et al., 2019). Therefore, improving proximity and connectivity through deliberate planning and targeted infrastructure, such as connector pathways, enhanced multi-modal integration, and prioritizing first- and last-mile accessibility, is crucial for equitable trail usage and community mobility.

Environmental and Urban Form Factors

Urban form and environmental barriers, such as highways, railroads, rivers, industrial zones, and zoning patterns, significantly constrain equitable access to urban trails. Physical barriers isolate neighborhoods from nearby greenways, substantially reducing practical accessibility and usage, even when trails are geographically close (Wolch et al., 2010; Clifton et al. 2008; Coutts, 2008).

Many urban trails constructed opportunistically along rivers or disused rail corridors often cross sparsely populated or industrial areas, leading to perceived isolation and reduced safety (whether real or perceived), which discourages potential users (Wolch et al., 2010). Historical land-use decisions and zoning practices, influenced by legacies of segregation and disinvestment, exacerbate these spatial inequities. Industrial zones and highways have historically been situated between low-income neighborhoods and recreational green spaces, creating "green walls" that both symbolically and physically separate neighborhoods, thereby exacerbating socio-spatial divisions (Cutts et al.,2009; Solecki and Welch, 1995).

Urban design research emphasizes targeted interventions, such as pedestrian bridges, underpasses, improved crossings, and thoughtful integration of the street grid, to overcome these barriers (American Trails, 2025; Lindsey et al., 2001). Frank and Engelke (2001) similarly note that strategic urban design, including interconnected street networks and integrated land-use patterns, significantly enhances trail accessibility. Additionally, Krizek and Johnson (2006) found that trail usage increased notably near commercial centers and decreased around heavy industrial zones, highlighting the critical role of land-use integration in trail planning.

To improve equitable trail access, cities must proactively address these historical and spatial constraints through intentional urban design solutions, targeted infrastructure investments, and zoning policies that prioritize connectivity and integration. Without deliberate efforts to bridge infrastructural divides and thoughtfully integrate trails into surrounding community fabrics, greenways risk reinforcing existing urban inequities rather than alleviating them.

Social, Cultural, and Perceptual Barriers

Awareness and Inclusiveness

Limited awareness and inadequate outreach significantly restrict equitable access to multi-use trails among underserved communities. Residents often remain unaware of nearby greenways, feeling neither informed nor invited to use them (Keith, 2016). For example, the Circuit Trails Justice, Equity, Diversity, and Inclusion (JEDI) task force in Philadelphia conducted market research on Equity of Access to Trails, which found that trail use was very low in neighborhoods with high proportions of residents of color—largely due to limited outreach and low community awareness. Focus groups revealed that residents frequently lacked basic information about trail locations or felt that the trails primarily served affluent or white communities (JEDI Task Force, 2020).

Language barriers and culturally insensitive outreach exacerbate these issues, disproportionately affecting immigrant and minority communities (Cronan, Shinew, and Stodolska, 2008). Wolch et al. (2010) highlight that deliberate community engagement and targeted communication strategies significantly increase trail use, especially among new and previously underserved users. Effective outreach practices include multilingual signage, culturally resonant marketing, partnerships with trusted local organizations, and inclusive community events. Such approaches transform awareness from passive information sharing into

active invitations, ensuring trails feel accessible and welcoming to diverse populations (JEDI Task Force, 2020; Keith, 2016).

Cultivating inclusive awareness through culturally relevant outreach is essential for equitable trail usage. Without intentional engagement strategies, urban greenways risk remaining underutilized resources in marginalized communities, perpetuating access disparities.

User Perceptions and Cultural Acceptance

Beyond basic awareness, deeper social and cultural perceptions critically shape who feels comfortable using urban trails. Historically, urban greenways have been associated with predominantly white, middle-class recreation norms, such as jogging, cycling, or dog walking, which may not align with the recreational habits or preferences of diverse communities, implicitly signaling exclusion (Keith, 2016; Finney, 2014). Paul Gobster's (2002) research in Chicago's Lincoln Park, illustrates distinct usage patterns by ethnicity: Latino families frequently visited in larger groups and preferred picnicking and communal activities, whereas white visitors often engaged in individual activities such as jogging or cycling.

The lack of trail design accommodating diverse cultural uses can unintentionally communicate that certain activities or user groups are less. Additionally, trail user groups often self-segregate by ethnicity and age, reinforcing perceptions among underrepresented groups that trails are "not for us." When residents repeatedly see homogeneous trail users who differ from themselves, it fosters discomfort and reinforces barriers to use (Theeba Paneerchelvam et al., 2020; Mehl, 2018; Corning et al., 2012; Cronan et al., 2008).

Historical racial tensions and experiences of discrimination further complicate these cultural perceptions. Lindsey et al. (2001) caution that trails can inadvertently become socio-cultural boundaries, mirroring historic divisions evident in parks where certain groups dominate use, effectively discouraging others. For instance, the authors' Indianapolis study documented disproportionate trail use by white, higher-income individuals despite trails running through diverse neighborhoods (ibid). Baquero et al. (2024) further illuminate how experiences of racism influence mobility, with Black women in Seattle reporting anxiety and scrutiny in public spaces, undermining their sense of safety on trails. Such stress easily transfers into trail settings, particularly when policing or past incidents of bias occur.

Addressing cultural barriers requires intentional inclusion efforts, such as involving diverse community members in trail programming, visibly representing multiple cultural backgrounds, and ensuring equitable enforcement of trail norms. Without actively fostering inclusive environments, even physically accessible trails risk failing to attract diverse community members, perpetuating inequitable access.

Safety and Security Barriers

Traffic Safety

Real and perceived dangers from traffic can be a significant barrier to accessing and using urban greenways. Many trails require users to navigate city streets to reach an entry point or to crossroads where the trail intersects with highways. If these crossings are dangerous, meaning they lack crosswalks ,are narrow, next to fast moving traffic, missing pedestrian or bicycle signals, and without adequate sight lines, people are understandably hesitant to risk it, especially vulnerable users such as children, older adults, or those with disabilities. High-speed, high-volume arterial roads adjacent to trails effectively become impediments that cut off pedestrian and bike access (Wolch et al., 2010). This is similar to the physical barriers discussed earlier.

Community members frequently voice concerns about traffic safety near trails. In South Seattle, for example, residents cited "unsafe drivers" and difficult road crossings as factors that made walking or biking to the neighborhood trail feel hazardous (Baquero et al., 2024). Even when a trail itself is off-road and safe from cars, the approach to it might involve navigating a "high injury corridor" – a street with a history of frequent crashes, which can dissuade use. Research on trail use determinants has quantified this effect. Wolch et al. (2010) included local traffic conditions in a neighborhood safety index and found that heavy traffic and lack of street lighting were associated with lower trail use in Los Angeles and Dallas neighborhoods. The very presence of fast traffic nearby not only poses a physical risk but also creates a psychological barrier. Parents may not allow children to go to the trail alone, as it means crossing a dangerous street. Additionally, less confident cyclists may avoid trails that lack protected connections.

In low-income neighborhoods, infrastructure for safe crossings is often lacking due to historic underinvestment in pedestrian safety. This contributes to disproportionately high rates of pedestrian injuries in those communities, reinforcing the fear of walking or biking. Addressing traffic safety barriers requires infrastructure improvements such as well-marked crosswalks, pedestrian refuge islands, traffic calming measures around trail crossings, and, in some cases, rerouting trails to grade-separated crossings. It also involves broader traffic safety interventions, such as Vision Zero policies, in the surrounding area. Without these changes, the perceived risk of being hit by a car can overshadow any desire to use even a high-quality local greenway or trail.

Personal Safety and Crime

The perception and reality of personal security on multi-use trails are crucial factors influencing equitable access. Many urban greenways are located in secluded or semi-secluded corridors, such as those along rivers or rail lines behind neighborhoods, which often have limited visibility from public streets (JEDI Task Force, 2020; Wolch et al., 2010). While this seclusion is often desired as an escape from the city's hustle and bustle, it can also heighten fears of crime or harassment. Users, particularly women and elders, often worry about becoming targets for assault, robbery, or unwanted attention when trails are quiet, poorly lit, or lack a visible security presence (Corning et al., 2012; Gobster, 2002).

Gobster (2002) also notes that "*perceptions of fear and safety and experiences of discomfort and physical harm resulted in…lowered use and spatial segregation of users within a park*" in some urban park settings. In greenways, similar patterns may emerge. Some groups may avoid using a trail at dusk or after dark, or at all, if they've heard of incidents or simply perceive the area as dangerous. In underserved neighborhoods, broader public safety issues like gang activity or substance use in nearby areas can spill over to affect trail use. Indeed, a community study on trails adjacent to disadvantaged neighborhoods found that residents' concerns extended beyond the trail itself: they raised issues of public safety, violence, and disorder in their community that made outdoor activity feel unsafe (JEDI Task Force, 2020).

Another aspect is the fear of harassment or bias on the trail- racial or cultural minorities might fear discriminatory treatment. Feeling unwelcome can heighten a sense of vulnerability. All these security concerns create a barrier of perceived risk, which can be as powerful as actual risk in deterring trail use (Theeba Paneerchelvam et al. 2020; Keith et al., 2018).

Solutions in literature emphasize the need for both environmental-design and community-based measures (Theeba Paneerchelvam et al. 2020; Keith et al., 2018; Wolch et al., 2010; Gobster, 2002). Environmental approaches include improving lighting along trails, designing clear sight lines (so users can see far ahead and are visible to others), and providing emergency call boxes or mile markers to facilitate reporting of issues. Having more "eyes on the trail" is often cited, meaning encouraging higher usage and adjacent development so that the space is seldom empty (Wolch et al., 2010). Some community-based strategies involve organizing volunteer trail patrols, programming group activities to allow people to walk and bike in groups, and building trust with local police or safety ambassadors who can monitor the trail without profiling users (JEDI Task Force, 2020).

Ensuring that people feel safe on greenways is as important as actual crime statistics. When safety and security concerns are not addressed, trails in even the best locations may go underused by those who arguably need them most, such as women, seniors, or residents of high-crime neighborhoods who lack alternative safe spaces to enjoy.

Planning and Institutional Barriers

Institutional and Policy Prioritization

Systemic biases in planning and resource allocation have created inequities in where trails are built and how they are maintained. Historically, park and greenway investments have often favored wealthier or more politically influential communities, resulting in a distribution of urban trails that leaves low-income and minority neighborhoods underserved.

Lindsey's (2001) exploratory study of Indianapolis greenways provided early evidence of this, finding that racial minorities and the poor had disproportionately low access to trails in that city. This pattern is seen in other cities. For instance, the initial development of urban trails often occurs in gentrifying areas or along waterfronts that border downtown or affluent districts, rather than in the neglected peripheries. Even when funding is ostensibly allocated for equitable green space, actual implementation can fall short. Rigolon and Christensen (2023), note that without explicit equity criteria, new green space funding tends to "*disproportionately go to high-income and white communities*," perpetuating underinvestment in low-income communities of color.

Institutional fragmentation can also hinder the equitable development of multi-use trails. Greenway planning often involves multiple jurisdictions, agencies, and stakeholders, including parks departments, transportation departments, county and city governments, and private landowners (Hellmund and Smith, 2006). Without strong coordination, this fragmentation can result in patchy development, where a trail stops at a city boundary or lacks regional continuity, and inconsistent maintenance or policing standards. A trail might be well-maintained in one township but become overgrown or unsafe as it enters the next, due to differing priorities and budgets. Fragmented governance can especially harm lower-income areas if wealthier areas have more effective advocacy to ensure their segment is completed or enhanced (ibid).

Additionally, some policies inadvertently create barriers. For example, rules about park funding, liability, or land acquisition can slow down trail projects in underserved areas. An equitable approach requires conscious institutional prioritization, agencies setting goals to serve vulnerable communities, dedicating funding for trails in marginalized neighborhoods, and adopting equity metrics to guide the location of new trails (American Trails, 2025; Rigolon and Christensen, 2023).

The Capital Trails Coalition (2018) in the Washington, D.C. area has committed to promoting an equitable trails network by analyzing the unique challenges that impact the mobility, safety, and connectivity needs of specific populations, and adjusting its decision-making framework accordingly. Such policies aim to overcome the legacy of underinvestment by explicitly directing attention and resources to where the gaps are greatest.

Community Engagement and Representation

A lack of meaningful community engagement in trail planning and management has been a barrier to equitable access and sustained use. When residents, particularly those from marginalized groups, are not involved in decision-making, the resulting trail facilities may not reflect their needs or desires. This can lead to mistrust or a sense of alienation. For example, Baquero et al. (2024) observed "mixed feedback regarding bike lanes and hasty transportation infrastructure changes that fail to incorporate community input" in a Seattle neighborhood. Community members felt that changes were imposed on them without consultation, which bred resentment despite the intended mobility benefits.

This underscores that even well-intentioned projects, such as adding a bike route or trail can backfire if the community perceives the process as top-down. Equitable greenway development calls for engagement processes that genuinely empower local voices, from initial planning through design and programming.

Summary

Table 1 shows the interlocking barriers to equitable access to greenways and trails. Physical impediments, such as poor infrastructure and disconnected networks, intersect with social dynamics, including awareness gaps and cultural exclusion. Safety concerns, ranging from speeding cars to personal security, further exacerbate these issues, which are most acute for the very populations with the least access to safe open spaces. The literature makes clear that to achieve truly equitable access, stakeholders must take a holistic approach: improving the built environment, actively engaging communities, and addressing the perceptions and realities of safety and inclusion simultaneously. By understanding and addressing these barriers, cities can move closer to realizing the vision of greenways and urban multi-use trails for "all ages and abilities."

Table 1: Summary of Benefits and Barriers to Equitable Access to Greenways and Trails

	Benefits (Enablers)	Barriers (Constraints)
Physical & Mental Health	• Increased physical activity and reduced sedentary lifestyle • Improved mental health, stress reduction, overall well-being • Supports older adult mobility and independence	• Lack of maintained infrastructure (sidewalks, lighting, sidewalk quality) • Physical barriers (e.g., highways, railways, poor connectivity) • Unsafe or inadequate crossing conditions
Environmental & Ecological	• Preserves biodiversity and ecological connectivity • Manages storm water and urban heat islands • Enhances urban climate resilience	• Poor integration with surrounding urban form (industrial areas, highways) • Trails isolated from populated areas, increasing perceived insecurity
Social & Community	• Enhances community cohesion, social integration • Creates spaces for social interaction and gathering across diverse groups • Potential to foster inclusive community identity	• Social segregation or exclusion due to race or cultural perceptions • Lack of culturally sensitive designs and programming • Historical racial tensions and discriminatory experiences
Economic Development	• Increased property values near trails • Boosts local businesses and retail activities • Enhances local economic vitality	• Potential displacement or gentrification near trail locations • Unequal distribution of economic benefits (favoring wealthier communities)
Transportation & Mobility	• Essential first and last-mile connections to transit hubs • Improves multi-modal transportation network efficiency • Supports transportation justice and equitable mobility	• Weak connectivity to critical destinations • Inadequate integration into broader transit and mobility networks • Poor infrastructure in low-income communities
Awareness & Inclusivity	• Increased usage through targeted, culturally sensitive outreach • Greater inclusivity via multilingual signs and community-driven programming	• Limited community awareness, poor outreach strategies • Cultural mismatch in messaging and engagement approaches
User Perceptions & Cultural Acceptance	• Enhanced perception of trails as safe, welcoming, and inclusive spaces through intentional cultural inclusion • Diverse programming fostering community ownership and identity	• Trails perceived as predominantly white/middle-class spaces • Fear of discrimination or harassment, reducing comfort and perceived safety
Safety & Security	• Enhanced user comfort through lighting, visibility, emergency facilities, and traffic calming measures • Safety improvements through community-based patrols and programming	• Real or perceived traffic dangers (unsafe crossings, lack of pedestrian amenities) • Personal security concerns (crime, isolation, poor visibility)
Institutional & Planning	• Equitable policy prioritization, targeted investment in underserved neighborhoods • Strong multi-agency coordination ensuring consistent trail quality and maintenance	• Historical underinvestment in marginalized communities • Fragmented governance leading to inconsistent quality and funding gaps • Top-down planning without meaningful community engagement

References

Abildso, Christiaan G., Sam Zizzi, Laurie C. Abildso, Jenessa C. Steele, and Paul M. Gordon. “Built Environment and Psychosocial Factors Associated With Trail Proximity and Use.” *American Journal of Health Behavior* 31, no. 4 (July 1, 2007): 374–83. https://doi.org/10.5993/AJHB.31.4.4.

“Advancing Trails to Support Multimodal Networks - American Trails.” Accessed March 22, 2025. https://www.americantrails.org/resources/advancing-trails-to-support-multimodal-networks.

Akpinar, Abdullah. “Factors Influencing the Use of Urban Greenways: A Case Study of Aydın, Turkey.” *Urban Forestry & Urban Greening* 16 (January 1, 2016): 123–31. https://doi.org/10.1016/j.ufug.2016.02.004.

Balharry, R., and A. Runte. “National Parks. The American Experience.” *The Journal of Applied Ecology* 25, no. 2 (August 1988): 754. https://doi.org/10.2307/2403871.

Baquero, Barbara I., Rachel Berney, Evalynn Fae T. Romano, Olivia Hicks, Robert Getch, Crystal Hall, Stephen J. Mooney, et al. “Advancing Active Transportation Through Mobility Justice and Centering Community.” *Health Equity* 8, no. 1 (May 1, 2024): 720–30. https://doi.org/10.1089/heq.2024.0087.

Capital Trails Coalition. “Equitable Trail Development,” August 9, 2018. https://www.capitaltrailscoalition.org/equitable-trail-development/.

Chen, Na, Greg Lindsey, and Chih-Hao Wang. “Patterns and Correlates of Urban Trail Use: Evidence from the Cincinnati Metropolitan Area.” *Transportation Research Part D: Transport and Environment* 67 (February 2019): 303–15. https://doi.org/10.1016/j.trd.2018.12.007.

Chudyk, Anna M., Meghan Winters, Md Moniruzzaman, Maureen C. Ashe, Joanie Sims Gould, and Heather McKay. “Destinations Matter: The Association between Where Older Adults Live and Their Travel Behavior.” *Journal of Transport & Health* 2, no. 1 (March 2015): 50–57. https://doi.org/10.1016/j.jth.2014.09.008.

Circuit Trails Justice, Equity, Diversity, and and Inclusion (JEDI) Task Force. “Equity of Access to Trails: Market Research Conducted Fall 2020,” 2020.

Clifton, Kelly, Ewing ,Reid, Knaap ,Gerrit Jan, and Yan and Song. “Quantitative Analysis of Urban Form: A Multidisciplinary Review.” *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 1, no. 1 (March 1, 2008): 17–45. https://doi.org/10.1080/17549170801903496.

Corning, Sarah E., Rasul A. Mowatt, and H. Charles Chancellor. “Multiuse Trails: Benefits and Concerns of Residents and Property Owners.” *Journal of Urban Planning and Development* 138, no. 4 (December 2012): 277–85. https://doi.org/10.1061/(ASCE)UP.1943-5444.0000124.

Coutts, Christopher. “Greenway Accessibility and Physical-Activity Behavior.” *Environment and Planning B: Planning and Design* 35, no. 3 (June 2008): 552–63. https://doi.org/10.1068/b3406.

———. “Multiple Case Studies of the Influence of Land-Use Type on the Distribution of Uses along Urban River Greenways.” *Journal of Urban Planning and Development* 135, no. 1 (March 1, 2009): 31–38. https://doi.org/10.1061/(ASCE)0733-9488(2009)135:1(31).

Coutts, Christopher, and Rebecca and Miles. “Greenways as Green Magnets:The Relationship between the Race of Greenway Users and Race in Proximal Neighborhoods.” *Journal of Leisure Research* 43, no. 3 (September 1, 2011): 317–33. https://doi.org/10.1080/00222216.2011.11950239.

Crompton, John L., and Sarah Nicholls. “The Impact of Greenways and Trails on Proximate Property Values: An Updated Review.” *Journal of Park and Recreation Administration,* 2019. https://doi.org/10.18666/JPRA-2019-9906.

Cronan, Megan Kelly, Kimberly J. Shinew, and Monika Stodolska. “Trail Use Among Latinos: Recognizing Diverse Uses Among A Specific Population.” *Journal of Park and Recreation Administration* 26, no. 1 (January 18, 2008). https://js.sagamorepub.com/index.php/jpra/article/view/1334.

Cutts, Bethany B., Kate J. Darby, Christopher G. Boone, and Alexandra Brewis. “City Structure, Obesity, and Environmental Justice: An Integrated Analysis of Physical and Social Barriers to Walkable Streets and Park Access.” *Social Science & Medicine* 69, no. 9 (November 1, 2009): 1314–22. https://doi.org/10.1016/j.socscimed.2009.08.020.

Draus, Paul, Dagmar Haase, Jacob Napieralski, Alec Sparks, Salman Qureshi, and Juliette Roddy. “Wastelands, Greenways and Gentrification: Introducing a Comparative Framework with a Focus on Detroit, USA” *Sustainability* 12, no. 15 (July 9, 2020): 6189. https://doi.org/10.3390/su12156189

“Equity Priority Communities | Metropolitan Transportation Commission,” March 17, 2021. https://mtc.ca.gov/planning/transportation/access-equity-mobility/equity-priority-communities.

Evenson, Kelly R., Amy H. Herring, and Sara L. Huston. “Evaluating Change in Physical Activity with the Building of a Multi-Use Trail.” *American Journal of Preventive Medicine* 28, no. 2 Suppl 2 (February 2005): 177–85. https://doi.org/10.1016/j.amepre.2004.10.020.

Ewing, Reid, and Susan Handy. “Measuring the Unmeasurable: Urban Design Qualities Related to Walkability.” *Journal of Urban Design* 14, no. 1 (February 1, 2009): 65–84. https://doi.org/10.1080/13574800802451155.

Fabos, Julius Gy. “Introduction and Overview: The Greenway Movement, Uses and Potentials of Greenways.” *Landscape and Urban Planning* 33, no. 1–3 (October 1995): 1–13. https://doi.org/10.1016/0169-2046(95)02035-R.

Finney, Carolyn. *Black Faces, White Spaces: Reimagining the Relationship of African Americans to the Great Outdoors.* Chapel Hill: The University of North Carolina Press, 2014.

Frank, Lawrence D., and Peter O. Engelke. “The Built Environment and Human Activity Patterns: Exploring the Impacts of Urban Form on Public Health.” *Journal of Planning Literature* 16, no. 2 (November 1, 2001): 202–18. https://doi.org/10.1177/08854120122093339.

Gobster, Paul H. “Managing Urban Parks for a Racially and Ethnically Diverse Clientele.” *Leisure Sciences* 24, no. 2 (April 1, 2002): 143–59. https://doi.org/10.1080/01490400252900121.

———. “Perception and Use of a Metropolitan Greenway System for Recreation.” *Landscape and Urban Planning*, Greenways, 33, no. 1 (October 1, 1995): 401–13. https://doi.org/10.1016/0169-2046(94)02031-A.

———. “Urban Parks as Green Walls or Green Magnets? Interracial Relations in Neighborhood Boundary Parks.” *Landscape and Urban Planning* 41, no. 1 (May 15, 1998): 43–55. https://doi.org/10.1016/S0169-2046(98)00045-0.

Hellmund, Paul Cawood, and Daniel Somers Smith. Designing Greenways: S*ustainable Landscapes for Nature and People.* Washington: Island press, 2006.

Henderson, Anne Hoover. Review of *Review Of Greenways: A Guide to Planning, Design, And Development; Trails for the Twenty-First Century: Planning, Design, And Management Manual For Multi-Use Trails, Charles A. Flink, Robert M. Searns*, by Loring LaB. Schwarz, Charles A. Flink, Robert M. Searns, Karen-Lee Ryan, Peter Lagerwey, and Diana Balmori. Landscape Journal 14, no. 2 (1995): 231–32.

Hsing-I Liu, Jenny, and Wei Shi. “Understanding the Accessibility, Economic and Social Equity Impacts of Urban Greenway Infrastructure.” *TREC Final Reports*, August 1, 2018. https://doi.org/10.15760/trec.207.

Immergluck, Dan and Tharunya Balan. “Sustainable for whom? Green urban development, environmental gentrification, and the Atlanta Beltline.” *Urban Geography* 39, no.4 (August 1, 2017): 546–562. https://doi.org/10.1080/02723638.2017.1360041

Jan Gehl, Birgitte Svarre (Auth.) How To Study Public Life Island Press Center For Resource Economics (2013). Accessed May 4, 2025.

Keith, Samuel. “Urban Greenway Use and Benefits in Diverse Cities: A Tale of Two Trails.” *All Theses*, May 1, 2016. https://open.clemson.edu/all_theses/2396.

Keith, Samuel J., Lincoln R. Larson, C. Scott Shafer, Jeffrey C. Hallo, and Mariela Fernandez. “Greenway Use and Preferences in Diverse Urban Communities: Implications for Trail Design and Management.” *Landscape and Urban Planning* 172 (April 1, 2018): 47–59. https://doi.org/10.1016/j.landurbplan.2017.12.007.

Kemperman, Astrid, and Harry Timmermans. “Influences of Built Environment on Walking and Cycling by Latent Segments of Aging Population.” *Transportation Research Record 2134*, no. 1 (January 1, 2009): 1–9. https://doi.org/10.3141/2134-01.

Kent, Margaret, and Alex Karner. “Prioritizing Low-Stress and Equitable Bicycle Networks Using Neighborhood-Based Accessibility Measures.” *International Journal of Sustainable Transportation* 13, no. 2 (February 7, 2019): 100–110. https://doi.org/10.1080/15568318.2018.1443177.

Krizek, Kevin J., and Pamela Jo Johnson. “Proximity to Trails and Retail: Effects on Urban Cycling and Walking.” *Journal of the American Planning Association* 72, no. 1 (March 31, 2006): 33–42. https://doi.org/10.1080/01944360608976722.

Lawson, Meghan, and Headwaters Economics. “Measuring Trails Benefits: Overall Benefits,” 2016. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ashlandmass.com/DocumentCenter/View/2695/Overall-Benefits.

Lindsey, Greg, Maltie Maraj, and SonCheong Kuan. “Access, Equity, and Urban Greenways: An Exploratory Investigation.” *The Professional Geographer* 53, no. 3 (2001): 332–46. https://doi.org/10.1111/0033-0124.00288.

Lindsey, Greg, Jeff Wilson, Jihui Anne Yang, and Christopher Alexa. “Urban Greenways, Trail Characteristics and Trail Use: Implications for Design.” *Journal of Urban Design* 13, no. 1 (February 2008): 53–79. https://doi.org/10.1080/13574800701804033.

Little, Charles E. *Greenways for America*. Baltimore : Johns Hopkins University Press, 1990. http://archive.org/details/greenwaysforamer0000litt.

Lochan Aristide, Maykah, Alicia Kollaard, and Shilpa Dogra. “‘I Just Want Safety’: Understanding the Needs of Diverse Residents to Facilitate Equitable Active Transportation Planning in Durham Region, Canada.” *Cities & Health*, January 10, 2025, 1–9. https://doi.org/10.1080/23748834.2024.2440979.

Mehl, Chris. “City Trails: Improving Equitable Access.” Headwaters Economics, August 16, 2018. https://headwaterseconomics.org/economic-development/trails-pathways/city-trails-improving-equitable-access/.

Metropolitan Transportation Comission. “The San Francisco Bay Trail,” October 5, 2021. https://mtc.ca.gov/operations/regional-trails-parks/san-francisco-bay-trail.

Moore, Roger L., and C. Scott Shafer. “Introduction to Special Issue Trails and Greenways: Opportunities for Planners, Managers, and Scholars.” *Journal of Park and Recreation Administration* 19, no. 3 (July 18, 2001). https://js.sagamorepub.com/index.php/jpra/article/view/1571.

Mu, Wangshu, and Gusiyuan Wang. “Connective Urban Greenway Route Planning: A Spatial Optimization Perspective.” *Land* 13, no. 11 (November 2024): 1833. https://doi.org/10.3390/land13111833.

Pedestrian and Bicycle Information Center. “Advancing Trails to Support Multimodal Networks.” (2022).

Qi, Yunlei, and Greg Lindsey. “Multiuse Trails, Gentrification, and Heterogeneity of Neighborhood Change.” *Landscape and Urban Planning* 249 (September 2024): 105078. https://doi.org/10.1016/j.landurbplan.2024.105078.

Rigolon, Alessandro, and Jeremy Németh. “We’re not in the business of housing:” Environmental gentrification and the nonprofitization of green infrastructure projects.” *Cities* 81 (November 2018): 71–80. https://doi.org/10.1080/07352166.2023.2184695.

Rigolon, Alessandro, and Jon Christensen. “Examining Facilitators and Challenges to Implementing Equitable Green Space Policies: Lessons from Los Angeles County.” *Journal of Urban Affairs*, March 29, 2023, 1–22. https://doi.org/10.1080/07352166.2023.2184695.

“Risk Assessment and Adaptation Prioritization Plan (RAAPP) | East Bay Parks.” Accessed March 27, 2025. https://www.ebparks.org/projects/risk-assessment-and-adaptation-prioritization-plan-raapp.

Rogers, William P., Na Chen, and Johanna W. Looye. “Beyond Traditional TOD: Integrating Multiuse Paths and Bike Share into Public Transit to Address the First/Last Mile Issue.” *Urban Rail Transit* 9, no. 1 (March 2023): 42–56. https://doi.org/10.1007/s40864-022-00182-x.

Scott, David, and Wayne Munson. “Perceived constraints to park usage among individuals with low incomes.” *Journal of Park and Recreation Administration* 12, no. 4 (Winter 1994): 79–96.

Shafer, C. Scott, Bong Koo Lee, and Shawn Turner. “A Tale of Three Greenway Trails: User Perceptions Related to Quality of Life.” *Landscape and Urban Planning* 49, no. 3 (July 20, 2000): 163–78. https://doi.org/10.1016/S0169-2046(00)00057-8.

Solecki, William D., and Joan M. Welch. “Urban Parks: Green Spaces or Green Walls?” *Landscape and Urban Planning* 32, no. 2 (June 1, 1995): 93–106. https://doi.org/10.1016/0169-2046(94)00193-7.

Theeba Paneerchelvam, Pa, Sreetheran Maruthaveeran, Suhardi Maulan, and Shureen Faris Abd. Shukor. “The Use and Associated Constraints of Urban Greenway from a Socioecological Perspective: A Systematic Review.” *Urban Forestry & Urban Greening* 47 (January 1, 2020): 126508. https://doi.org/10.1016/j.ufug.2019.126508.

Wolch, Jennifer R, Zaria Tatalovich, Donna Spruijt-Metz, Jason Byrne, Michael Jerrett, Chih-Ping Chou, Susan Weaver, Lili Wang, William Fulton, and Kim Reynolds. “Proximity and Perceived Safety as Determinants of Urban Trail Use: Findings from a Three-City Study.” *Environment and Planning A: Economy and Space* 42, no. 1 (January 2010): 57–79. https://doi.org/10.1068/a41302.



Marina Way South Overpass

A child and an adult on an afternoon ride. Man was cautiously watching the child and directing him to use the sidewalk.

Methodology

METHODOLOGY

This research employs a multi-scale, mixed-methods approach to examine barriers to the San Francisco Bay Trail's (SFBT) access for underserved communities. The analysis is structured at four levels- regional, corridor-wide, citywide, and site-specific, with each scale building context for the next. First, a broad regional review of the Bay Trail is followed by a brief study of the Richmond to Oakland Bay Trail corridor. The next stage is a focused city-level GIS analysis in Richmond, and finally, detailed field audits at the site level, evaluating on-ground conditions along key connector routes.

Regional-Scale Analysis

At the regional scale, the study reviewed existing planning documents and datasets to understand Bay Trail's overall alignment and gaps in the network. The key source of this information was MTC's Bay Trail Gap Closure Implementation Plan (BTGCIP). This report includes a dataset of the entire regional trail with documented gaps and proposed connector trails to the SFBT. The report analyzes the Bay Trail alongside regional employment centers, transit hubs, and recreational destinations (parks, shorelines) using GIS, to see where trail connectivity is strongest and where it is lacking. Underserved population maps, that is, the MTCs Equity Priority Community maps and BCDCs Communities of Concern Maps, were overlayed to visualize where these communities are concentrated and what their points of access to the Bay Trail is. This regional mapping provided a big-picture view of coverage gaps, segments where the trail is not continuous or easily reachable, and highlighted broad patterns of inequitable access.

Citywide Analysis – Richmond, CA

At the city scale, the focus narrowed to the city of Richmond. The City of Richmond has one of the most complete Bay Trail connections of most cities in the Bay and would serve as a good study for barriers to access. Richmond also has a relatively high concentration of vulnerable populations. These communities are effectively disconnected from the Bay Trail by different infrastructural barriers.

In the context of Richmond, GIS was used to map critical barriers and community characteristics that affect trail access. Key infrastructural barriers such as freight rail lines, highways (I-580 and I-80), and large industrial or port areas were mapped to see how they physically impede or complicate routes to the shoreline. In addition, I overlaid the underserved community maps to identify areas where underserved residents live or are concentrated. This analysis considered their level of need in relation to proximity to the Bay Trail. The existing and proposed bike/pedestrian infrastructure layers from city plans help understand the current network of active transportation connections. The location of key transit lines and stops was also overlaid to understand their coverage in relation to the Bay Trail heads or access points. This spatial analysis informed the site selection of the detailed study areas. In this focus area, major connector routes that link neighborhoods across the barriers toward the Bay Trail were identified for closer study. In total, six key corridors were selected based on this city-scale mapping, each representing a crucial access route from inland communities to a Bay Trail entry point.

Site Level Analysis

For the site-level analysis, six road corridors were selected in Richmond (part of the analysis extended to El Cerrito as it hosts key Bay Area Rapid Transit stops) that serve as vital links between underserved neighborhoods and the Bay Trail. These include:

- Harbor Way South
- Marina Way South
- Marina Bay Parkway
- Meade Street (through Juliga Woods St to Cutting Blvd)
- Bayview Avenue
- Central Avenue

Each corridor traverses one or more major barriers (such as highway interchanges or railroad crossings) that historically limited safe walking or biking access to the shoreline. By examining a set of diverse sites, from industrial port-adjacent streets to suburban arterial roads, the study captures a range of challenges facing Bay Trail connectivity at the neighborhood level.

Field Audit

To evaluate conditions on these streets systematically, an audit instrument was developed with a 4-point rating scale:

- 1-2 = absent or in poor condition.
- 2-4 = present and in good condition.

This tool was adapted from established pedestrian environmental audit methods, drawing on metrics and checklists from the Pedestrian Environment Data Scan (PEDS) and Systematic Pedestrian and Cycling Environment Survey (SPACES), and Jan Gehl's Public Life Study techniques.

The instrument was divided into two main components to assess street segments and intersections separately since the user experience and challenges can differ between mid-block areas and crossings.

Segment Audit Criteria

For each road segment (the portion of a street between two intersections) leading toward the Bay Trail, conditions relating to pedestrian, bicycle, and urban design features were documented. This included noting the presence and quality of pedestrian and bicycle infrastructure to support movement, additional amenities such as sitting, and the experience, such as the degree of street enclosure (Table 2).

The parcel frontage was also evaluated to gauge its support for walkability and bikeability. This included land use mix along each segment, and how active the frontage is. A diverse, active frontage and mixed land use tend to make a walking route more inviting, so these factors were rated accordingly. Each aspect was scored on the 1–4 scale based on defined benchmarks. For example, a segment with a broad, obstacle-free sidewalk and buffered bike lane might score 4 for infrastructure quality, whereas one with no sidewalk or only a narrow shoulder would score 1. Observational notes were also taken to supplement the numeric

Table 2: Segment Audit Criteria for Assessing Bay Trail Access

Theme	Criteria Evaluated	Rationale
Parcel Frontage & Land Use	• Setback (left & right) • Parcel & Building Access (left & right) • Façade Articulation (left & right) • Building/Parcel Maintenance (left & right) • Land-Use Diversity	Active frontages ("eyes on the street") and varied land uses enhance safety, visual interest, and accessibility to multiple destinations.
Traffic Exposure & Control	• Traffic Volume (lanes) • Posted Speed Limit- On-Street Parking Bays	Vehicle volumes, speeds, and curbside parking significantly affect pedestrian and cyclist comfort and perceived safety.
Pedestrian Infrastructure	• Sidewalk Presence • Sidewalk Width • Obstructions • Surface Condition • Cleanliness • Lighting	Continuous, well-maintained sidewalks and crossings are foundational for comfortable and safe walking environments.
Bicycle Infrastructure	• Bike Facility Type (Class I–IV) • Pavement Condition • Surface Cleanliness • Bike-Related Signage & Way-finding	Dedicated cycling facilities and sidewalk quality are essential for ensuring cyclists' comfort and safety, promoting active transportation.
Environmental Comfort & Aesthetics	• Degree of Enclosure (street "wall" or tree canopy) • Shade & Comfort- Sitting Opportunities- Trees Present- Slope of Street- Attractiveness	A comfortable, shaded, aesthetically pleasing route encourages walking and biking, increasing route usage and enjoyment.
User Perception	• Pedestrian Safety & Comfort • Bicycling/Rolling Safety & Comfort	The perceived safety and comfort of users directly influence actual usage levels, highlighting the importance of subjective experiences.

Table 3: Intersection Audit Criteria for Assessing Bay Trail Access

Theme	Criteria Evaluated	Rationale
Crossing Safety	• Traffic Control (stop signs, lights) • Crosswalk Presence & Visibility • Cyclist Crossing Markings & Design • Pedestrian/Cyclist Alert Signage • Crosswalk & Cycle Marking Visibility	Safe crossings significantly reduce conflicts between vehicles, pedestrians, and cyclists. Clear markings and signage improve safety and navigation clarity.
Crossing Exposure & Delay	• Length of Crossing (without median) • Ease of Crossing (frequency of gaps) • Crossing Safety Time (signal timing)	Shorter crossing distances and ample crossing times reduce pedestrian and cyclist exposure and stress, enhancing safety and comfort.
Accessibility & Intersection Design	• Curb Cuts & Tactile Pavers (ADA compliance) • Obstructions & Blind Spots (visibility at intersections)	Accessible intersection design supports usability for all, particularly vulnerable populations. Clear sight lines minimize collision risk.
Comfort & Maintenance	• Surface Condition (sidewalk quality) • Overall Comfort & Legibility (ease of navigation)	Well-maintained surfaces and clear intersection layouts improve comfort, reduce accidents, and encourage usage.

scores, capturing any notable issues such as bicycle riding on the sidewalk, pedestrian crossing mid-block, or walking on the carriageway, and other barriers not on the checklist.

Intersection Audit Criteria

Intersections often pose a significant safety risk for pedestrians and cyclists as multiple modes (motor, bike, and pedestrian) converge and conflicts arise as the respective paths or routes cross. All intersections in the selected site corridor were using a focused checklist, see Table 2. At each intersection, safety, exposure and stress factors, design and accessibility, and comfort/maintenance were assessed. Each element was marked according to the 4-point scale criteria, similar to the segment approach. In addition to the checklist, a 30-minute field observation at the respective intersections during a daytime period was also done.

During this observation, driver, cyclist, and pedestrian behavior and crossing patterns were noted and recorded. For instance, counting how many people crossed, whether they were walking or cycling, if they waited for signals or crossed mid-block, and any conflicts or close calls with vehicles. This provided qualitative insight into how the existing conditions affect real users. These observations were summarized to complement the scored data, illustrating the human impact of the infrastructure conditions.

Each audited observation at the intersection was assigned to one of these themes. Safety infrastructure, exposure and stress, design and accessibility, and comfort and maintenance. For example, sidewalk presence and quality contributed to Design & Accessibility, while lighting and upkeep fell under Comfort & Maintenance. Intersection crossing distance would relate to Exposure & Stress, whereas a functioning pedestrian signal contributes to Safety Infrastructure.

Data Scoring and Index Calculation

All field data from the segment and intersection audits were compiled into a database for analysis. Since each item was rated initially 1 through 4, the scores were first normalized to a 0–1 scale (with 1.0 representing the most supportive conditions and 0.0 the least). This normalization allowed the combination of various metrics more easily and the comparison of results despite some categories having multiple sub-items. Next, each audit metric was grouped into broader thematic categories reflecting key dimensions of a supportive active transportation environment for both the segment (parcel and street) and intersection.

Once grouped, we calculated a theme score for each segment and intersection by averaging the normalized sub-scores within that theme. Not all themes were considered equal in their impact on access; therefore, the themes were weighted in the final analysis based on findings from prior research and planning guidelines. Greater weight was given to factors most critical for safe and equitable access.

Using these weights, a composite "Supportiveness Index" for parcel frontage, street, and intersection was computed for each road segment and the audited intersection. This index is essentially a weighted sum of the theme scores, resulting in a single value (between 0 and 1) representing how well that location supports pedestrian/bicycle access to the Bay Trail. A value closer to 1 indicates a highly supportive environment, whereas values near 0 indicate severe barriers or poor conditions.

Classification of Results and Mapping

To interpret the results, the continuous index values were classified into four descriptive categories of access supportiveness. Based on this score distribution (and informed by qualitative judgment from field observations), each segment (parcel frontage and street) and intersection were labeled as one of the following: Red for "Barrier to Access," orange and red hatch for "Limited Support/Partial Barrier," or light blue and dark blue hatch for "Supportive," and deep blue for "Highly Supportive".

After categorization, the results were visualized using color-coded maps and diagrams. Each audited parcel frontage, street segment and intersection were mapped against the relevant road access corridor to the Bay trail from Richmond underserved neighborhoods

This visual representation clearly highlights spatial disparities in Bay Trail access conditions. Clusters of red/orange segments point to neighborhoods where infrastructure investment is most urgently needed, whereas blue segments show where conditions are already favorable. By presenting the data in map form, the study effectively communicates how physical barriers and infrastructure quality vary across different access routes, and underscores the inequities faced by underserved communities in reaching a regional amenity like the Bay Trail. These methodology steps provided an evidence-based foundation for the subsequent site analysis and for formulating design recommendations to improve trail access equity.

Barrier to Access: for low-scoring locations (roughly corresponding to index scores in the lowest quartile). These are places with serious deficiencies, where infrastructure is so lacking or hazardous that it effectively blocks safe access to the Bay Trail. For example, a parcel frontage with blank walls, no access, and a setback of above 20 feet, a segment with no sidewalks, or an intersection with no crosswalks or stop signs might fall here.

Limited Support (Partial barrier): indicating sub-par conditions (next quartile of scores). These areas have some infrastructure but with notable issues or gaps, providing only minimal support for walking or biking. Users may be able to reach the trail, but not without inconvenience or risk.

Supportive: indicating generally good conditions (second-highest range of scores). These corridors or junctions offer a decent level of safety and comfort, for instance, continuous sidewalks and some bike accommodation, although there may still be minor improvements needed. Most people would feel reasonably comfortable accessing the trail via these routes.

Highly Supportive: for top-performing locations (highest scores). These are model connectors that excel in safety, design, and comfort, functioning as welcoming, accessible links to the Bay Trail for all ages and abilities. This score indicates the presence of multiple land use types, including retail and commercial, with active frontages.

Bayview Avenue

A view from the overpass. High volume traffic with no bike facility, poor surface condition, and long fences, but still a good view



Site Analysis

Regional Analysis

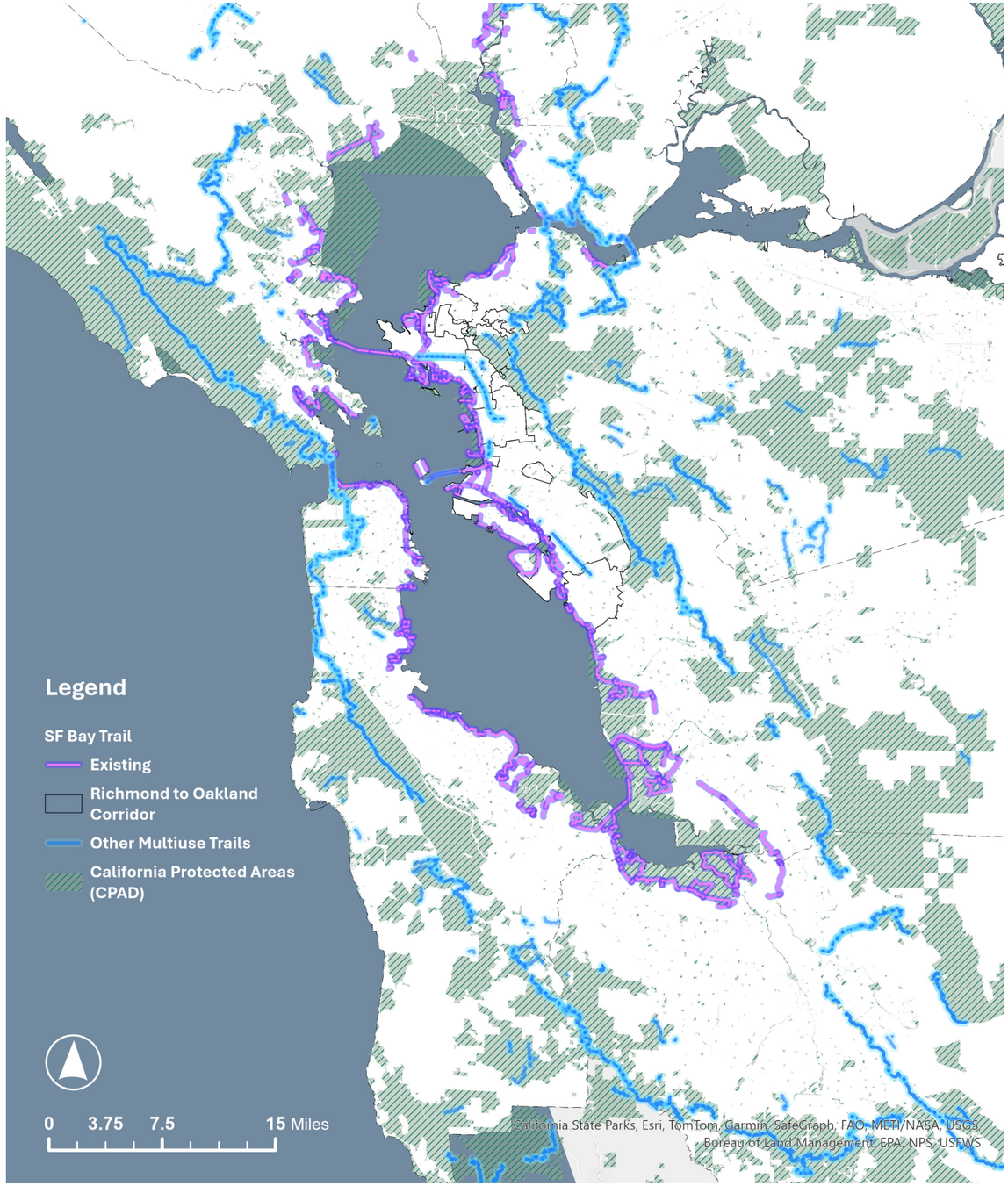


Figure 1: Map of Existing Trail Network for the San Francisco Bay Area Region, including the ridge trail.

The San Francisco Bay Trail is a regional multi-use corridor-path that will eventually form a continuous loop around the entirety of San Francisco and San Pablo Bays. Once complete, the Bay Trail will span approximately 500 miles, connecting 47 cities across all nine Bay Area counties and crossing seven toll bridges. This ambitious network is envisioned as a welcoming, multi-use pathway open to people of all ages and abilities who walk, bike, or roll. Initially initiated as a recreational trail around the San Francisco and San Pablo bays, now it serves many purposes, from outdoor recreation to daily commuting , linking residents to jobs, schools, transit hubs, parks, and waterfront destinations across the region. The Bay Trail's core goals include promoting active transportation, supporting healthy communities, encouraging environmental stewardship and education, and providing equitable public access to the Bay shoreline for all residents and visitors.



Bay Trail Gaps and Challenges

Since its inception in the late 1980s, roughly 70% of the planned Bay Trail route has been completed as of 2024, amounting to about 352 miles of trail in place (Figure 1). The remaining unbuilt gaps, however, represent the most challenging segments of the network. These gaps are often located in areas with constrained right-of-way, sensitive environments, or complex jurisdictional overlaps. In many cases, planned trail alignments must contend with physical barriers like active industrial waterfronts, highways, or wetlands, and face complications such as utility conflicts or land ownership issues. As the Bay Trail Gap Closure Implementation Plan (BTGCIP) notes, the "remaining segments are among the most complicated" to build due to such factors as limited right-of-way, environmental barriers, conflicts with existing infrastructure, and the need for coordination across multiple jurisdictions. To address these challenges, the BTGCIP (July 2024) was developed as a road-map to identify and prioritize each missing Bay Trail segment for completion. This plan provides a strategic framework for closing gaps by emphasizing feasibility and impact. This involves prioritizing projects that would unlock long continuous stretches of trail or connect to important destinations.





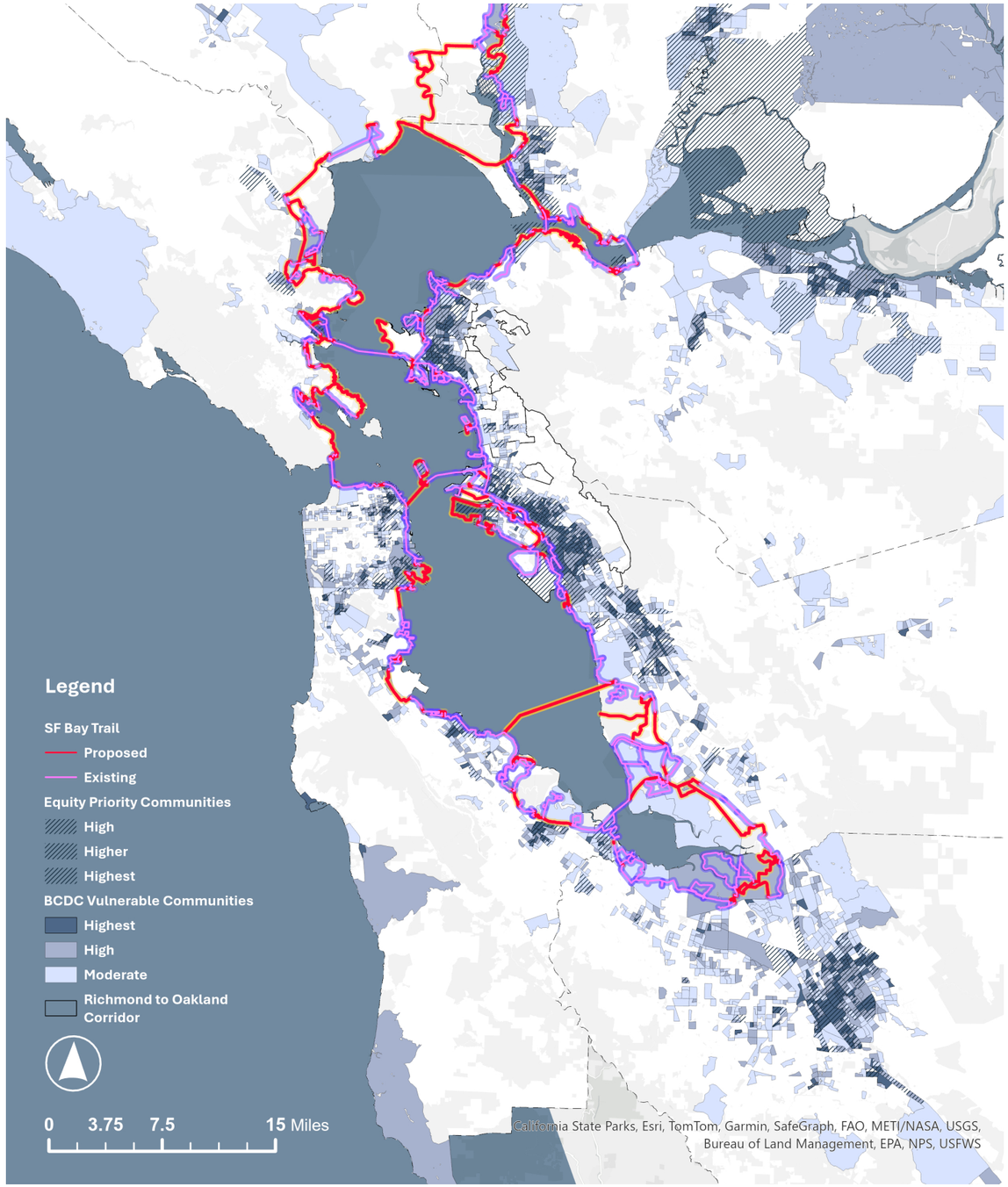


Figure 2: Map of Vulnerable Communities for the San Francisco Bay Area Region

Access, Equity and Priority Communities

Ensuring that the Bay Trail is accessible to all Bay Area residents, particularly those in historically underserved or marginalized communities, is a prominent focus of recent planning efforts. Equity Priority Communities (EPCs: MTC's designation for areas with high concentrations of low-income households, communities of color, and other factors). The BCDC also identifies these underserved neighborhoods as 'Communities of Concern". These communities often face disproportionate barriers to accessing the Bay Trail. Both the 2024 Gap Closure Plan and the Bay Trail Equity Strategy (Phase I, 2023) recognize this gap: the BTGCIP explicitly made expanding Bay Trail access to EPCs a key objective of its implementation strategy.

Field research and community interviews from the Equity Strategy highlight several key challenges that EPCs and other vulnerable communities encounter in reaching or using the Bay Trail.

CBO Outreach Feedback

The outreach consistently emphasized the importance of completing community connector trails and local bike and pedestrian networks as critical to the success of the Bay Trail, particularly to provide isolated communities access to shoreline recreation

- Participants consistently raised the need to address environmental justice concerns, specifically avoiding trail routes through contaminated areas like Hunters Point Naval Shipyard, due to health risks for nearby communities
- Feedback strongly highlighted the need for regular trail maintenance, including pothole repairs, trash cleanup, and landscaping, as well as safety improvements such as improved lighting, increased patrols in sensitive areas, and clearly maintained amenities to ensure safety and comfort.
- Residents advocated for improved public transportation connections to trail-heads and increased parking capacity to facilitate equitable access, particularly for communities located distant from trail segments.
- Attendees requested more user-friendly amenities, including directional and multilingual signage, educational displays, shade, bathrooms, play areas, and waste disposal stations, to enhance the trail's appeal and usability.
- Participants encouraged the organization of regular free community events (such as rides or walks) to increase awareness, familiarity, and comfort in using the Bay Trail, helping residents develop a sense of ownership and belonging.

Bay Trail Equity Strategy

MTC launched the Bay Trail Equity Strategy to ensure that the completion of the trail is accompanied by inclusion and accessibility. The Equity Strategy's Phase I, completed in 2023, was a "history and existing conditions" study examining how different communities currently access (or fail to access) the Bay Trail. This report documented historic inequities. For instance, patterns of shoreline industrial development and highway construction have left low-income communities cut off from the waterfront. Present-day barriers include gaps in infrastructure, safety concerns, and lack of awareness.

The Equity Strategy was developed under MTC's broader Equity Platform initiative, meaning its recommendations aim to integrate equity considerations into all aspects of Bay Trail development, including planning, investment, design, programming, and other related areas. I involved data analysis and interviews with community leaders to identify key issues. Subsequent phases (ongoing in 2023-2024) involve direct public engagement (community meetings, surveys, and events) to hear from residents in Equity Priority Communities through various community organizations, such as Bike East Bay, about what improvements would make the Bay Trail more accessible and welcoming to them

Figure 3: Pedestrian Overpass over I80 at Gilman



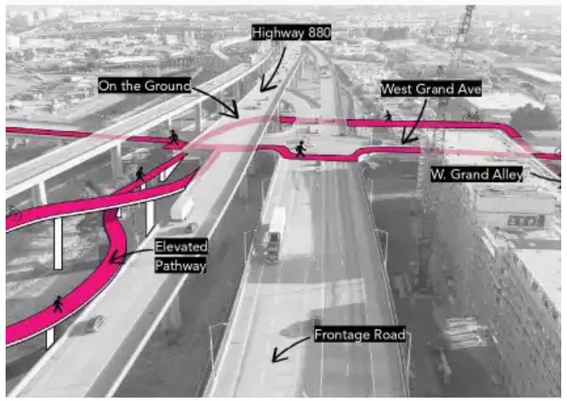
Figure 4: Pedestrian Overpass over I80 at Addison



Figure 5: South Bay-front Bridge, 2021, Emeryville



Figure 6: Proposed West Oakland Link (Proposed)



Key Findings/Notes

- Feeling “Not for Us”: A recurring theme throughout the interviews was the feeling that the Bay Trail is not a space for all races, classes, and abilities. Some interviewees… perceived wealthy, White, able-bodied cyclists to be the primary users.
- Lack of community connection and exclusion is evident in places like Richmond’s Iron Triangle, a historically Black and low-income neighborhood. There, “proximity to the trail has not translated into community connections or identity.
- Interviewees flagged that traditional approaches to security can backfire for marginalized users. Many noted “that police presence on the Bay Trail may deter Black residents from using the trail. Most interviewees agreed that more enforcement would not increase the sense of personal security.
- “Interviewees shared that the primary physical barriers to accessing the Bay Trail are (1) inadequate parking and public transportation at Bay Trail access points and (2) traffic safety concerns when walking or biking to get to the Trail.”
- For many residents, cars offer the only comfortable, convenient mode to reach the Bay Trail, which is a challenge for those who do not own cars, or cannot drive due to disability, age, or not having a driver’s license.
- Community members voiced fears that trail improvements could attract new investors or residents at the expense of locals. One leader from Vallejo urged: “Show the community that you’re improving this trail for the current residents, not as some way to attract new residents.”
- “It is critical that the Bay Trail does not become yet another driver of displacement and alienation.” Instead, “Equitable Bay Trail development would prioritize existing and historic Black and Indigenous communities.”

Ongoing Bay Trail Access Projects

Richmond Wellness Trail

The Richmond Wellness Trail (RWT) is a community-driven initiative that aims to create a safe and attractive route connecting Richmond’s inner-city neighborhoods to the Bay Trail and waterfront open spaces on Marina Way South. The concept emerged around 2015 when a National Park Service urban fellow, working with the City of Richmond and the Local Government Commission, engaged residents in envisioning a dedicated wellness-oriented trail.

The RWT is envisioned as a four-mile, multi-use trail that runs from downtown Richmond through the Iron Triangle community to the shoreline of the San Francisco Bay. Its mission statement describes it as “a safe, inviting, multi-modal route that inspires a healthy, active lifestyle, increasing connections between historic Downtown Richmond, the Iron Triangle, and the natural and historic features of the Bay”. The trail is designed not only as a transportation link but as a health and equity intervention. To improve access to parks and provide a pleasant place for walking and biking. It aims to enhance wellness outcomes in communities that have faced health disparities.

West Oakland Link

The West Oakland Link is a planned project in Oakland designed to overcome major physical barriers between West Oakland neighborhoods and the Bay Trail/Bay Bridge pathway. West Oakland has long been isolated from its waterfront by the MacArthur Maze (I-80/I-880/I-580 interchange), freight railroad tracks, and the Port of Oakland’s maritime facilities. Currently, a bicyclist or pedestrian attempting to reach the Bay Trail at the eastern terminus of the Bay Bridge must navigate a patchwork of on-street routes through industrial areas, characterized by heavy truck traffic and unsafe crossings. The West Oakland Link project proposes a 1.1-mile elevated pedestrian and bicycle pathway that would directly connect West Oakland to the Bay Bridge Trail in a safe and accessible manner.

Richmond to Oakland Corridor Analysis

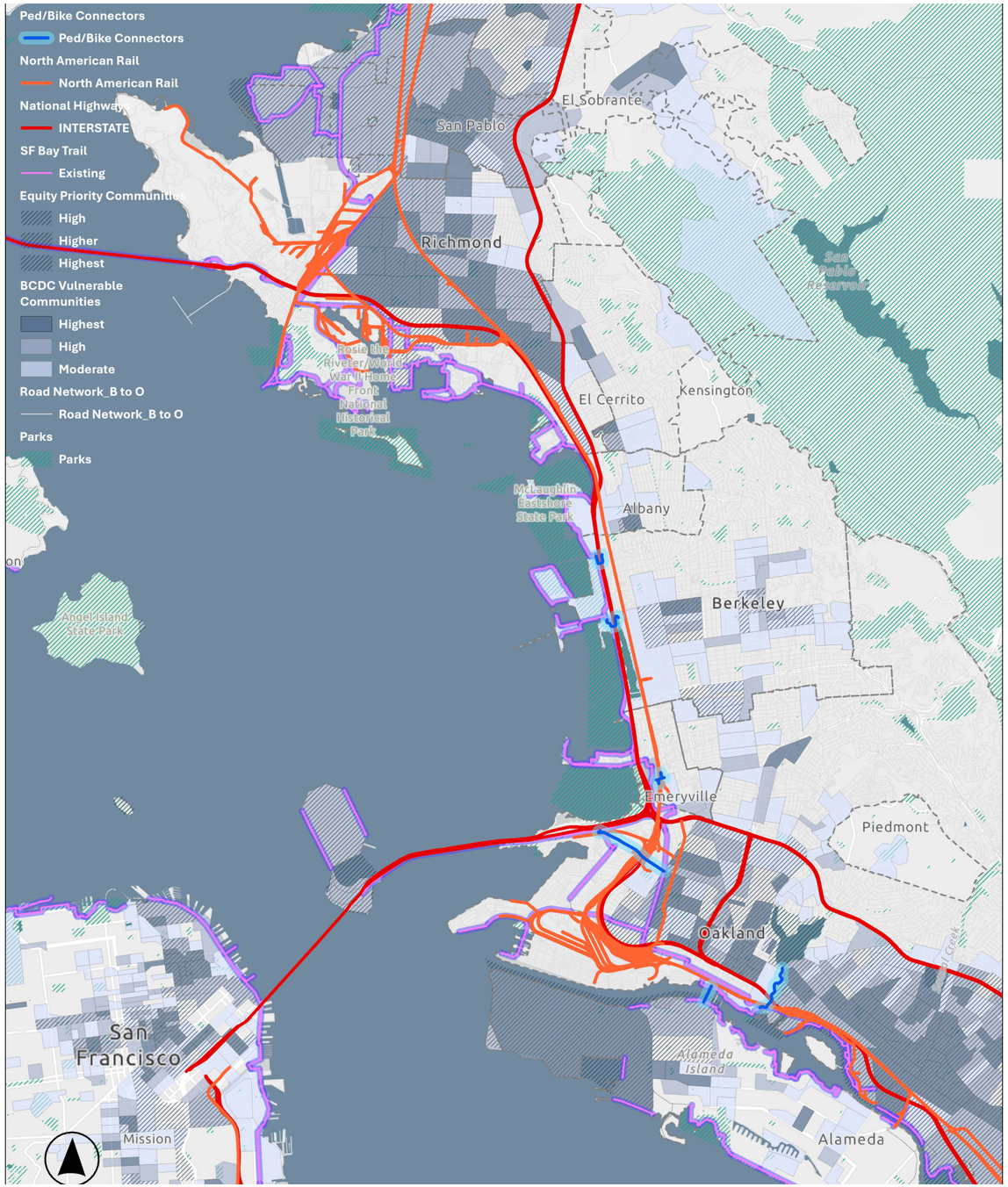


Figure 7: Map of Roadway connections to the Bay Trail in the San Francisco Bay Area Region

Richmond–Oakland Corridor Analysis

The stretch of the East Bay shoreline corridor between the City of Richmond in western Contra Costa County and Oakland in Alameda County, is an example of how urban form can impede access to the water front and therefore the bay trail. This area – encompassing Richmond, Emeryville, Berkeley, Albany, and West Oakland – contains a high concentration of underserved communities (EPC and Communities of Concern) and is marked by severe infrastructure barriers that separate inland neighborhoods from the Bay Trail along the waterfront. The corridor's historical land uses (heavy industry, ports, railroads, and highways running parallel to the bay) have created a barrier between many residents and the shoreline.

Richmond, a city with predominantly minority and low-income neighborhoods, separated from the shoreline by like the Iron Triangle, North Richmond, and South Richmond are separated from the shoreline by Interstate 580 and 80, freight rail lines, and large industrial facilities, which lie directly inland of the Bay's edge. The Bay Trail in Richmond mostly runs along the water's edge, but much of the city's population lives on the other side of the freeway and railroad corridor. As a result, Richmond residents, mostly the underserved, are often disconnected from their waterfront despite the trail's presence.

The city is effectively separated by railroad tracks, industrial land uses, and high-speed arterials that are difficult and dangerous to cross. Only a few roads provide access to the South shoreline. These are through **Harbor Way South, Marina Way South, Marina Bay Parkway, Regatta Overpass, Bayview Avenue, and Central Avenue.** They are multi-lane, high volume (some of them truck routes) with fast traffic and complex interchanges, and minimal bike/pedestrian facilities. There is no dedicated pedestrian or bicycle bridge that connects central or inland Richmond over the highway or rail lines to the shoreline or the Bay Trail. Bay Trail, meaning residents must navigate the existing at-grade roadways to reach shoreline parks and destinations.

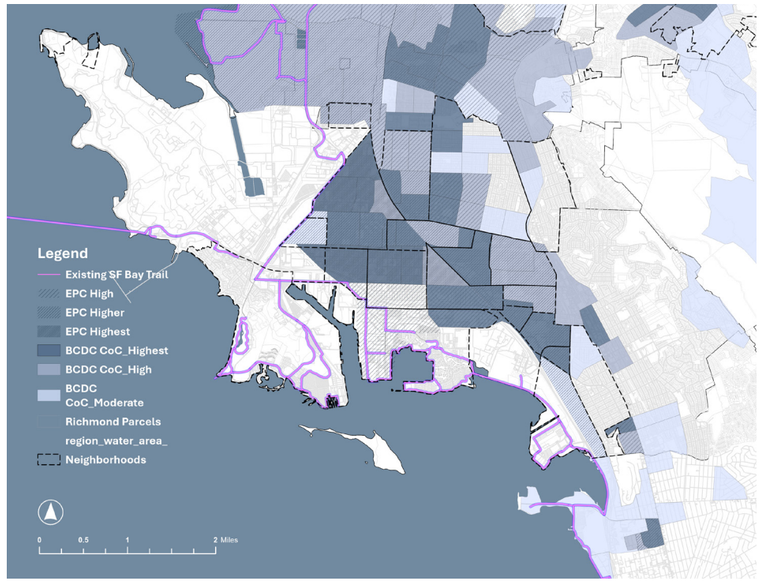
West Oakland faces similar impediments. Bordered by the I-880 freeway, the Port of Oakland, and freight rail tracks, West Oakland's predominantly Black and low-income communities are isolated from the Bay shoreline. The planned West Oakland Link project is a direct response to this: it will create a grade-separated path weaving through freeway and railroad infrastructure to finally connect West Oakland to the Bay Bridge Trail on Yerba Buena Island.

By contrast, some of the adjacent smaller cities between Richmond and Oakland have made targeted investments to overcome specific barriers. For instance, the City of Berkeley built a **pedestrian/ bicycle bridge** over Interstate 80 (at University Avenue). This allows cyclists and walkers to safely reach the Berkeley Marina and Bay Trail without crossing freeway on-ramps at grade. Berkeley has also constructed a **pedestrian overpass at Gilman Street**, improving access from both Albany and Berkeley to the waterfront and the Bay Trail.

The City of Emeryville recently opened the **South Bay front Bridge (December 2021)**, spanning a busy rail corridor to connect its interior neighborhoods and Emeryville Greenway path to the Bay Trail on the waterfront. The City of Oakland is improved connections around Lake Merritt Channel to enhance access to its estuary waterfront which connects to the Bay Trail. Oakland's efforts also include the 'West Oakland Link' a multi-use (pedestrian/Bike) path that connects the West Oakland neighborhoods to the Bay bridge and to the Island. These examples illustrate that where investments have been made in pedestrian and bicycle infrastructure, shoreline access has improved in this corridor.

Richmond, however, lacks comparable infrastructure. Despite having one of the longest contiguous stretches of Bay Trail in the region along its shoreline, Richmond has no pedestrian overpasses or safe access routes linking its inland residential neighborhoods to the waterfront.

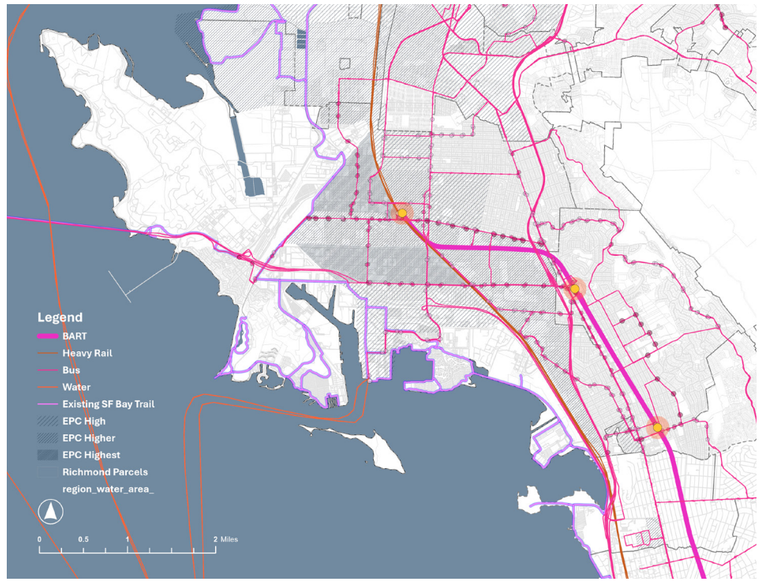
City Analysis



Underserved Communities

Richmond's Equitable Priority Communities (EPCs) and BCDC-designated Communities of Concern concentrate in inland neighborhoods, Iron Triangle, North & South Richmond, Annex, where low-income and people-of-color residents face compounded barriers to the Bay Trail. These areas lack safe crossings over I-580, rail lines, and industrial zones. Overlaying EPC and CoC maps reveals critical gaps: residents live adjacent to barriers rather than waterfront access points, underscoring urgent equity-driven improvements.

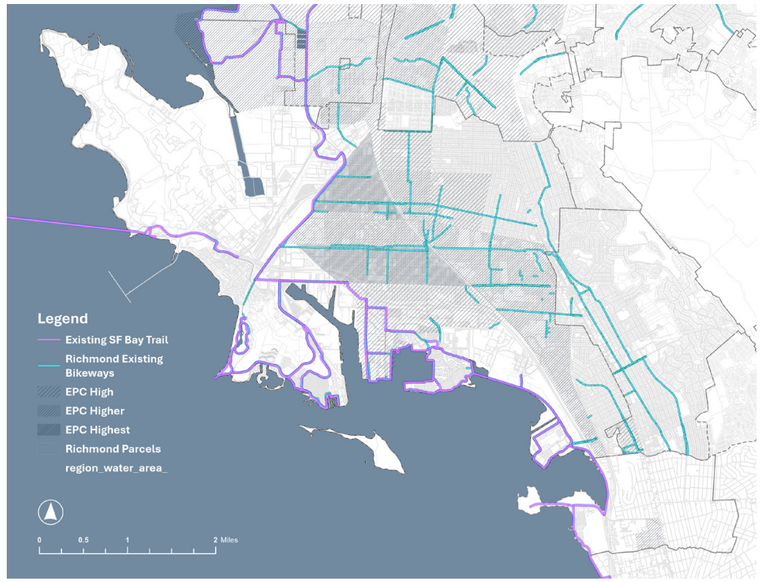
Figure 8: Map of Underserved Communities in Richmond



Transit Service

Richmond's transit network centers on the Richmond BART - connecting the South of the Bay and Amtrak station, also in the same place, connecting the Richmond–Warm Springs/South Fremont line and Capitol Corridor, with feeder AC Transit buses (72M, 74, 376) serving key corridors. The Richmond Ferry Terminal at Marina Bay adds peak-hour ferry service to San Francisco. While this multi-modal hub links inland neighborhoods to jobs and the waterfront, many audit routes still lack frequent bus stops and shelters, limiting seamless last-mile connections for trail access.

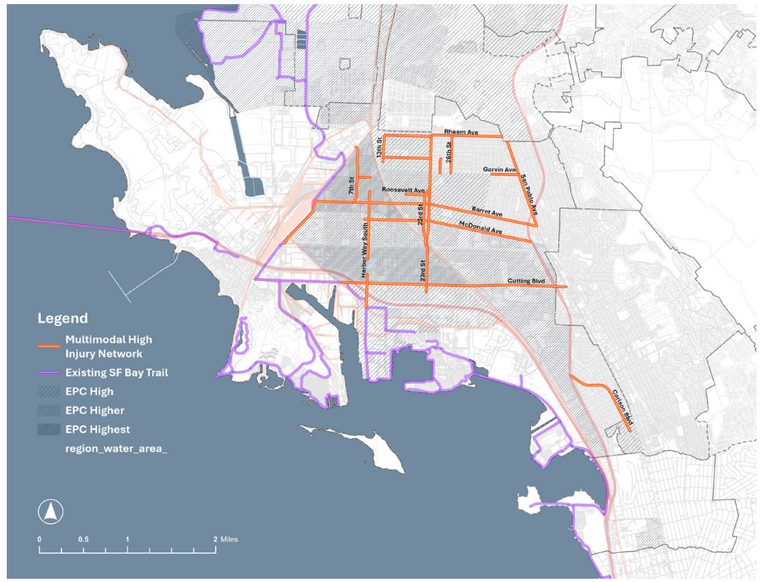
Figure 9: Map of Existing Transit Service in Richmond



Existing Bikeways

Richmond's bikeway network spans Class I–IV facilities, with most routes north of I-580. East–west connections include the Bay Trail (both shoreline path and adjacent on-street segments) and the Richmond Greenway. A future north–south spine, the Richmond Wellness Trail along Marina Way South, will link BART to the waterfront. Critical gaps remain south of Cutting Boulevard and across the freeway/rail barriers, creating hazardous, discontinuous crossings for cyclists and pedestrians accessing the Bay Trail.

Figure 10: Map of Existing Bike Infrastructure in Richmond



Multi-modal High Injury Network

The Multi-modal High-Injury Network highlights corridors with elevated pedestrian and cyclist collision rates, as mapped in Richmond's Local Road Safety Plan. Key hot-spots include Harbor Way South, Cutting Boulevard, San Pablo Avenue, and Carlson Boulevard, each showing clusters of serious crashes. This network guides targeted safety investments where they can most reduce injuries and improve equity.

Figure 11: Map of Multi-modal High Injury Network (LRSP) in Richmond

Audit Sites Analysis

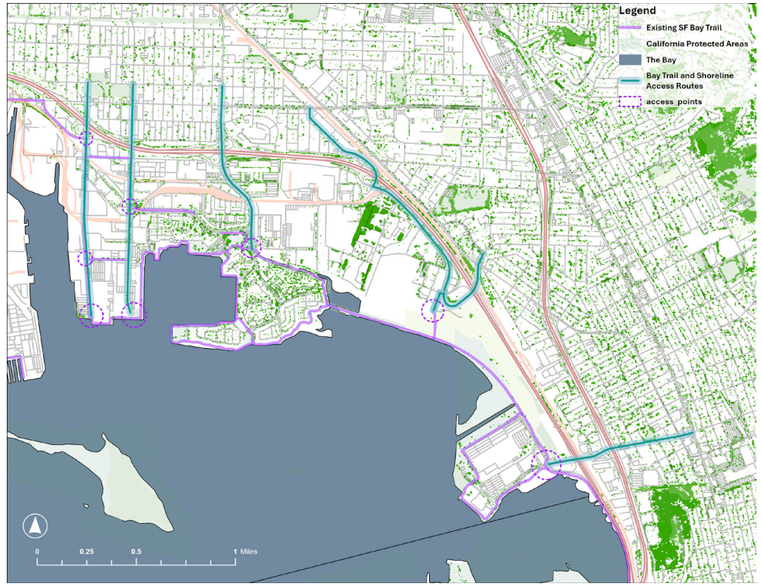


Figure 12: Map of Tree Canopy in Richmond

Tree Canopy

Street tree cover is minimal across Richmond's Bay Trail access routes, most corridors have under 10% canopy, leaving sidewalks exposed to sun and traffic. Only the Meade Street segment near UC Berkeley's Field Station boasts dense tree clusters. Local groups like Urban Tilth and Friends of Richmond's Urban Forest are promoting rapid street-tree plantings, but significant shade gaps persist, limiting pedestrian comfort and cooling.

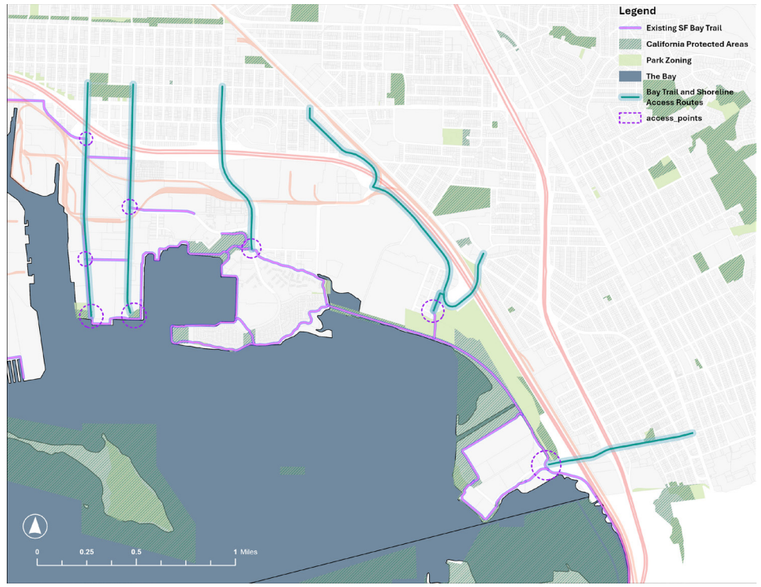


Figure 13: Map of Key Shoreline Destinations in Richmond

Destinations

Shoreline destinations include Marina Bay Park, Point Isabel Shoreline Park, and Rosie the Riveter/ WWII Home Front National Historical Park. Inland anchors South of the highway are the Richmond Ferry Terminal, Central Avenue's Costco, Rosie the Riveter Visitor Center, UC Berkeley's Field Station, and the Richmond BART/Amtrak station. Improved walking and cycling links would connect residents to recreation, jobs, transit, and services.

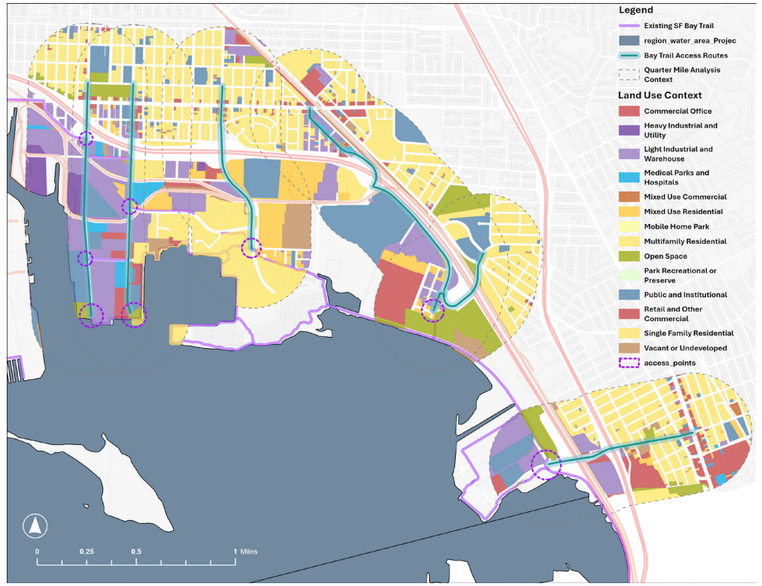


Figure 14: Map of Existing Land Uses in Richmond

Existing Land use

Industrial zoning lines five of six corridors, yielding long, inactive frontages. Only Marina Bay Parkway south of I-580 features low-density homes; Central Avenue east of San Pablo mixes small retail and single-family houses; Meade Street east of Regatta hosts UC Berkeley's Field Station and R&D. Bayview and Harbor Way remain almost entirely heavy industrial.

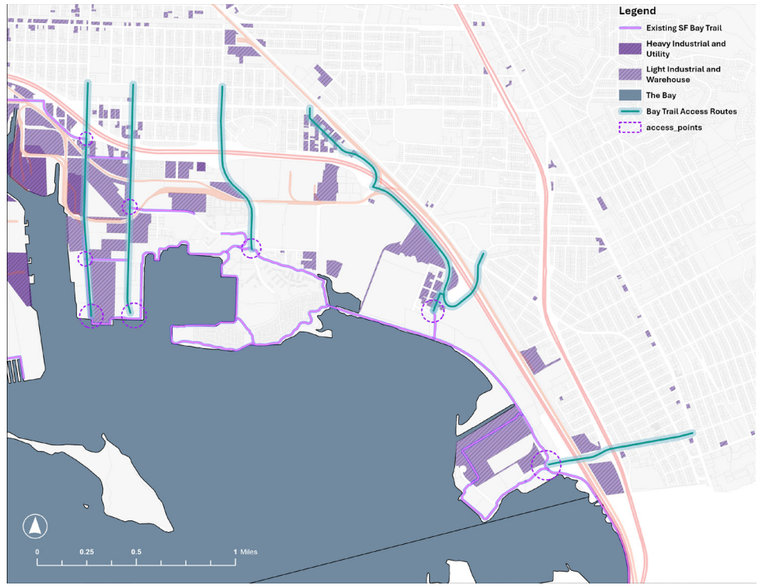


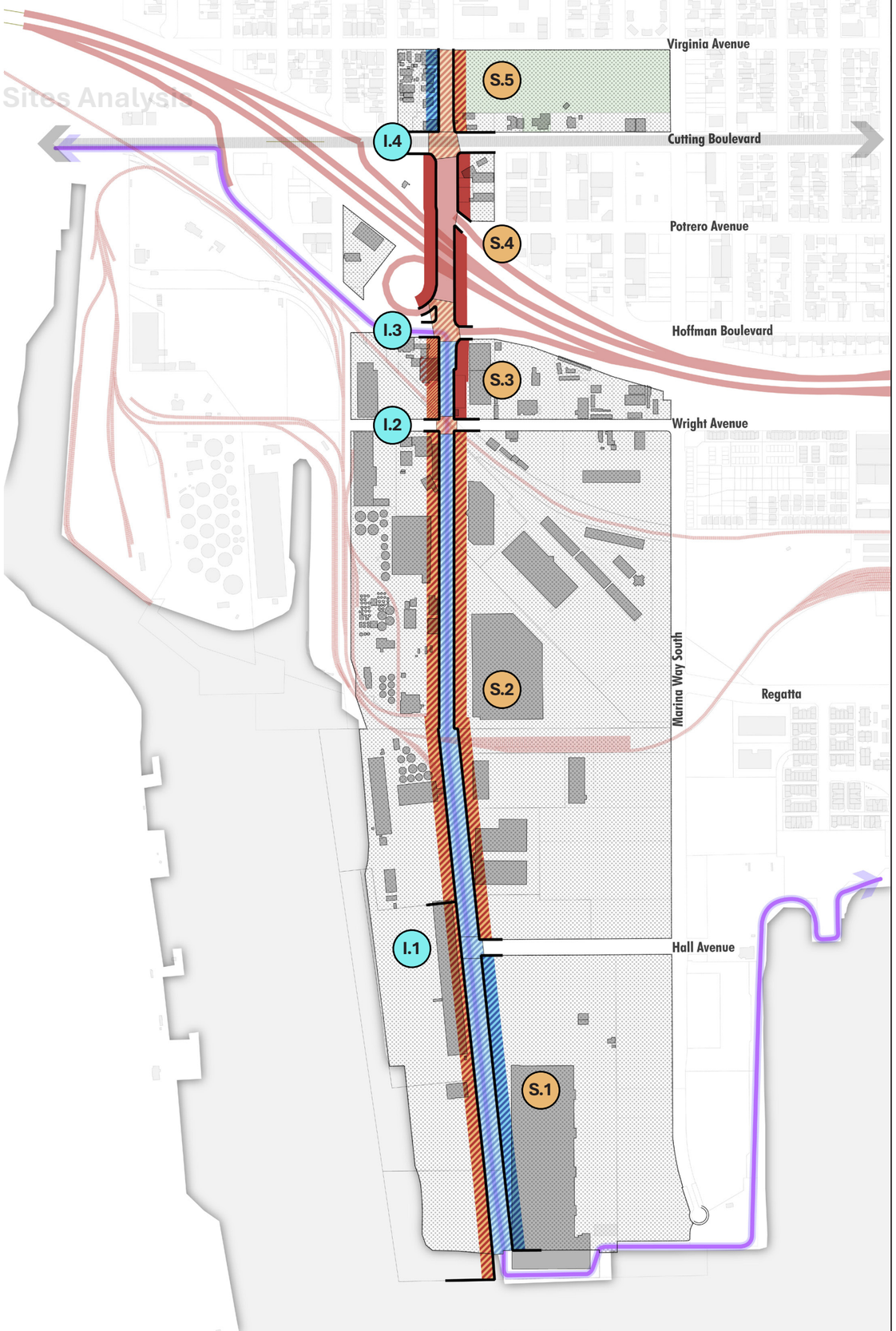
Figure 15: Map of Existing Industrial Land Uses in Richmond

Industrial Land Use

Industrial parcels dominate Harbor Way South, Marina Way South, Bayview Avenue, and Central Avenue west of San Pablo, resulting in long, inactive frontages, noise, and poor air quality. By contrast, Central Avenue east of San Pablo, Marina Bay Parkway south of I-580, and Meade Street east of Regatta Boulevard feature pockets of residential, retail, and institutional uses, highlighting the stark land-use imbalance along most corridors.



Figure 16: Map of Site Audit Sites (Selected for Analysis) in Richmond.



Site 1: Harbor Way South

Harbor Way South is a key corridor connecting central Richmond neighborhoods directly to important shoreline destinations, including the Richmond Ferry Terminal and Rosie the Riveter Historic Park. It also serves as a primary access route to Terminals 2 and 3 of the Port of Richmond, resulting in regular heavy vehicle and freight traffic. This corridor is predominantly industrial, characterized by large parcels, extended block lengths, and sizable building footprints, creating distinct challenges for pedestrian and cyclist accessibility.

Notably, Harbor Way South also accommodates a section of the Bay Trail, specifically the on-street route, highlighting its strategic importance for active transportation and equitable waterfront access in Richmond.

- Connects Santa Fe and Coronado Neighborhoods

- Bay Trail
- Highly Supportive
- Moderately Supportive
- Limited Support (Partial Barrier)
- Barrier to Access
- Interstate Highway
- Heavy-Rail
- S — Segment Marker
- I — Intersection Marker

0.42

Route Access Supportiveness Index/Score

Street Condition

- **Average Score (0.45):** Limited-to-moderate pedestrian and cyclist support overall.
- **Traffic Exposure:** No buffers, high speeds, high-volume traffic (esp. Hoffman to Cutting Blvd).
- **Poor Maintenance:** Litter and debris reduce pedestrian usability.
- **Bike Facilities South of Hoffman Blvd**: Safer cycling experience with Class IV protected bikeway (scores 0.83–0.92), though pedestrian support remained limited (0.39–0.44) due to obstructions and truck-oriented infrastructure.

Street segments along Harbor Way South scored an overall average of 0.45, reflecting limited-to-moderate support for pedestrian and cyclist access to the Bay Trail. However, significant variability was noted between segments.

The segment from Hoffman Boulevard to Cutting Boulevard performed notably poorly (0.39 - Limited Support), creating a clear barrier to access. This section is characterized by six lanes of high-volume, fast-moving traffic with no buffers, bike lanes, or sense of enclosure, making conditions particularly stressful and uncomfortable. Despite generally good quality, sidewalks showed poor maintenance, frequent litter, and debris accumulation, significantly reducing pedestrian appeal and usability.

Observations confirmed speeding vehicles and very limited pedestrian activity on the overpass, reflecting discomfort due to these harsh conditions.

Segments south of Hoffman Boulevard towards the Richmond Ferry Terminal offered a substantially improved experience, particularly for cyclists. These segments featured a clearly marked Class IV protected bikeway (Bay Trail route), significantly enhancing cycling safety and comfort, which was clearly reflected in the high bike infrastructure scores (0.83 to 0.92 - Highly Supportive).

Pedestrian facilities along this southern section were generally adequate with good sidewalk quality and cleanliness, but scores remained lower (0.39 to 0.44 - Limited to Moderate Support) due to frequent sidewalk obstructions, particularly from rail crossings, utility equipment, and parked construction vehicles. These factors, along with intersection designs favoring large truck turning movements, compromised pedestrian comfort, explaining observed low pedestrian activity compared to cyclist volumes.



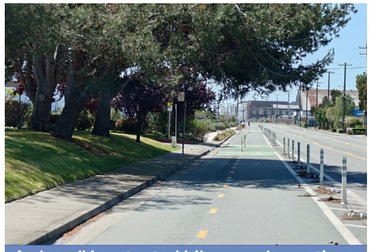
Poor surface condition from Virginia to Cutting Blvd



Sidewalk is narrow, full of debris and liter, next to a high-speed-high-volume road and a long fence



On going construction activities interrupting pedestrian with no alternative provisions for movement



A class IV protected bikeway also acting as a buffer with shaded sidewalk



A buffered sidewalk with ornamental planting and frequent signage supportive of pedestrians



A wide,buffered excellent quality sidewalk (landscape and bikeway) with ornamental planting great for walkability



Several vehicle were observed with mounted bike which may suggest that people prefer to drive and only bike at destination



Railway crossing infrastructure blocks the sidewalk and disrupts the continuity of the sidewalk and bikeway

Table 4: Street Condition Audit Scoring for Harbor Way South

ID	Segment Start	Segment End	Traffic Exposure	Pedestrain Infrastructure	Bicycle Infrastructure	Environmental Comfort	Subjective Perception	Segment Index	Rank
1	Harbour Way South & San Francisco Bay Trail	Harbour Way South & Hall Avenue	**0.22**	0.44	0.83	0.44	0.83	***0.54***	***Moderately Supportive***
2	Harbour Way South & Hall Avenue	Harbour Way South & Wright Avenue	0.56	0.33	0.92	0.39	0.58	***0.56***	***Moderately Supportive***
3	Harbour Way South & Wright Avenue	Harbour Way South & Hoffman Boulevard	0.44	0.44	0.83	0.33	0.50	***0.52***	***Moderately Supportive***
4	Harbour Way South & Hoffman Boulevard	Harbour Way South & Cutting Boulevard	**0.11**	0.44	**0.25**	**0.00**	**0.00**	***0.17***	***Barrier to Access***
5	Harbour Way South & Cutting Boulevard	Harbour Way South & Cutting Boulevard	0.44	0.56	0.42	0.39	0.42	***0.45***	***Limited Support***
		Average Score	0.36	0.44	0.65	0.31	0.47	***0.45***	***Limited Support***

Intersections

- **Average Score (0.40):** Limited-to-moderate pedestrian and cyclist support overall.
- **Traffic Exposure:** 90-foot crossings lacking refuge islands and poorly aligned curb cuts (Cutting Blvd.)
- **Railway Crossing Obstructions:** At-grade rail crossing poses as barriers for cyclists and pedestrians.
- **Discontinuous Bike Facilities:** Abrupt transition between Class IV and Class II facilities at Wright Avenue reduce cyclist safety
- **Confusing Design and Lack of Way-finding:** Frequent cyclist confusion and unsafe pedestrian behavior due to unclear design.

Intersections along Harbor Way South received an average score of 0.49, indicating limited support (partial barrier) for pedestrian and cyclist movements, particularly due to low comfort, safety, and maintenance conditions.

The intersections at Wright Avenue (0.33) and Carlson Boulevard (0.40) performed notably low in safety and comfort. The Wright Avenue intersection was especially problematic due to the complexity introduced by an at-grade rail crossing, creating challenging conditions for pedestrians and cyclists. Additionally, the abrupt transition of bicycle infrastructure from a Class IV separated bikeway to a standard Class II bike lane at Wright Avenue, and subsequently reverting back at Hoffman Boulevard, created confusion, reduced rider comfort, and significantly increased rider stress. Field observations confirmed that cyclists often navigated this confusion by continuing on-street instead of utilizing the provided separated bikeway. Clear way-finding signage and earlier transition notices are urgently recommended to improve cyclist predictability, especially for unfamiliar or novice riders.

The intersection at Cutting Boulevard scored lowest for exposure (0.11 - barrier to access), primarily due to its excessively long crossing distance (over 90 feet) without refuge islands or medians. Further complicating pedestrian crossings, curb cuts and crosswalk alignments were poorly designed and misaligned with existing sidewalks, significantly increasing crossing complexity, discomfort, and risk.

Field observations reinforced these findings, capturing frequent cyclist confusion at Wright Avenue and dangerous pedestrian crossing behaviors at Cutting Boulevard due to poor intersection design and excessive vehicle speeds.









Table 5: Intersection Audit Scoring for Harbor Way South

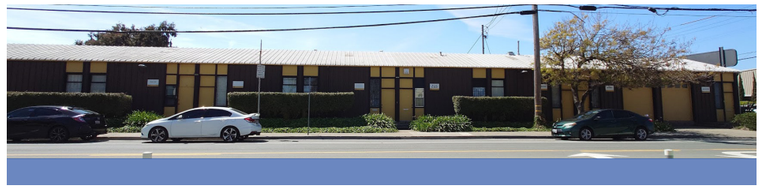
ID	Intersection	Traffic Control	Pedestrian Crossing	Cyclist Crossing	Signage indicating ped/bike presence	Crossing Marking Visibility	**Safety**	Length of Crossing	Ease of Crossing	Crossing Time	**Exposure**	Obstruction & Blindspots	Curb Cuts	**Accessibility & Design**	Street Surface Condition	Comfort & Legibility	**Comfort & Maintenance**	**Intersection Index**	**Rank**
1	Harbour Way South & Hall Avenue	0.33	0.67	1.00	0.00	0.67	**0.53**	0.33	1.00	1.00	**0.78**	1.00	1.00	**1.00**	0.00	0.67	**0.33**	***0.66***	***Moderately Supportive***
2	Harbour Way South & Wright Avenue	0.33	0.00	0.33	0.00	1.00	**0.33**	0.00	0.67	1.00	**0.56**	0.33	0.33	**0.33**	1.00	0.33	**0.67**	***0.47***	***Limited Support***
3	Harbour Way South & Hoffman Boulevard	0.67	1.00	0.67	0.00	1.00	**0.67**	0.33	1.00	0.67	**0.67**	0.33	0.33	**0.33**	0.00	0.67	**0.33**	***0.50***	***Limited Support***
4	Harbour Way South & Cutting Boulevard	0.67	1.00	0.00	0.00	0.33	**0.40**	0.00	0.00	0.33	**0.11**	0.67	0.33	**0.50**	0.67	0.00	**0.33**	***0.34***	***Limited Support***
	Average Scores	0.50	0.67	0.50	0.00	0.75	**0.48**	0.17	0.67	0.75	**0.53**	0.58	0.50	**0.54**	0.42	0.42	**0.42**	***0.49***	***Limited Support***

Parcel Frontage

- **Average Score (0.36):** Limited-to-moderate pedestrian and cyclist support overall.
- **Industrial Land Use and Access Restrictions:** Controlled access, large setbacks, and uninviting frontages.
- **Inactive and Unmaintained Frontages:** Extensive blank walls, fences, and poor maintenance contribute to a harsh, unattractive pedestrian environment.
- **Lack of Visual Engagement:** Minimal architectural articulation and absence of active ground-level uses result in an unengaging public realm.
- **Inconsistent Land Use Integration:** Areas with single-use industrial zoning perform poorly, while mixed-use areas support a more vibrant and pedestrian-friendly atmosphere.

Harbor Way South scored an average of 0.36, indicating limited support for pedestrians and cyclists accessing the Bay Trail. The west side parcels south of the I-580 are dominated by Port of Richmond facilities, characterized by strictly controlled access, large setbacks, and uninviting frontage. These parcels feature extensive blank walls, fences, and industrial storage areas, resulting in an unattractive and unengaging pedestrian environment.

The least supportive sections are notably between Wright Avenue and Cutting Boulevard, where substantial building setbacks, inactive frontages, and poor maintenance create particularly harsh conditions. Conversely, the best-performing segments were found between Ferry Terminal and Hall Avenue (especially near Rosie the Riveter historic building), featuring multiple access points, articulated architecture, and engaging façades. Similarly, the northern section from Cutting Boulevard to Virginia Avenue demonstrated supportive characteristics due to its mixed land uses—residential, commercial, and park space—promoting a more comfortable and visually appealing and vibrant pedestrian environment.













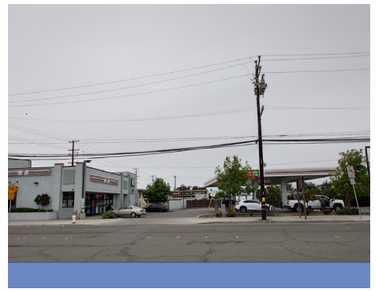
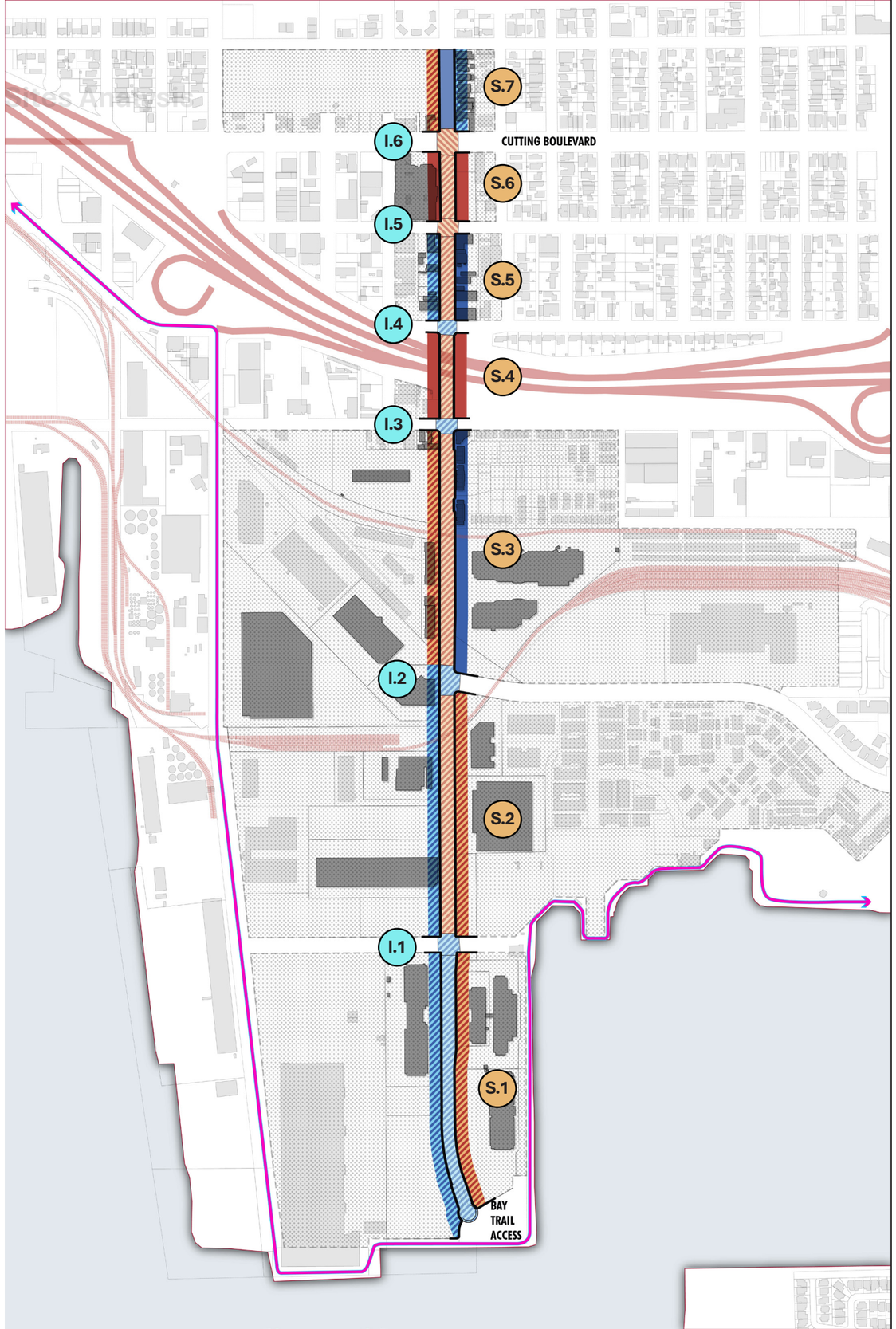


Table 6: Parcel Frontage Audit Scoring for Harbor Way South

			LEFT							RIGHT						
ID	Segment Start	Segment End	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank
	Harbour Way South & San Francisco Bay Trail	Harbour Way South & Hall Avenue	1.00	0.00	0.33	0.33	0.67	***0.47***	***Limited Support***	0.67	0.00	0.67	0.67	1.00	***0.60***	***Moderately Supportive***
	Harbour Way South & Hall Avenue	Harbour Way South & Wright Avenue	0.33	0.33	0.33	0.67	0.33	***0.40***	***Limited Support***	0.33	0.00	0.33	0.67	1.00	***0.47***	***Limited Support***
	Harbour Way South & Wright Avenue	Harbour Way South & Hoffman Boulevard	0.33	0.67	0.33	0.33	0.33	***0.40***	***Limited Support***	0.00	0.00	0.00	0.33	0.33	***0.13***	***Barrier to Access***
	Harbour Way South & Hoffman Boulevard	Harbour Way South & Cutting Boulevard	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***
	Harbour Way South & Cutting Boulevard	Harbour Way South & Virginia Avenue	1.00	0.33	1.00	0.67	0.67	***0.73***	***Moderately Supportive***	0.67	0.00	0.33	0.33	0.67	***0.40***	***Limited Support***
		Average Score	0.53	0.27	0.40	0.40	0.40	***0.40***	***Limited Support***	0.33	0.00	0.27	0.40	0.60	***0.32***	***Limited Support***

Audit Sites Analysis



Site 2: Marina Way South

Marina Way South is a key north-south connector linking Central Richmond and the Richmond BART station to the shoreline and San Francisco Bay Trail. The corridor connects diverse inland neighborhoods north of Cutting Boulevard to a variety of commercial, industrial, institutional, and residential destinations—including offices, schools, business centers, and shoreline amenities.

Several investments are planned to significantly improve the corridor's pedestrian and cycling environment, notably the Richmond Wellness Trail (Phase 2), which aims to enhance connectivity and extend directly to Lucretia Edwards Shoreline Park and the Bay Trail. Additionally, planned mixed-use residential developments along the shoreline present opportunities to improve active transportation infrastructure and street-level engagement, crucial for equitable access to waterfront amenities. Evaluating current infrastructure conditions, identifying barriers, and highlighting opportunities for targeted improvements along this corridor are central to enhancing equitable Bay Trail access in Richmond. Connects Coronado Neighborhood

- Bay Trail
- Highly Supportive
- Moderately Supportive
- Limited Support (Partial Barrier)
- Barrier to Access
- Interstate Highway
- Heavy-Rail
- S Segment Marker
- I Intersection Marker

0.67

Route Access Supportiveness Index/Score

Street Condition

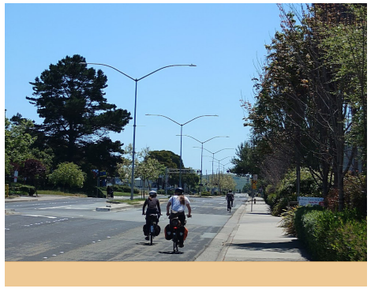
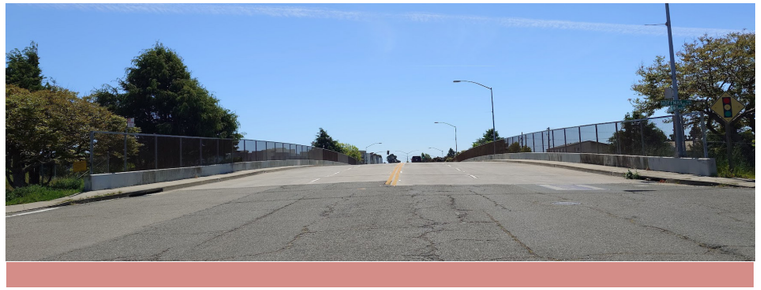
- **Average Score (0.49):** Limited-to-moderate pedestrian and cyclist support overall.
- **Traffic Exposure:** No buffers, high speeds, rough sidewalk (esp. Hall Ave–Wright Ave).
- **Railway Crossing Obstructions:** Concrete grade panels create discomfort and accessibility barriers.
- **Potrero Ave–Cutting Blvd Sidewalks**: Narrow, cracked, debris-filled, overgrown – poorest pedestrian conditions.
- **No Bike Facilities:** Cyclists forced onto sidewalks due to zero dedicated lanes.
- **Hall Ave–Wright Ave Comfort:** Street trees improve walkability but lack enclosure undermines environmental comfort.

Marina Way South segments scored an average of 0.49, indicating limited-to-moderate support for pedestrian and cyclist access to the Bay Trail. The lowest-performing category was traffic exposure due to the absence of physical buffers separating pedestrians and cyclists from vehicular traffic, high vehicle speeds, and lack of dedicated bicycle facilities. Observations confirmed uncomfortable sidewalk conditions, particularly for cyclists between Hall Avenue and Wright Avenue.

While pedestrian infrastructure generally scored higher (0.60), intermittent obstructions—particularly railway crossings with concrete grade-crossing panels—present discomfort and limit universal accessibility, which will affect movement of children and people with disabilities. The poorest pedestrian conditions were observed between Potrero Avenue and Cutting Boulevard, where sidewalks were narrow, cracked, poorly maintained, and impeded by debris and vegetation growth from sidewalk gaps.

No dedicated bicycle facilities exist along Marina Way South, creating uncomfortable cycling conditions. Despite generally adequate sidewalk quality in most segments, the absence of bike infrastructure significantly diminishes safety and comfort for cyclists, encouraging sidewalk riding.

The segment between Hall Avenue and Wright Avenue provided a more comfortable pedestrian experience due to street trees. However, this section still scored relatively low for environmental comfort, primarily due to resulting in minimal sense of enclosure.



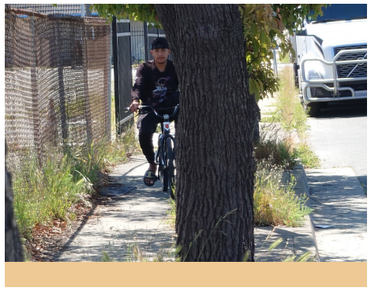




Table 7: Street Condition Audit Scoring for Marina Way South

ID	Segment Start	Segment End	Traffic Exposure	Pedestrain Infrastructure	Bicycle Infrastructure	Environmental Comfort	Subjective Perception	Segment Index	Rank
1	Marina Way South & San Francisco Bay TraiL	Marina Way South & Hall Avenue	0.33	0.83	0.50	0.28	0.92	***0.58***	***Moderately Supportive***
2	Marina Way South & Hall Avenue	Marina Way South & Regatta Boulevard	0.22	0.61	0.50	0.50	0.67	***0.49***	***Limited Support***
3	Marina Way South & Regatta Boulevard	Marina Way South & Wright Avenue	0.44	0.61	0.25	0.56	0.58	***0.48***	***Limited Support***
4	Marina Way South & Wright Avenue	Marina Way South & Hoffman Boulevard	0.22	0.56	0.33	0.28	0.25	***0.33***	***Limited Support***
5	Marina Way South & Hoffman Boulevard	Marina Way South & Potrero Avenue	0.22	0.44	0.33	0.39	0.67	***0.40***	***Limited Support***
6	Marina Way South & Potrero Avenue	Marina Way South & Cutting Boulevard	0.44	0.44	0.25	0.33	0.17	***0.33***	***Limited Support***
7	Marina Way South & Cutting Boulevard	Marina Way South & Virginia Avenue	0.78	0.72	1.00	0.61	0.92	***0.81***	***Highly Supportive***
		Average score	0.38	0.60	0.45	0.42	0.60	***0.49***	

Intersections

- **Average Score (0.52):** Moderately supportive for pedestrian and cyclist access.
- **Sparse Intersection Frequency:** Large parcels and long blocks limiting crossing opportunities.
- **Unsafe Crossings:** Poor sidewalk, steep grades, and broken signals at Cutting Blvd create hazardous conditions
- **Inaccessible Curb Cuts:** Misaligned, cracked, and steep ramps without tactile paving reduce accessibility.
- **Faded Crosswalks:** Worn markings, especially at Regatta Blvd, reduce visibility.
- **Obstructed Sidewalks:** Narrow paths and overgrown vegetation at Wright Ave impact comfort and safety.

Marina Way South has relatively few intersections due to large parcel sizes and long block lengths. Overall, intersections along this corridor scored an average of 0.52, indicating a moderately supportive environment for pedestrians and cyclists accessing the Bay Trail.

The intersection at Cutting Boulevard performed poorly (0.44 - Limited Support), characterized by inadequate sidewalk conditions, steep gradients for pedestrians, poorly aligned and designed curb cuts without tactile paving, and non-functional pedestrian crossing signals.

Field observations noted pedestrians visibly frustrated by signal failures, resulting in dangerous informal crossings. Other intersections along Marina Way South generally featured clearly marked crosswalks, though some were observed to be faded, particularly at the Regatta Boulevard intersection.

Additionally, curb cuts at Hall Avenue were steep and misaligned with crosswalks, lacking tactile paving, and suffering from sidewalk cracks, contributing to overall accessibility challenges despite its moderate supportiveness rating (0.51 - Moderately Supportive). At the Wright Avenue overpass, vegetation growing into pedestrian areas and narrow sidewalks negatively impacted comfort and safety, especially during low-light conditions.

These findings highlight priority areas for improving intersection conditions to enhance pedestrian and cyclist accessibility, safety, and comfort along Marina Way South.









Table 8: Intersection Audit Scoring for Marina Way South

ID	Intersection	Traffic Control	Pedestrian Crossing	Cyclist Crossing	Signage indicating ped/bike presence	Crossing Marking Visibility	**Safety**	Length of Crossing	Ease of Crossing	Crossing Time	**Exposure**	Obstruction & Blindspots	Curb Cuts	**Accessibility & Design**	Street Surface Condition	Comfort & Legibility	**Comfort & Maintenance**	**Intersection Index**	**Rank**
1	Marina Way South & Hall Avenue	0.33	0.67	0.00	0.00	0.33	**0.27**	0.33	1.00	1.00	**0.78**	1.00	0.33	**0.67**	0.00	0.67	**0.33**	***0.51***	***Moderately Supportive***
2	Marina Way South & Regatta Boulevard	0.33	0.67	0.00	0.00	0.00	**0.20**	0.00	0.67	1.00	**0.56**	1.00	0.67	**0.83**	0.33	0.67	**0.50**	***0.52***	***Moderately Supportive***
3	Marina Way South & Wright Avenue	0.67	1.00	0.00	0.00	1.00	**0.53**	0.33	0.67	0.67	**0.56**	0.00	0.33	**0.17**	1.00	0.67	**0.83**	***0.52***	***Moderately Supportive***
4	Marina Way South & Hoffman Boulevard	0.33	0.67	0.00	0.00	0.67	**0.33**	0.67	1.00	1.00	**0.89**	0.00	0.33	**0.17**	0.67	0.67	**0.67**	***0.51***	***Moderately Supportive***
5	Marina Way South & Potrero Avenue	0.33	0.00	0.00	0.00	0.67	**0.20**	0.33	1.00	1.00	**0.78**	1.00	0.00	**0.50**	0.33	0.67	**0.50**	***0.49***	***Limited Support***
6	Marina Way South & Cutting Boulevard	0.67	1.00	0.33	0.00	0.67	**0.53**	0.00	0.00	0.67	**0.22**	1.00	0.33	**0.67**	0.67	0.00	**0.33**	***0.44***	***Limited Support***
	Average Scores	0.42	0.75	0.00	0.00	0.50	**0.33**	0.33	0.83	0.92	**0.69**	0.50	0.42	**0.46**	0.50	0.67	**0.58**	***0.52***	***Moderately Supportive***

Parcel Frontage

- **Average Score (0.47):** Limited support for pedestrian and cyclist access.
- **Auto-Oriented Design (South of I-580)**: Large setbacks, surface parking, and wide blocks (1,200+ ft) reduce pedestrian comfort and connectivity.
- **Low Street Engagement:** Institutional uses (e.g., school district offices) offer controlled access and minimal activation, though some visual interest from façade articulation
- **Improved Urban Form (North of I-580 to Potrero):** Shorter blocks, smaller setbacks, and articulated façades create a more walkable, engaging environment (scores 0.6–0.8).
- **Vacant and Blighted Parcels (Potrero to Cutting):** Poorly maintained lots and an abandoned building create an unwelcoming streetscape and access barrier

Parcel frontages along Marina Way South scored an average of 0.47, providing limited support for pedestrian access and walkability toward the Bay Trail.

Parcels south of the I-580 freeway generally exhibit auto-oriented development patterns, characterized by large-footprint buildings substantially set back from the street, often separated by surface parking. This configuration creates a visually and physically disconnected streetscape, resulting in an unpleasant pedestrian experience and reduced street activation.

Parcels such as the school and school district offices further diminish comfort due to controlled access points and minimal street engagement. However, these institutional buildings display moderately well-articulated architectural features, providing some visual interest for pedestrians and cyclists. Nonetheless, segments south of the freeway have an average block length exceeding approximately 1,200 feet, significantly longer than recommended walkable block lengths, reinforcing discomfort and diminishing pedestrian-friendliness.

North of the freeway, parcels from Hoffman Boulevard to Potrero Avenue demonstrate stronger urban design characteristics, including shorter block lengths, smaller setbacks, and well-articulated building façades. These segments scored notably higher (0.6 to 0.8, supportive to highly supportive), enhancing pedestrian comfort and street-level engagement.

Conversely, the segment from Potrero Avenue to Cutting Boulevard is characterized by vacant, undeveloped parcels and an abandoned building, both poorly maintained. These conditions, together with the freeway overpass, create an unattractive streetscape environment, representing significant barriers to pedestrian and cyclist access.

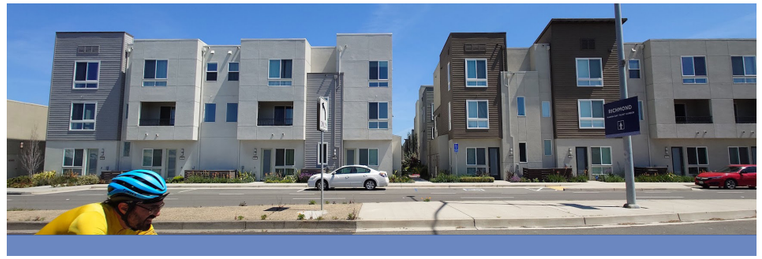


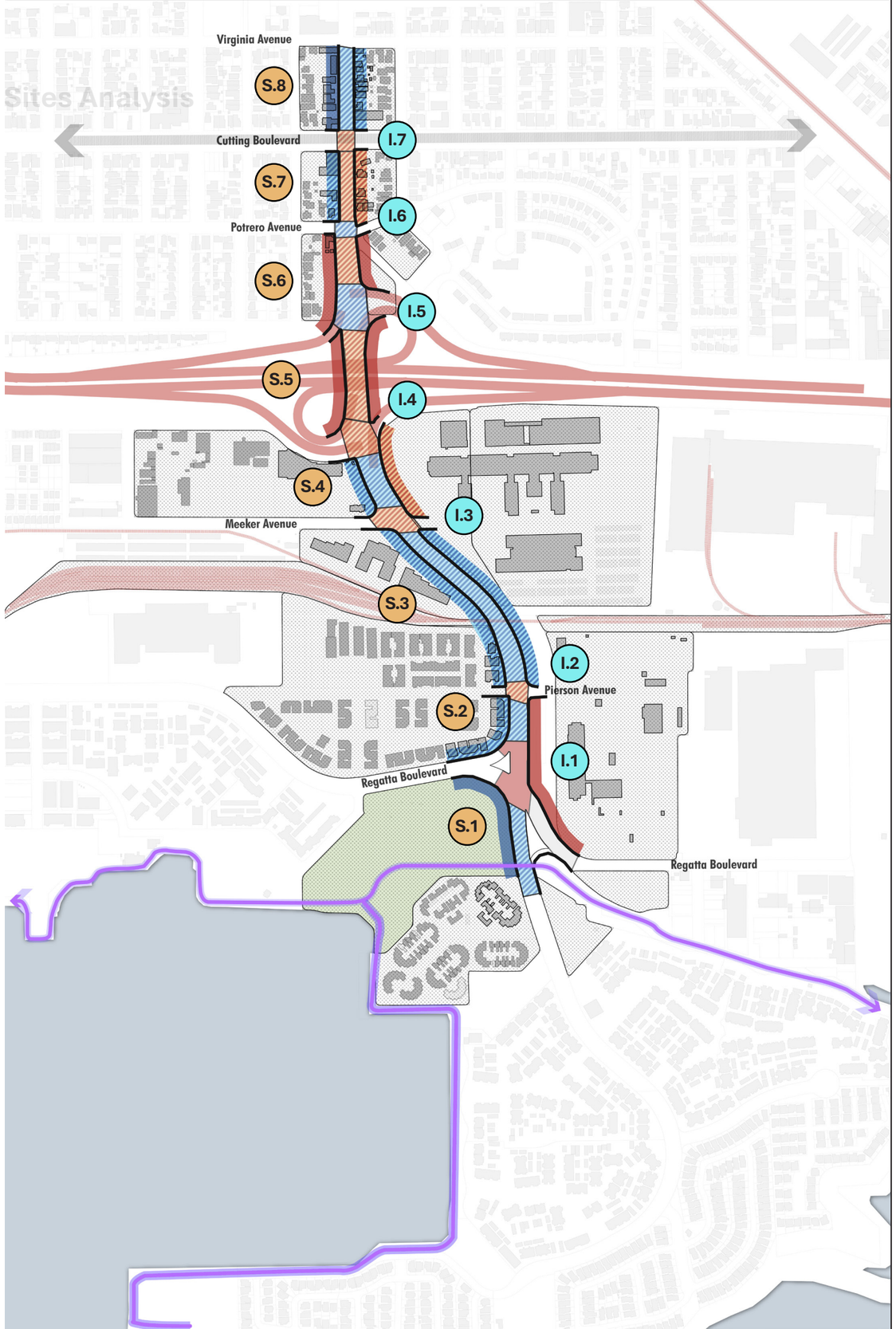






Table 9: Parcel Frontage Audit Scoring for Marina Way South

			LEFT						RIGHT					
ID	Segment Start	Segment End	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index / Rank	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index / Rank
	Marina Way South & San Francisco Bay Trail	Marina Way South & Hall Avenue	1.00	0.00	0.33	0.67	1.00	***0.60 Moderately Supportive***	0.33	0.00	0.33	0.67	1.00	***0.47 Limited Support***
	Marina Way South & Hall Avenue	Marina Way South & Regatta Boulevard	1.00	0.00	0.33	0.67	1.00	***0.60 Moderately Supportive***	0.67	0.00	0.00	0.67	1.00	***0.47 Limited Support***
	Marina Way South & Regatta Boulevard	Marina Way South & Wright Avenue	0.33	0.00	0.33	0.67	0.67	***0.40 Limited Support***	1.00	0.33	1.00	1.00	1.00	***0.87 Highly Supportive***
	Marina Way South & Wright Avenue	Marina Way South & Hoffman Boulevard	0.33	0.00	0.00	0.00	0.00	***0.07 Barrier to Access***	0.00	0.00	0.00	0.00	1.00	***0.20 Barrier to Access***
	Marina Way South & Hoffman Boulevard	Marina Way South & Potrero Avenue	1.00	0.67	0.67	0.33	0.33	***0.60 Moderately Supportive***	1.00	1.00	0.67	0.67	0.67	***0.80 Highly Supportive***
	Marina Way South & Potrero Avenue	Marina Way South & Cutting Boulevard	0.67	0.00	0.00	0.33	0.00	***0.20 Barrier to Access***	0.00	0.00	0.33	0.00	0.00	***0.07 Barrier to Access***
	Marina Way South & Cutting Boulevard	Marina Way South & Virginia Avenue	1.00	0.00	0.33	0.33	0.67	***0.47 Limited Support***	1.00	0.33	1.00	0.67	0.67	***0.73 Moderately Supportive***
		Average Score	0.76	0.10	0.29	0.43	0.52	***0.42 Limited Support***	0.57	0.24	0.48	0.52	0.76	***0.51 Moderately Supportive***



Site 3: Marina Bay Parkway

Marina Bay Parkway is one of Richmond's primary arterial connectors, linking inland Richmond neighborhoods directly to the Marina Bay waterfront, its associated parks, and commercial, institutional, and industrial areas. This corridor accommodates high traffic volumes and includes a major interchange with Interstate 580 (I-580), significantly influencing traffic conditions and pedestrian-cyclist comfort along the route. Key destinations served by Marina Bay Parkway include Barbara and Jay Vincent Park, Marina Bay Park, Shimada Park, and the Marina Bay shopping center at Meeker Avenue, making it a critical route for recreational and local commuting purposes.

The Parkway transitions into South 23rd Street north of Cutting Boulevard, another major arterial with dedicated Class II bike lanes. This corridor directly connects the Coronado and Cortez/Siege neighborhoods to the Bay Trail at Regatta Boulevard—a distance of 0.77 miles from Cutting Boulevard.

- Bay Trail
- Highly Supportive
- Moderately Supportive
- Limited Support (Partial Barrier)
- Barrier to Access
- Interstate Highway
- Heavy-Rail
- S — Segment Marker
- I — Intersection Marker

0.44

Route Access Supportiveness Index/Score

Street Condition

- **Mixed Support Levels:** Segments split between moderate and limited support for Bay Trail access.
- **High Traffic Exposur**e: Fast-moving vehicles, especially near freeway ramps, create stress and discourage safe walking and biking.
- **Poor Sidewalk Conditions**: Potrero to Cutting Blvd segment has cracked sidewalk, weeds, debris, and low maintenance—clearly impeding access.
- **Consistent Usage Despite Issues**: Parks and decent infrastructure attract users, though many cyclists ride on sidewalks due to traffic stress.

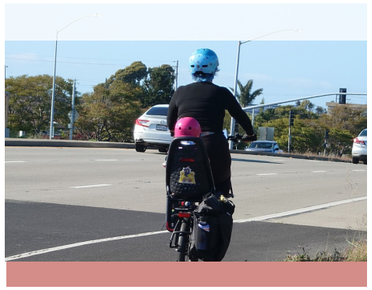
Segment conditions along Marina Bay Parkway are evenly split between moderate and limited support for pedestrian and cyclist access to the Bay Trail.

Segments south of the I-580 southbound ramps, and between Cutting Boulevard and Virginia Avenue, provided moderate support—reflecting relatively higher-quality pedestrian infrastructure and improved conditions for cyclists. In contrast, segments between the I-580 ramps and Cutting Boulevard offered only limited support due primarily to low environmental comfort and poor subjective perceptions of safety.

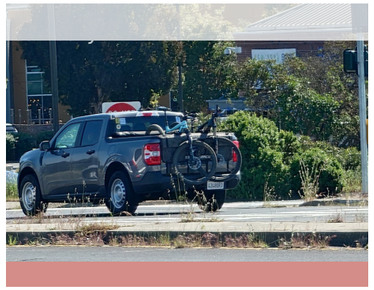
Low subjective scores in these segments can be directly attributed to high traffic exposure, the lowest-scoring category along Marina Bay Parkway. Field observations consistently noted vehicles significantly exceeding the posted 25 mph and 30 mph limits, creating uncomfortable and stressful conditions for pedestrians and cyclists, especially around the freeway interchange. These traffic conditions explain frequent sidewalk riding behaviors observed between the I-580 overpass and Cutting Boulevard.

Despite these challenges, substantial pedestrian and cyclist usage was observed, likely driven by attractive local destinations (such as parks), good sidewalk width, and generally well-maintained sidewalk surfaces. However, the segment from Potrero Avenue to Cutting Boulevard notably had the poorest sidewalk conditions, characterized by numerous cracks, weeds growing through sidewalk gaps, significant debris, and inadequate maintenance, clearly representing a barrier to Bay Trail access.











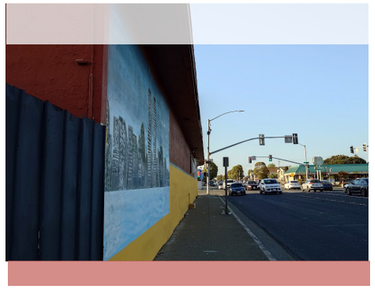




Table 10: Street Condition Audit Scoring for Marina Bay Parkway

ID	Segment Start	Segment End	Traffic Exposure	Pedestrain Infrastructure	Bicycle Infrastructure	Environmental Comfort	Subjective Perception	Segment Index	Rank
1	Marina Bay Parkway & San Francisco Bay Trail	Marina Bay Parkway & Regatta Boulevard	0.56	0.61	0.67	0.78	0.83	***0.68***	*Moderately Supportive*
2	Marina Bay Parkway & Regatta Boulevard	Marina Bay Parkway & Pierson Avenue	0.33	0.83	0.67	0.78	0.75	***0.65***	*Moderately Supportive*
3	Marina Bay Parkway & Pierson Avenue	Marina Bay Parkway & Meeker Avenue	0.33	0.89	0.92	0.50	0.83	***0.69***	*Moderately Supportive*
4	Marina Bay Parkway & Meeker Avenue	Marina Bay Parkway & I-580 Eastbound Ramp	0.22	0.72	0.50	0.44	0.33	***0.43***	*Limited Support*
5	Marina Bay Parkway & I-580 Eastbound Ramp	Marina Bay Parkway & I-580 Westbound Ramp	0.11	0.78	0.75	0.22	0.42	***0.45***	*Limited Support*
6	Marina Bay Parkway & I-580 Westbound Ramp	Marina Bay Parkway & Potrero Avenue	0.11	0.83	0.67	0.44	0.50	***0.49***	*Limited Support*
7	Marina Bay Parkway & Potrero Avenue	Marina Bay Parkway & Cutting Boulevard	0.33	0.56	0.17	0.22	0.58	***0.38***	*Limited Support*
8	Marina Bay Parkway & Cutting Boulevard	South 23rd Street & Virginia Avenue	0.44	0.67	0.58	0.56	0.83	***0.61***	*Moderately Supportive*
		Average Score	0.31	0.74	0.61	0.49	0.64	***0.55***	*Moderately Supportive*

Intersections

- **Average Score (0.43):** Indicates limited intersection support for pedestrian and cyclists.
- **Worst Intersection – Regatta Blvd:** Long crossings, high-speed slip lanes, missing crosswalks, and poor visibility make it a major barrier.
- **Design Challenges:** Acute angles, industrial context, and overgrown medians at Regatta create stressful, unsafe conditions.
- **Shared-Use Path Conflicts:** Narrow widths, blind corners, and poor transitions cause cyclist-pedestrian conflicts.
- **Widespread Speeding:** Aggressive driving, especially near freeway ramps, reduces comfort and leads to frequent sidewalk riding.

Intersections along Marina Bay Parkway scored an average of 0.43, indicating limited support for pedestrians and cyclists accessing the Bay Trail.

The intersection at Regatta Boulevard was notably the worst-performing (0.22 - Barrier to Access). It features extremely long crossings, complex navigation, unclear sidewalk markings, and high-speed slip lanes prioritizing vehicular traffic. Field observations confirmed this intersection as particularly stressful, with vegetation in medians creating hazardous blind spots, further amplifying pedestrian and cyclist discomfort. Additionally, crosswalks were completely missing on two legs of this intersection, significantly reducing accessibility.

This intersection's acute angle and proximity to industrial areas contribute to its design challenges, emphasizing the need for comprehensive redesign focused on non-motorized safety. Another problematic intersection identified was at Pierson Avenue, scoring 0.40 (Limited Support). This intersection has no crosswalks or stop signs despite proximity to Ookwe Park, creating hazardous conditions due to high vehicle speeds emerging from the underpass, compounded by limited visibility.

At Potrero Avenue, though moderately supportive (0.54), field observations noted pedestrians and cyclists crossing dangerously due to missing connections and inadequate infrastructure to guide safe crossings. The segment from Pierson Avenue to Meeker Avenue includes a shared-use path which, despite enhancing safety compared to roadway cycling, generates conflicts between pedestrians and cyclists due to narrow widths, blind corners, and unclear transition points.

Field notes consistently identified speeding vehicles and aggressive acceleration behaviors along the Parkway, particularly near the freeway interchanges, severely impacting pedestrian and cyclist comfort. These conditions encourage sidewalk riding, observed frequently during site visits.















Table 11: Intersection Audit Scoring for Marina Bay Parkway

ID	Intersection	Traffic Control	Pedestrian Crossing	Cyclist Crossing	Signage indicating ped/bike presence	Crossing Marking Visibility	**Safety**	Length of Crossing	Ease of Crossing	Crossing Time	**Exposure**	Obstruction & Blindspots	Curb Cuts	**Accessibility & Design**	Street Surface Condition	Comfort & Legibility	**Comfort & Maintenance**	**Intersection Index**	**Rank**
1	Marina Bay Parkway & Regatta Boulevard	0.67	0.33	0.00	0.33	0.33	**0.33**	0.00	0.00	0.67	**0.22**	0.00	0.33	**0.17**	0.33	0.00	**0.17**	***0.22***	Barrier to Access
2	Marina Bay Parkway & Pierson Avenue	0.00	0.33	0.00	0.00	0.67	**0.20**	0.00	0.33	0.33	**0.22**	1.00	1.00	**1.00**	0.00	0.33	**0.17**	***0.40***	***Limited Support***
3	Marina Bay Parkway & Meeker Avenue	0.67	0.67	0.00	0.00	1.00	**0.47**	0.00	0.33	0.67	**0.33**	0.67	1.00	**0.83**	0.00	0.00	**0.00**	***0.41***	***Limited Support***
4	Marina Bay Parkway & I-580 Eastbound Ramp	0.67	0.67	0.00	0.33	1.00	**0.53**	0.33	0.67	0.67	**0.56**	0.00	0.67	**0.33**	0.00	0.33	**0.17**	***0.40***	***Limited Support***
5	Marina Bay Parkway & I-580 Westbound Ramp	0.67	1.00	0.00	0.33	1.00	**0.60**	0.33	0.67	0.67	**0.56**	1.00	0.67	**0.83**	0.33	0.67	**0.50**	***0.62***	***Moderately Supportive***
6	Marina Bay Parkway & Potrero Avenue	0.33	0.00	0.00	0.00	0.67	**0.20**	0.33	1.00	1.00	**0.78**	1.00	0.33	**0.67**	0.67	0.33	**0.50**	***0.54***	***Moderately Supportive***
7	Marina Bay Parkway & Cutting Boulevard	0.67	1.00	0.00	0.00	0.33	**0.40**	0.00	0.67	0.67	**0.44**	0.33	0.33	**0.33**	0.67	0.33	**0.50**	***0.42***	***Limited Support***
	Average Scores	0.52	0.57	0.00	0.14	0.71	**0.39**	0.14	0.52	0.67	**0.44**	0.57	0.62	**0.60**	0.29	0.29	**0.29**	***0.43***	***Moderately Supportive***

Parcel Frontage

- **Average Score (0.45):** Indicates limited support for pedestrian and cyclist access.
- **Uneven Performance by Side:** West side (0.55) shows moderate support with mixed uses, active frontages, and regular entrances; east side (0.35) lacks street interaction and has controlled institutional access.
- **Lowest-Scoring Segments (≤ 0.20):** I-580 overpass to Potrero and east side from Pierson to Regatta lack active frontages, access points, and maintenance.
- **Limited Support Areas:** Some access and visual interest present, but hindered by poor land-use diversity and inconsistent upkeep.

Overall, parcel frontage conditions along Marina Bay Parkway scored 0.45, indicating limited support (partial barrier) for pedestrian and cyclist access to the Bay Trail. Scores varied notably between the two sides of the corridor.

The left (west) side performed moderately better (0.55), reflecting a beneficial mix of commercial, retail, and residential uses with regular street-facing entrances and fenestration. In contrast, the right (east) side scored lower (0.35, limited support), primarily due to large institutional parcels between I-580 and Regatta Boulevard characterized by substantial setbacks, limited street interaction, and controlled access points.

Segments scoring lowest (0.20 or below) included the I-580 overpass area up to Potrero Avenue, and the east side between Pierson Avenue and Regatta Boulevard. These segments lack street-level access, active frontages, and are poorly maintained, significantly reducing comfort and perceived safety for pedestrians and cyclists.

Segments offering limited support generally provided some level of parcel access or visual interest but lacked land-use diversity and consistent parcel maintenance.







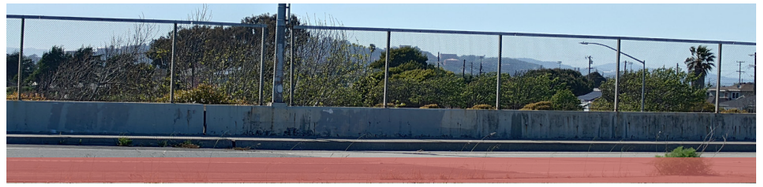
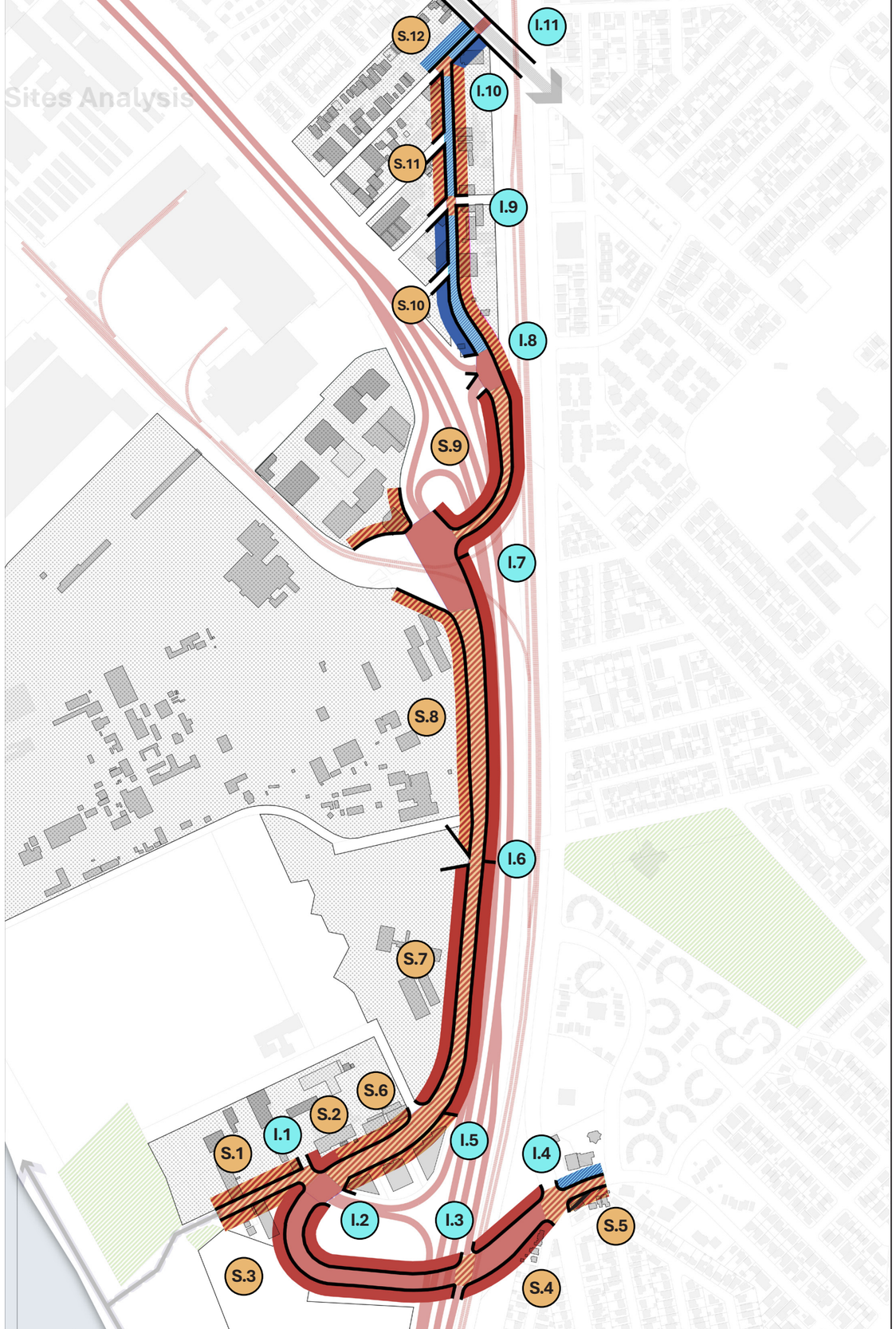




Table 12: Parcel Frontage Audit Scoring for Marina Bay Parkway

			LEFT							RIGHT						
ID	Segment Start	Segment End	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank
	Marina Bay Parkway & San Francisco Bay Trail	Marina Bay Parkway & Regatta Boulevard	1.00	1.00	1.00	1.00	1.00	***1.00***	***Highly Supportive***	0.00	0.00	0.00	0.00	1.00	***0.20***	***Barrier to Access***
	Marina Bay Parkway & Regatta Boulevard	Marina Bay Parkway & Pierson Avenue	0.67	0.00	0.00	1.00	1.00	***0.53***	***Moderately Supportive***	0.33	0.00	0.33	0.33	1.00	***0.40***	***Limited Support***
	Marina Bay Parkway & Pierson Avenue	Marina Bay Parkway & Meeker Avenue	1.00	0.00	0.00	1.00	1.00	***0.60***	***Moderately Supportive***	1.00	0.00	0.00	0.67	1.00	***0.53***	***Moderately Supportive***
	Marina Bay Parkway & Meeker Avenue	Marina Bay Parkway & I-580 Eastbound Ramp	1.00	0.00	0.33	1.00	1.00	***0.67***	***Moderately Supportive***	0.33	0.00	0.33	0.33	1.00	***0.40***	***Limited Support***
	Marina Bay Parkway & I-580 Eastbound Ramp	Marina Bay Parkway & I-580 Westbound Ramp	0.00	0.00	0.00	0.00	0.33	***0.07***	***Barrier to Access***	0.00	0.00	0.00	0.00	0.33	***0.07***	***Barrier to Access***
	Marina Bay Parkway & I-580 Westbound Ramp	Marina Bay Parkway & Potrero Avenue	0.67	0.00	0.00	0.00	0.33	***0.20***	***Barrier to Access***	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***
	Marina Bay Parkway & Potrero Avenue	Marina Bay Parkway & Cutting Boulevard	1.00	0.67	0.00	0.33	0.00	***0.40***	***Limited Support***	0.33	0.67	0.67	0.67	0.00	***0.47***	***Limited Support***
	Marina Bay Parkway & Cutting Boulevard	South 23rd Street & Virginia Avenue	1.00	0.67	1.00	1.00	1.00	***0.93***	***Highly Supportive***	0.33	0.67	1.00	1.00	0.67	***0.73***	***Moderately Supportive***
		Average Score	0.79	0.29	0.29	0.67	0.71	***0.55***	***Moderately Supportive***	0.29	0.17	0.29	0.38	0.63	***0.35***	***Limited Support***



Site 4 & 5: Bay Avenue & Meade Street

Bayview Avenue and Meade Street intersect at Seaport Avenue, sharing a common access point to the Bay Trail located at the dead end of South 51st Street. Meade Street, the longer route, extends approximately 1.27 miles from Seaport Avenue to the Cortez/Stege neighborhoods and Cutting Boulevard via the Regatta Boulevard overpass. Bayview Avenue, the shorter route, serves as one of the closest connectors linking Equity Priority Communities (EPC) neighborhoods, including Parkview, Panhandle Annex, and the northern portion of Richmond Annex, to the Bay Trail.

Both routes experience relatively low pedestrian, cycling, and vehicle traffic volumes, accompanied by clear indications of disuse, particularly regarding pedestrian infrastructure. The primary land uses along these corridors are institutional and industrial. This in addition to most of its sections being abutted by the I-580 highway contributes to an environment generally unsupportive of pedestrian activity.

- Bay Trail
- Highly Supportive
- Moderately Supportive
- Limited Support (Partial Barrier)
- Barrier to Access
- Interstate Highway
- Heavy-Rail
- S — Segment Marker
- I — Intersection Marker

0.32

Route Access Supportiveness Index/Score

Street Condition

- **Average Score (0.42):** Indicates limited support for pedestrian and cyclist access.
- **High Traffic Exposure:** Frequent trucks and speeding vehicles increase stress for pedestrians and cyclists.
- **Poor Pedestrian Infrastructure:** Narrow, discontinuous, obstructed, or missing sidewalks. Cracked, debris-filled, and rough surfaces, especially near rail crossings and freeway ramps.
- **Absent Bike Infrastructure:** Cyclists share fast-moving traffic lanes, raising safety risks.
- **Very Low Environmental Comfort:** Lack of shade, lighting, seating, and way-finding; corridors feel isolated and unsafe, with minimal pedestrian activity.

Meade Street and Bayview Avenue offer very limited support for pedestrians and cyclists accessing the Bay Trail, with the most significant barriers being the Regatta Boulevard overpass area (Meade & Regatta to Juliga & Regatta) and the Bayview Avenue segment (Seaport Avenue to Carlson Boulevard). These segments scored particularly low (average 0.24), primarily due to inadequate pedestrian buffers, non-existent bike infrastructure, high traffic exposure, and extremely poor environmental comfort.

Traffic exposure along these corridors is moderate but includes frequent truck and industrial traffic, especially along Bayview Avenue. Observations noted vehicles often exceeding posted speed limits, significantly increasing discomfort and stress for non-motorized users. Pedestrian infrastructure conditions scored poorly (average 0.44). Sidewalks were often narrow, discontinuous, obstructed by utility poles and rail crossings, poorly maintained, or completely missing in segments near I-580 freeway and industrial areas.

Meade Street's segment at Regatta Boulevard notably suffers from sidewalk disruptions at rail crossings and driveways, forcing pedestrians dangerously to walk on the street. The Meade route also has very long blocks with nor safe crossing opportunities in between, especially in the case where the sidewalk end abruptly in Montgomery to Seaver.

Bike infrastructure is largely absent along both corridors, except for Juliga Woods Street (a designated bicycle route). Cyclists must share road space directly with fast-moving vehicles and trucks, exacerbating perceived and actual risk. Sidewalk /asphalt conditions, particularly near rail crossings and freeway ramps, and a large section of Meade st are poor, featuring significant cracks, debris, and rough surfaces hazardous to cyclists.

Environmental comfort and aesthetics were very low (average scores: 0.40 for Meade, 0.11 for Bayview). Except for brief sections near Juliga Woods Street and from Montgomery Avenue to Regatta Boulevard, these corridors lack essential amenities such as shade, lighting, seating, and way-finding. Field observations indicated low pedestrian activity and notable discomfort, particularly during hot weather, due to harsh streetscape conditions.

Overall, both Meade Street and Bayview Avenue felt isolated, uncomfortable, and unsafe to pedestrians and cyclists. This perception, supported by quantitative scores, underscores the urgency for targeted infrastructure interventions—such as improved sidewalks, dedicated bike lanes, pedestrian crossings, traffic calming, and streetscape enhancements—to effectively improve Bay Trail accessibility along these corridors.

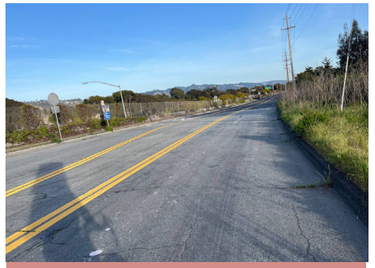














Table 13: Street Condition Audit Scoring for Bay Avenue and Meade Street

ID	Segment Start	Segment End	Traffic Exposure	Pedestrain Infrastructure	Bicycle Infrastructure	Environmental Comfort	Subjective Perception	Segment Index	Rank
1	South 51st Street & San Francisco Bay Trail	South 51st Street & Seaport Avenue	0.67	0.44	0.42	0.33	0.33	***0.46***	***Limited Support***
2	South 51st Street & Seaport Avenue	Bayview Avenue & Seaport Avenue	0.22	0.56	0.58	0.11	0.58	***0.42***	***Limited Support***
3	Bayview Avenue & Seaport Avenue	Bayview Avenue & I-580 Northbound Ramp	0.22	0.44	0.25	0.00	0.08	***0.21***	***Barrier to Access***
4	Bayview Avenue & I-580 Northbound Ramp	Bayview Avenue & Carlson Boulevard	0.11	0.44	0.42	0.00	0.08	***0.22***	***Barrier to Access***
5	Bayview Avenue & Carlson Boulevard	Bayview Avenue & Hartnett Avenue	0.22	0.44	0.33	0.61	0.58	***0.42***	***Limited Support***
6	Meade Street & Sea Port Avenue	Meade Street & East Montgomery Avenue	0.44	0.67	0.42	0.39	0.33	***0.45***	***Limited Support***
7	Meade Street & East Montgomery Avenue	Meade Street & Seaver Avenue	0.11	0.50	0.17	0.67	0.33	***0.33***	***Limited Support***
8	Meade Street & Seaver Avenue	Meade Street & Regatta Boulevard	0.33	0.39	0.17	0.44	0.25	***0.31***	***Limited Support***
9	Meade Street & Regatta Boulevard	Regatta Boulevard & Juliga Woods Street	0.22	0.61	0.42	0.17	0.00	***0.29***	***Limited Support***
10	Regatta Boulevard & Juliga Woods	Juliga Woods Street & South 33rd Street	0.67	0.56	0.58	0.39	0.67	***0.59***	***Moderately Supportive***
11	Juliga Woods Street & South 33rd Street	Juliga Woods Street & South 31st Street	0.78	0.72	0.58	0.39	0.67	***0.65***	***Moderately Supportive***
12	Juliga Woods Street & South 31st Street	Cutting Boulevard & South 31st Street	0.56	0.72	0.67	0.39	0.92	***0.66***	***Moderately Supportive***
		Average score	0.38	0.54	0.42	0.32	0.40	***0.42***	***Limited Support***

Intersections

- **Average Score (0.32):** Indicates limited support for pedestrian and cyclist access.
- **Missing Crosswalks:** Meade & Regatta, Bayview & Seaport, Regatta & Juliga Woods, Cutting & South 31st lack crosswalks, bike crossings, and driver awareness signage.
- **Poor Sidewalk Infrastructure:** Cracked and uneven surfaces worsen safety and accessibility
- **Vegetation and Maintenance Issues:** Sidewalk cracks allow plant growth, reducing comfort and perceived safety..
- **Unsafe User Behavior:** Frequent informal crossings and riding against traffic highlight infrastructure gaps.

Intersections along Meade Street and Bayview Avenue scored poorly overall (average score: 0.32), providing only limited support for Bay Trail access. The most problematic intersections were at Meade Street & Regatta Boulevard, Bayview Avenue & Seaport Avenue, Regatta Boulevard & Juliga Woods Street, and Cutting Boulevard & South 31st Street. These intersections consistently lack basic pedestrian and cyclist infrastructure, including crosswalks, dedicated bicycle crossings, and adequate driver-awareness signage. Poor sidewalk conditions at crossings further exacerbate safety and accessibility challenges, creating significant barriers to access.

Field observations highlighted additional critical issues not fully captured by scoring. Rail crossings at Meade & Regatta Boulevard severely disrupt pedestrian and cyclist flow, causing confusion due to unclear way-finding and frequent sidewalk obstructions. Sidewalk cracks at overpasses along Meade Street and Bayview Avenue allow vegetation to grow through the asphalt, reducing pedestrian comfort, perceived safety, and overall maintenance quality. Additionally, pedestrians and cyclists were frequently observed making informal crossings or riding against traffic, behaviors reflecting inadequate infrastructure and poor directional guidance.

These qualitative observations reinforce the urgent need for targeted interventions at these intersections, including improved pedestrian crosswalks, clearly marked cyclist crossings, enhanced sidewalk maintenance, traffic-calming measures, effective way-finding signage, and general intersection safety improvements.













Table 14: Intersection Audit Scoring for Bay Avenue and Meade Street

ID	Intersection	Traffic Control	Pedestrian Crossing	Cyclist Crossing	Signage indicating ped/bike presence	Crossing Marking Visibility	**Safety**	Length of Crossing	Ease of Crossing	Crossing Time	**Exposure**	Obstruction & Blindspots	Curb Cuts	**Accessibility & Design**	Street Surface Condition	Comfort & Legibility	**Comfort & Maintenance**	**Intersection Index**	**Rank**
1	South 51st Street & Seaport Avenue	0.33	0.00	0.00	0.33	0.67	**0.27**	1.00	1.00	1.00	**1.00**	0.33	0.00	**0.17**	0.33	0.00	**0.17**	***0.40***	***Limited Support***
2	Bayview Avenue & Seaport Avenue	0.33	0.00	0.00	0.00	0.00	**0.07**	0.00	0.33	0.67	**0.33**	0.67	0.00	**0.33**	0.33	0.00	**0.17**	***0.23***	Barrier to Access
3	Bayview Avenue & I-580 Northbound Ramp	0.67	0.67	0.00	0.00	0.67	**0.40**	0.33	0.67	0.67	**0.56**	0.00	0.33	**0.17**	0.00	0.33	**0.17**	***0.32***	***Limited Support***
4	Bayview Avenue & Carlson Boulevard	0.67	0.33	0.00	0.00	0.67	**0.33**	0.33	0.33	0.67	**0.44**	0.00	0.67	**0.33**	0.33	0.33	**0.33**	***0.36***	***Limited Support***
5	Meade Street & East Montgomery Avenue	0.33	0.00	0.00	0.00	0.33	**0.13**	0.00	1.00	1.00	**0.67**	0.67	0.00	**0.33**	0.33	0.00	**0.17**	***0.33***	***Limited Support***
6	Meade Street & Seaver Avenue	0.00	0.00	0.00	0.00	0.33	**0.07**	0.33	1.00	1.00	**0.78**	1.00	0.00	**0.50**	0.67	0.33	**0.50**	***0.46***	***Limited Support***
7	Meade Street & Regatta Boulevard	0.33	0.00	0.00	0.00	0.67	**0.20**	0.00	0.33	0.33	**0.22**	0.33	0.00	**0.17**	0.33	0.00	**0.17**	***0.19***	Barrier to Access
8	Regatta Boulevard & Juliga Woods	0.00	0.00	0.00	0.00	0.67	**0.13**	0.00	0.00	0.00	**0.00**	1.00	0.00	**0.50**	0.33	0.00	**0.17**	***0.20***	Barrier to Access
9	Juliga Woods Street & South 33rd Street	0.00	0.00	0.00	0.33	0.33	**0.13**	0.33	1.00	1.00	**0.78**	0.33	0.33	**0.33**	0.33	0.33	**0.33**	***0.39***	***Limited Support***
10	Juliga Woods Street & South 31st Street	0.33	0.00	0.33	0.00	0.33	**0.20**	0.67	1.00	1.00	**0.89**	0.00	0.33	**0.17**	0.33	0.33	**0.33**	***0.40***	***Limited Support***
11	Cutting Boulevard & South 31st Street	0.00	0.33	0.00	0.33	0.33	**0.20**	0.00	0.00	0.00	**0.00**	0.67	0.33	**0.50**	0.33	0.00	**0.17**	***0.22***	Barrier to Access
	Average Scores	0.27	0.12	0.03	0.09	0.45	**0.19**	0.27	0.61	0.67	**0.52**	0.45	0.18	**0.32**	0.33	0.15	**0.24**	***0.32***	***Limited Support***

Parcel Frontage

- **Average Score (0.27):** Indicates very limited support for pedestrian and cyclist access.
- **Bayview Ave:** Entirely fenced with adjacent wetlands, highways, and railways, lacking active frontage and visual interest
- **Meade St:** Parallels I-580 freeway with minimal engagement, bordered by freeway infrastructure and vacant spaces.
- **Sparse and Setback Uses:** Institutional/industrial buildings with limited access and fenced-off frontages, increasing isolation.
- **More Supportive Segments:** From Juliga Woods to Cutting Blvd, mixed land uses, frequent entrances, small setbacks, architecture create inviting streetscapes. High pedestrian and cyclist friendliness near Cutting Blvd.

The average parcel frontage score along Bayview Avenue and Meade Street corridors was 0.27, indicating very limited support for pedestrians and cyclists traveling to the Bay Trail through these routes.

Bayview Avenue (from Seaport Avenue to Carlson Boulevard) is approximately 0.36 miles and is bordered entirely by a wire mesh fence, with wetlands, highway corridors, and railway tracks adjacent to both sides. This lack of active frontage and visual engagement resulted in extremely low parcel frontage scores, significantly detracting from pedestrian comfort and safety.

Similarly, Meade Street provides a generally unsupportive environment, particularly the segment from Montgomery Avenue to Regatta Boulevard, which parallels the I-580 freeway for more than half a mile. This segment offers minimal pedestrian comfort and no engagement, bordered primarily by freeway infrastructure and vacant or inactive spaces.

The opposite side of Meade Street features institutional and industrial land uses, such as the Richmond Field Station. Here, buildings are sparse, significantly set back from street edges, separated by fences, and offer only a single point of access along an extensive half-mile length. This configuration further reduces pedestrian engagement and street-level activity, amplifying the sense of isolation.

However, more supportive frontage conditions exist in segments from Juliga Woods Street to Cutting Boulevard, achieving an average supportiveness score of 0.59. Particularly notable segments include the right side of South 31st Street to Cutting Boulevard (near a church), and the left side of Regatta Boulevard to South 33rd Street, which received high scores. These segments benefited from mixed land uses (including commercial, institutional, and residential buildings) with frequent entrances, minimal setbacks (often less than 2 feet), and articulated architectural detailing. This, combined with a strong sense of enclosure, creates a pleasant, comfortable, and inviting street experience for pedestrians and cyclists.







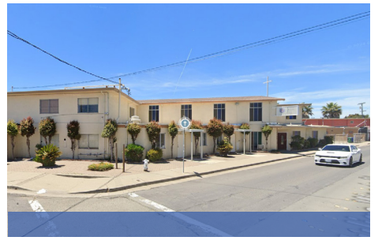
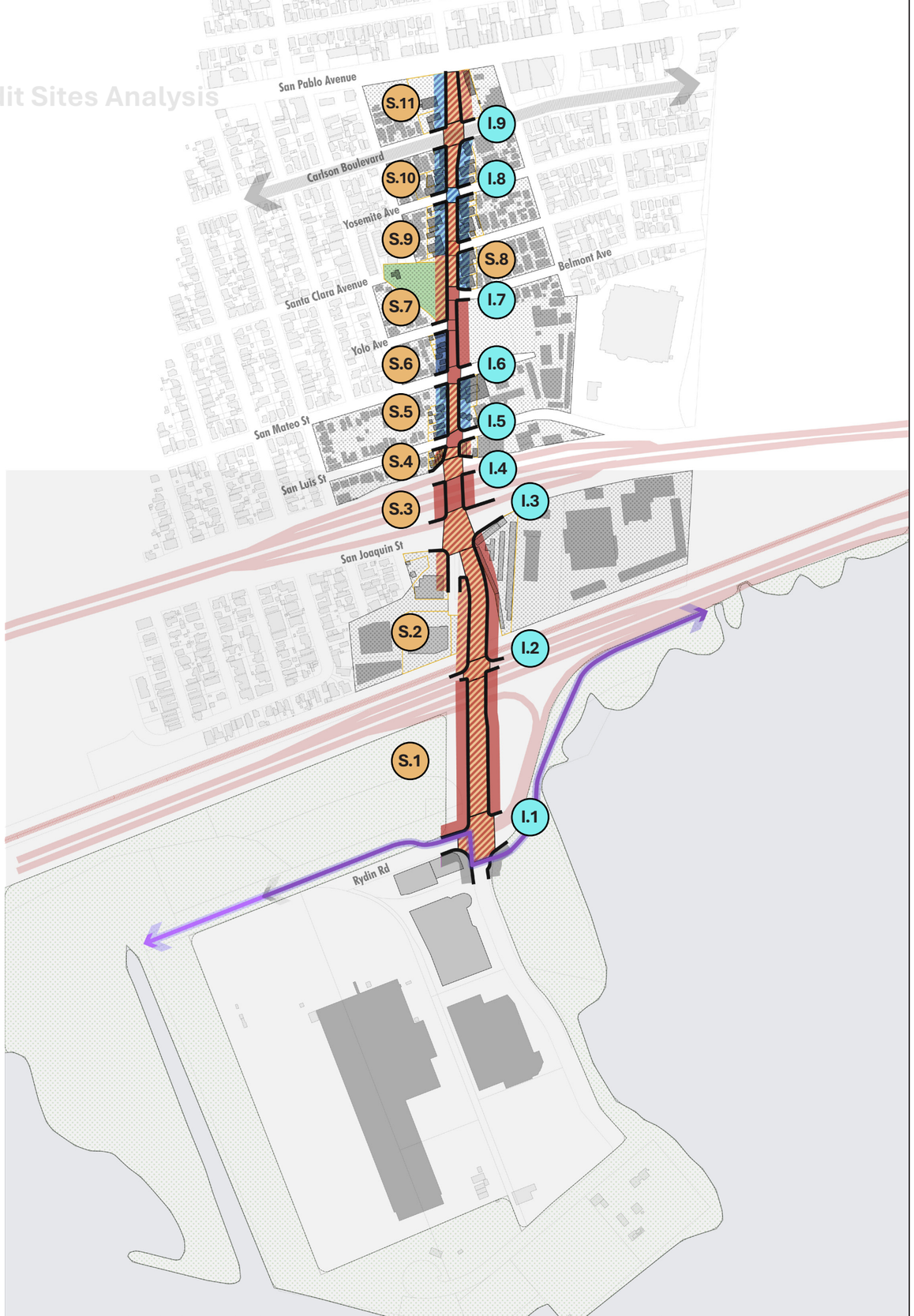






Table 15: Parcel Frontage Audit Scoring for Bay Avenue and Meade Street

			LEFT							RIGHT						
ID	Segment Start	Segment End	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank
1	South 51st Street & San Francisco Bay Trail	South 51st Street & Seaport Avenue	0.33	0.67	0.33	0.33	0.00	0.33	Limited Support	0.00	0.67	0.33	0.33	0.00	0.27	Limited Support
2	South 51st Street & Seaport Avenue	Bayview Avenue & Seaport Avenue	0.33	0.00	0.33	0.00	0.33	0.20	Barrier to Access	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access
3	Bayview Avenue & Seaport Avenue	Bayview Avenue & I-580 Northbound Ramp	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access
4	Bayview Avenue & I-580 Northbound Ramp	Bayview Avenue & Carlson Boulevard	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access
5	Bayview Avenue & Carlson Boulevard	Bayview Avenue & Hartnett Avenue	0.67	0.00	0.33	1.00	0.67	0.53	Moderately Supportive	0.33	0.00	0.33	0.33	0.33	0.27	Limited Support
6	Meade Street & Sea Port Avenue	Meade Street & East Montgomery Avenue	0.33	0.00	0.33	0.33	0.33	0.27	Limited Support	0.67	0.00	0.33	0.67	0.67	0.47	Limited Support
7	Meade Street & East Montgomery Avenue	Meade Street & Seaver Avenue	0.33	0.00	0.00	0.00	0.67	0.20	Barrier to Access	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access
8	Meade Street & Seaver Avenue	Meade Street & Regatta Boulevard	0.67	0.00	0.00	0.33	0.67	0.33	Limited Support	0.00	0.00	0.00	0.00	0.33	0.07	Barrier to Access
9	Meade Street & Regatta Boulevard	Regatta Boulevard & Juliga Woods Street	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access	0.00	0.00	0.00	0.00	0.00	0.00	Barrier to Access
10	Regatta Boulevard & Juliga Woods	Juliga Woods Street & South 33rd Street	1.00	0.67	0.67	1.00	0.67	0.80	Highly Supportive	0.67	0.67	0.33	0.33	0.33	0.47	Limited Support
11	Juliga Woods Street & South 33rd Street	Juliga Woods Street & South 31st Street	1.00	0.67	0.33	0.00	0.33	0.47	Limited Support	0.33	0.33	0.33	0.33	0.00	0.27	Limited Support
12	Juliga Woods Street & South 31st Street	Cutting Boulevard & South 31st Street	1.00	1.00	0.67	0.67	0.33	0.73	Moderately Supportive	0.67	0.33	1.00	1.00	1.00	0.80	Highly Supportive
		Average Score	0.47	0.25	0.25	0.31	0.33	0.32	Limited Support	0.22	0.17	0.22	0.25	0.22	0.22	Barrier to Access



Site 6: Central Avenue

Central avenue is a critical connector between the South of Richmond (Richmond Annex and South-West Annex) and El Cerrito neighborhoods and the San Francisco Bay Trail. It is also one of the main accesses to the I-80 and I-580. It is designated as an Integrated Corridor Mobility (ICM) route, indicating its importance in facilitating multi-modal connectivity and efficient travel across Richmond. Despite this strategic role, it still has significant shortcomings in its design and considerations. Its designation as an ICM adds a level of complexity for non-motorized users, on top of the already present urban complexity such as the I-80 and I-580 highways and the Amtrak rail.

- Bay Trail
- Highly Supportive
- Moderately Supportive
- Limited Support (Partial Barrier)
- Barrier to Access
- Interstate Highway
- Heavy-Rail
- S — Segment Marker
- I — Intersection Marker

0.32

Route Access Supportiveness Index/Score

Street Condition

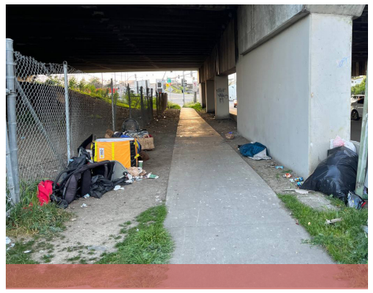
- **Average Score (0.32):** Very limited support for pedestrian and cyclist access.
- **Narrow, Obstructed Sidewalks:** Northern sidewalk (~5 ft) hindered by utility poles, buildings at edge, and close fast traffic.
- **Poor Pedestrian Infrastructure:** Bumps, cracks, and debris increase cycling hazards, especially near Belmont Ave.
- **Absent Bike Infrastructure:** Class II bike lane only from Rydin Rd to San Joaquin St; beyond that, cyclists forced to ride close to traffic.
- **Critical Barriers:** Segments between San Joaquin & San Luis underpass and San Mateo & Belmont score very low (0.22), limiting Bay Trail access.

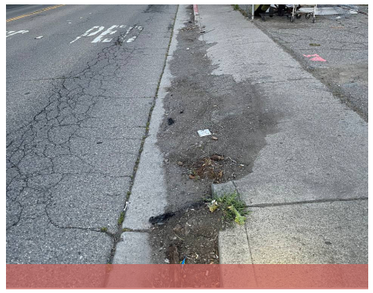
Central Avenue offers limited support for pedestrians and cyclists accessing the Bay Trail, largely due to significant exposure to high-speed traffic (scoring very low at 0.23). Sidewalks on both sides provide minimal buffering from vehicles, resulting in a challenging pedestrian environment and only limited support. The northern sidewalk, approximately 5 feet wide, is particularly difficult to navigate due to frequent obstructions from utility poles, buildings constructed at the sidewalk edge, and proximity to fast-moving vehicles.

Cycling conditions are similarly problematic. A class II (striped) bike lane is provided only from Rydin Road to San Joaquin Street, after which cyclists must rely solely on signage advising motorists to maintain a 3-foot distance. Beyond San Joaquin, particularly up to Belmont Avenue, the sidewalk quality is poor—characterized by bumps, cracks, and debris—forcing cyclists dangerously close to fast-moving traffic.

Environmental comfort along Central Avenue is notably poor, with minimal shade or seating amenities, except near the park area. This lack of amenities reduces the corridor's attractiveness for pedestrians and cyclists heading toward the Bay Trail. Although a 25 mph speed limit is posted, motorists regularly exceed it, amplifying the corridor's unsafe conditions.

Overall subjective comfort is very low, with segments between San Joaquin Street and the San Luis underpass, as well as between San Mateo Street and Belmont Avenue, rated especially poor (average score of 0.22), clearly constituting barriers to Bay Trail access.





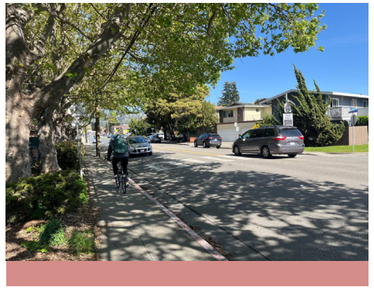



Table 16: Street Condition Audit Scoring for Central Avenue

ID	Segment Start	Segment End	Traffic Exposure	Pedestrain Infrastructure	Bicycle Infrastructure	Environmental Comfort	Subjective Perception	Segment Index	Rank
1	Central Avenue & Rydin road	Central Avenue & I-580 Northbound Ramp	0.11	0.61	0.42	0.17	0.25	***0.31***	***Limited Support***
2	Central Avenue & I-580 Northbound Ramp	Central Avenue & San Joaquin Street	0.11	0.61	0.50	0.11	0.25	***0.32***	***Limited Support***
3	Central Avenue & San Joaquin Street	Central Avenue & I-80 Northbound Ramp	0.11	0.44	0.17	0.56	0.00	***0.23***	***Barrier to Access***
4	Central Avenue & I-80 Northbound Ramp	Central Avenue & San Luis Street	0.33	0.44	0.33	0.33	0.17	***0.32***	***Limited Support***
5	Central Avenue & San Luis Street	Central Avenue & San Mateo Street	0.22	0.44	0.25	0.44	0.17	***0.29***	***Limited Support***
6	Central Avenue & San Mateo Street	Central Avenue & Yolo Avenue	0.22	0.44	0.17	0.22	0.00	***0.21***	***Barrier to Access***
7	Central Avenue & Yolo Avenue	Central Avenue & Belmont Avenue	0.22	0.33	0.00	0.44	0.08	***0.21***	***Barrier to Access***
8	Central Avenue & Belmont Avenue	Central Avenue & Santa Clara Avenue	0.44	0.44	0.58	0.72	0.17	***0.46***	***Limited Support***
9	Central Avenue & Santa Clara Avenue	Central Avenue & Yosemite Avenue	0.22	0.56	0.58	0.44	0.25	***0.40***	***Limited Support***
10	Central Avenue & Yosemite Avenue	Central Avenue & Carlson Boulevard	0.44	0.44	0.42	0.50	0.25	***0.41***	***Limited Support***
11	Central Avenue & Carlson Boulevard	Central Avenue and San Pablo Avenue	0.11	0.61	0.42	0.39	0.42	***0.38***	***Limited Support***
		Average Scores	0.23	0.49	0.35	0.39	0.18	***0.32***	***Limited Support***

Intersections

- **Average Score (0.36):** Very limited support for pedestrian and cyclist access.
- **Safety and Design Issues:** Missing crosswalks and curb ramps, blind spots, inadequate signage create pedestrian hazards, especially for those with strollers or mobility aids.
- **Poor Pedestrian Infrastructure:** Bumps, cracks, and debris increase cycling hazards, especially near Belmont Ave.
- **Lack of Bike-Specific Crossings:** Almost no dedicated bicycle crossing treatments except minimal facilities at Rydin Road.

The average intersection score for Central Avenue was 0.36, indicating limited support for pedestrians and cyclists accessing the Bay Trail. Intersections at San Luis Street, San Mateo Street, and Belmont Avenue emerged as particularly problematic, representing significant barriers to access.

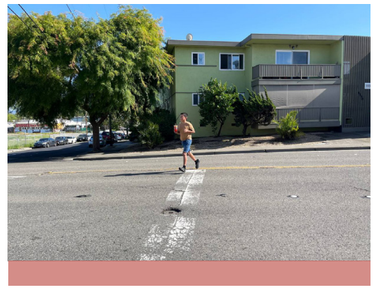
Safety and design deficiencies were pronounced at these intersections. For instance, the San Mateo intersection completely lacks crosswalk markings, resulting in frequent unsafe mid-block crossings. At San Luis Street, missing curb ramps and poor sidewalk conditions impede universal accessibility, notably affecting pedestrians with strollers or mobility impairments. The intersection at Belmont Avenue presents severe safety issues: several observed sudden braking suggest inadequate signage to alert drivers of pedestrian crossings, compounded by drivers rarely slowing down appropriately.

Comfort and maintenance scores were consistently low across intersections, particularly at the I-80 freeway ramps (underpass area) and intersections at San Mateo and Belmont, scoring notably poor (0.00, 0.17, 0.17 respectively). These intersections feature dangerous conditions, including blind spots at freeway ramps and Belmont Avenue, significantly increasing risk for pedestrians and cyclists.
A critical universal issue identified was long crossing distances without median refuge islands, significantly increasing pedestrian and cyclist exposure to traffic stress. Moreover, consistent with segment conditions, the absence of bicycle-specific crossing treatments at nearly all intersections (apart from minimal facilities at Rydin Road) further compounds these issues.

Overall, intersections at San Mateo Street, San Luis Street, and Belmont Avenue represent the greatest barriers along Central Avenue due to poor scores in safety, traffic exposure, accessibility, and user comfort. Targeted infrastructure interventions at these critical locations—such as improved signage, high-visibility crosswalks, curb extensions, dedicated bike crossing markings, and enhanced sidewalk conditions—are essential to improving Bay Trail accessibility along Central Avenue.







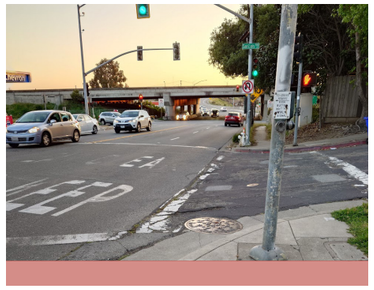






Table 17: Intersection Audit Scoring for Central Avenue

ID	Intersection	Traffic Control	Pedestrian Crossing	Cyclist Crossing	Signage indicating ped/bike presence	Crossing Marking Visibility	**Safety**	Length of Crossing	Ease of Crossing	Crossing Time	**Exposure**	Obstruction & Blindspots	Curb Cuts	**Accessibility & Design**	Street Surface Condition	Comfort & Legibility	**Comfort & Maintenance**	**Intersection Index**	**Rank**
1	Central Avenue & Rydin road	0.67	0.67	0.33	0.00	0.67	**0.47**	0.00	0.33	0.67	**0.33**	0.00	1.00	**0.50**	0.00	0.33	**0.17**	**0.37**	***Limited Support***
2	Central Avenue & I-580 Northbound Ramp	0.67	0.67	0.00	0.00	0.67	**0.40**	0.00	0.67	0.67	**0.44**	0.00	1.00	**0.50**	0.00	0.33	**0.17**	**0.38**	***Limited Support***
3	Central Avenue & San Joaquin Street	0.67	1.00	0.00	0.33	1.00	**0.60**	0.00	0.00	0.67	**0.22**	0.00	1.00	**0.50**	1.00	0.00	**0.50**	**0.46**	***Limited Support***
4	Central Avenue & I-80 Northbound Ramp	0.67	0.67	0.00	0.33	0.00	**0.33**	0.00	0.67	0.67	**0.44**	0.00	1.00	**0.50**	0.00	0.00	**0.00**	**0.32**	***Limited Support***
5	Central Avenue & San Luis Street	0.67	0.67	0.00	0.00	0.33	**0.33**	0.33	0.00	0.00	**0.11**	0.00	0.00	**0.00**	0.67	0.00	**0.33**	**0.19**	**Barrier to Access**
6	Central Avenue & San Mateo Street	0.33	0.00	0.00	0.00	0.33	**0.13**	0.33	0.00	0.67	**0.33**	0.33	0.00	**0.17**	0.33	0.00	**0.17**	**0.20**	**Barrier to Access**
7	Central Avenue & Belmont Avenue	0.33	0.33	0.00	0.33	0.67	**0.33**	0.33	0.00	0.67	**0.33**	0.00	0.33	**0.17**	0.33	0.00	**0.17**	**0.25**	**Barrier to Access**
8	Central Avenue & Yosemite Avenue	0.33	0.33	0.00	0.33	1.00	**0.40**	0.67	1.00	1.00	**0.89**	0.33	1.00	**0.67**	0.00	1.00	**0.50**	**0.61**	***Moderately Supportive***
9	Central Avenue & Carlson Boulevard	0.67	1.00	0.00	0.00	0.67	**0.47**	0.00	0.33	0.67	**0.33**	0.33	1.00	**0.67**	0.00	0.67	**0.33**	**0.45**	***Limited Support***
	Average Scores	0.56	0.59	0.04	0.15	0.59	**0.39**	0.19	0.33	0.63	**0.38**	0.11	0.70	**0.41**	0.26	0.26	**0.26**	**0.36**	***Limited Support***

Parcel Frontage

- **Average Score (0.40):** Limited support for pedestrian and cyclist access.
- **Inactive Land Uses:** Industrial and undeveloped sites, large building setbacks, fences, and empty lots reduce pedestrian comfort and engagement.
- **Positive Mixed Uses:** Residential areas, parks, and local businesses enhance street vibrancy and perceived safety.

Parcel frontage conditions along the western half of Central Avenue generally undermined pedestrian and biking comfort due to significant setbacks, vacant parcels, and inactive uses. Parcels near freeway infrastructure. Segments between Rydin Street & San Joaquin were especially challenging, characterized by long fences on the overpass, inactive industrial lots, and a feeling of isolation.

Conversely, areas East of San Luis street, closer to Carlson Boulevard were noticeably more supportive, benefiting from nearby residential frontages and a local park, and a gas station. This resulting in improved perceived safety and street vibrancy. This is however undermined by the presence an entire block of an undeveloped land on the South of San Mateo to Belmont.











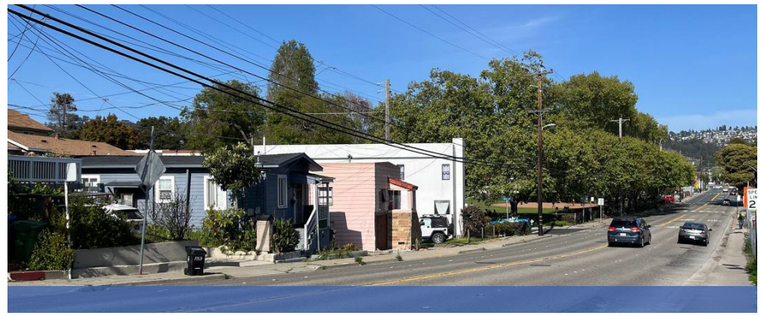


Table 18: Parcel Frontage Audit Scoring for Central Avenue

			LEFT							RIGHT						
ID	Segment Start	Segment End	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank	Landuse Mix	Setback	Building or Parcel Access	Façade Articulation	Building or Parcel Maintenance	Index	Rank
1	Central Avenue & Rydin road	Central Avenue & I-580 Northbound Ramp	1.00	0.00	0.00	0.00	0.00	***0.20***	***Barrier to Access***	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***
2	Central Avenue & I-580 Northbound Ramp	Central Avenue & San Joaquin Street	0.33	0.00	0.33	0.33	0.33	***0.27***	***Limited Support***	0.00	0.33	0.00	0.00	0.67	***0.20***	***Barrier to Access***
3	Central Avenue & San Joaquin Street	Central Avenue & I-80 Northbound Ramp	1.00	0.00	0.00	0.00	0.00	***0.20***	***Barrier to Access***	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***
4	Central Avenue & I-80 Northbound Ramp	Central Avenue & San Luis Street	0.67	0.33	0.00	0.67	0.00	***0.33***	***Limited Support***	0.33	0.33	0.33	0.67	0.33	***0.40***	***Limited Support***
5	Central Avenue & San Luis Street	Central Avenue & San Mateo Street	0.67	0.33	1.00	1.00	0.67	***0.73***	***Moderately Supportive***	0.33	0.67	0.67	0.67	0.67	***0.60***	***Moderately Supportive***
6	Central Avenue & San Mateo Street	Central Avenue & Yolo Avenue	0.67	0.67	1.00	1.00	0.67	***0.80***	***Highly Supportive***	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***
7	Central Avenue & Yolo Avenue	Central Avenue & Belmont Avenue	1.00	0.00	0.33	0.00	1.00	***0.47***	***Limited Support***	0.00	0.00	0.00	0.00	0.00	***0.00***	***Barrier to Access***
8	Central Avenue & Belmont Avenue	Central Avenue & Santa Clara Avenue	1.00	0.00	0.00	0.00	0.67	***0.33***	***Limited Support***	0.33	0.33	0.67	0.67	1.00	***0.60***	***Moderately Supportive***
9	Central Avenue & Santa Clara Avenue	Central Avenue & Yosemite Avenue	0.67	0.67	1.00	0.67	0.67	***0.73***	***Moderately Supportive***	0.00	0.33	0.67	1.00	1.00	***0.60***	***Moderately Supportive***
10	Central Avenue & Yosemite Avenue	Central Avenue & Carlson Boulevard	0.67	0.67	0.67	0.67	0.67	***0.67***	***Moderately Supportive***	0.00	0.67	0.67	0.67	0.67	***0.53***	***Moderately Supportive***
11	Central Avenue & Carlson Boulevard	Central Avenue and San Pablo Avenue	1.00	0.33	0.67	0.67	0.67	***0.67***	***Moderately Supportive***	0.00	0.00	0.33	0.33	1.00	***0.33***	***Limited Support***
		Average Score	0.79	0.27	0.45	0.45	0.48	***0.49***	***Limited Support***	0.09	0.24	0.30	0.36	0.48	***0.30***	***Limited Support***

Cross-Site Analysis



Figure 17: Map of Cross Site Analysis win Richmond.

Discussion

Traffic Exposure and Safety

All six corridors struggle with traffic exposure. Fast-moving vehicles on multi-lane roads and freeway ramps routinely engulf pedestrians and cyclists headed to the Bay Trail, often with no buffer or marked bike space to protect them. With the exception of short stretches on Meade Street and Harbor Way South, every route features four-lane arterials that feel too hostile to walk or bike, effectively discouraging many potential users. The most hazardous segments, reflected in our lowest scores and direct observations, are the Marina Bay Parkway overpass and its Cutting Boulevard interchange, as well as Central Avenue's underpasses at San Joaquin Street and the I-580 ramps. In these locations, high speeds, complex merging maneuvers, and a lack of refuge make crossings feel unsafe and, for many, simply not worth the risk.

Intersection Design and Crossing Experience

Throughout all six Bay Trail access corridors, intersections consistently fall short of accommodating pedestrians, cyclists, and people with disabilities. At busy junctions like Marina Bay Parkway at Cutting Boulevard and Central Avenue at San Mateo Street, there are no marked crosswalks, forcing users to dash across speeding traffic. Where crossings do exist, they span wide, multi-lane roadways with no refuge islands, often requiring an entire signal cycle to traverse safely. Critical traffic controls are missing at many high-demand locations—neither stop signs nor signals are provided—pushing pedestrians into hazardous mid-block runs.

Dedicated bicycle crossing treatments are almost entirely absent, with only Hall Avenue, Wright Avenue, and Hoffman Boulevard on Harbor Way South, plus Rydin Road on Central Avenue, offering any cyclist-specific markings. Accessibility features lag behind standard guidelines: curb ramps are frequently missing, improperly aligned, or lack tactile paving, creating significant barriers for wheelchair users and those with visual impairments. Finally, the near-total absence of "Yield to Pedestrians/Cyclists" signage—coupled with widespread driver noncompliance—renders crossings unpredictable and intimidating.

- Missing or incomplete crosswalks at major intersections (e.g., Marina Bay Pkwy/Cutting, Central/San Mateo) force unsafe road crossings
- Excessive crossing distances on wide, multi-lane roads without refuge islands prolong exposure to traffic.
- Minimal traffic controls—many crossings lack both stop signs and signals—compelling pedestrians into risky mid-block sprints.
- Bicycle crossings are rare, limited to only four locations across all corridors.
- Inadequate accessibility features: curb ramps are often absent, misaligned, or lack tactile strips.
- Poor driver yielding and signage: almost no "Yield to Pedestrians/Cyclists" signs, leading to low driver compliance and heightened user stress.

Parcel Frontage and Adjacent Land Use

The quality of street frontage and adjacent land use varies across the routes. The main issues are the presence of large single use parcels or blocks, vacant land or abandoned buildings. A few of the segments, especially the overpasses and industrial areas, had long stretches of blank walls chain link fences or parking lots. These segments do little to encourage walking or biking especially the overpass sections which are in all the routes. These stretches feel isolated and unwelcoming, providing no "eyes on the street" for security and feelings of safety and no visual interest or services for trail users.

Unsupportive frontage is a frequent issue across the corridors. Majority of the segments were rated as either "Barrier" or "Limited Support" in terms of parcel frontage. This means most Bay Trail access roads currently offer little in the way of pedestrian-friendly land use context. Only scattered portions (perhaps 20–30% of segments) show a truly supportive interface (retail, commercial residential) with adjacent uses and appealing frontage.

Connectivity and Continuity Gaps

Connectivity issues, such as breaks in the pedestrian or bicycle network continuity, are prevalent and undermine the usability of these corridors. The audits revealed that sidewalks and bike lanes are not consistently continuous from end to end. Trail users often encounter segments where facilities suddenly end, switch sides, or become difficult to follow. A common scenario is a sidewalk present only on one side of the street, or a bike lane that disappears at a pinch point. Such gaps force undesirable maneuvers like mid-block street crossings or sharing lanes with traffic, eroding the safe, intuitive flow of the trail connection.

- Sidewalk gaps
- Bike facility gaps
- Route legibility

Connectivity gaps of one form or another appeared in nearly every corridor. **At least four of the six corridors have a missing sidewalk on one side that necessitates a crossing or detour.** All six have at least one transition point (intersection or mid-block) where a bike lane or path stops due to some form of obstruction. These Bay Trail connectors are only partially complete in terms of continuous infrastructure, which can be frustrating and unsafe for users expecting a seamless access to the shoreline.

Maintenance and Cleanliness

Maintenance and cleanliness, while secondary to infrastructure gaps, also significantly affect the user experience. The field audit noted problems across the board with either sidewalk quality, or cleanliness or both in some cases like Meade Street and Bay Avenue. Broken or uneven sidewalks, accumulations of trash or glass, overgrown vegetation are all common across Central, Bay Avenue, Meade route and some section or Marina Bay Marina Way, and Harbor Way. These conditions not only present discomfort but can also pose safety hazards. Bicycle pictures or pedestrian trip hazards. This pattern was especially pronounced in the more remote or industrial stretches that see less regular attention, especially Meade and Bay Avenue.

The least maintained sections tend to coincide with low traffic areas - pedestrian, foot, and vehicular. Bayview Avenue, again, being in a semi-truck route area, has rough sidewalks and often scattered gravel or glass – not ideal for cyclists. Harbor Way South's mid-section and Central Avenue under the freeway. These kinds of issues cumulatively send a message that the corridor is overlooked, which can discourage usage and cause people to perceive it as unsafe. Maintenance problems were noted all corridors, but in varying degrees. At least half of the individual segments across the six sites had a "fair" or worse rating for surface condition or cleanliness. **All the routes had something that needs cleaning or fixing.** Filling a pothole, replacing a cut-off section of sidewalk, or just regular street sweeping. The consistency of these reports suggests maintenance is not **just an isolated issue but a systemic one** for these shoreline or Bay Trail connectors.

Environmental Comfort and Amenities

User comfort elements such as shade, greenery (trees), seating, lighting, are generally lacking on these connectors. The corridors often feel auto oriented, utilitarian and exposed. Most of the routes have minimal street trees or amenities to make the journey pleasant. In the audits, most segments fell into the lowest categories for shade and seating (e.g. "No shade present" and "None" for places to sit).

This means trail users might be walking or biking in full sun on hot days, with nowhere to rest, which can be discouraging especially for more vulnerable users, children or persons with disabilities. Other comfort factors like buffering from traffic, aesthetic landscaping, and lighting vary by corridor but are frequently low.

- Shade and landscaping
- Benches and pedestrian/bike amenities
- Noise and air quality.

Noise and Air Quality: Environmental comfort isn't just about physical amenities. The noise and fumes from traffic also play a role. In segments where the connectors run next to highways or heavy truck routes, users are subject to loud engine noise and exhaust. Central Avenue's interchange area, for example, is quite noisy and polluted from I-80, I-580, and Amtrak

railway traffic, which makes walking unpleasant and discourage people from reaching the Bay trail. Bayview and Marina Bay Parkway near the freeway ramps have similar issues. In contrast, segments passing through green space or away from traffic (like Meade Street approaching the shoreline, even with its infrastructure shortcomings) are quieter and more enjoyable. This contrast highlights how the presence of natural elements or buffers can significantly improve comfort.

Signage, Way-finding, and User Legibility

Way-finding, specifically for the bay trail emerged as a problem across all corridors. There is a notable lack of signage and legibility to guide Bay Trail users from inland areas to the shoreline (and the other way round). The audits frequently recorded the lowest score for signage (“no visible signage or way-finding”) on segments, indicating that along many of these streets there are few if any indications that one is on a Bay Trail connector or how to continue. This can lead to confusion, wrong turns, or missed connections, especially for people unfamiliar with the area. Good way-finding is crucial for a network like the Bay Trail, especially when connecting to destinations, other trails, or transit. However, currently these access routes often feel disconnected due to poor signage continuity.

On most corridors, signage is limited to perhaps a single sign at the trail-head and then nothing along the rest of the route until further inland at some bike-ways intersections. No Bay Trail signage was noted on Cutting and Carlson boulevard at Marina Way South, Harbor Way South, and Marina Bay Parkway. There was also no Bay Trail signage at Carlson and central Avenue. These are key intersections right before the I-580 highway and the shoreline. Similarly, Meade Street’s jogs through the neighborhood have no signs; one could easily lose the trail connection without prior knowledge or a GPS. This lack of consistent signage means the routes are not legible as “Bay Trail” for users – they just look like ordinary city streets with no indication of a regional trail link. Marina Way South and Harbor way South routes have frequent legible sign post signage. This is because they are a designated bike route (part of the on-street Bay Trail.



Ohlone Greenway

A section of the greenway at El Cerrito

Recommendations

Recommendations

Recommended improvements for the project range over time and investment. Immediate, low-cost fixes include installing high-visibility crosswalks, yield-to-pedestrian signs, and pavement markings at critical intersections to create safer riding connections. Deploying way-finding signage from transit hubs to trail-heads and scheduling routine sidewalk and bike-lane maintenance can also help improve pedestrian and biking experience urgently (Table 19).

Mid-Term Infrastructure Investments include completing missing sidewalk segments, building protected bike lanes, and introducing targeted traffic calming strategies such as curb extensions, refuge islands, especially on four-lane arterials. Interventions like street trees and seating for shade and comfort can also help build a more comfortable and enjoyable riding or walking experience over time (Table 20).

Recommended longer-range investments include building grade-separated pedestrian/bike crossings (overpasses or underpasses) at freeway and rail choke-points and securing dedicated funding for corridor upkeep and maintenance. Finally, ensuring equitable access to the Bay Trail requires dedicated, long-term policy actions which integrate focuses, equity-driven improvements into local general plans and capital programs (Table 21).

Table 19: Immediate, Low-Cost Recommendations

Intervention or Action	Intended Impact	Notes/Description	Responsible Parties
Install high-visibility crosswalk markings & "Yield to Pedestrians" signs	Traffic Safety	Paint fresh continental crosswalks at all trail crossings and install driver-alert yield signs.	City Public Works
Refresh/add bike lane markings or sharrows	Bicycle Visibility	Repaint existing bike lanes and add sharrows on connectors to define cycling space.	City Public Works
Trim vegetation, remove debris & repair minor pavement hazards	Maintenance & Cleanliness	Conduct corridor sweeps to clear trash, overgrowth, and fix small potholes or lifted sidewalk panels.	Public Works; Parks Dept.
Deploy tactical traffic-calming measures	Traffic Speed Reduction	Install portable speed feedback signs, temporary curb extensions or bollards at high‑speed segments.	Transportation Engineering
Install interim way-finding & Bay Trail entry signs	Way-finding & Access	Place directional arrows and simple trail-head banners at key junctions to guide users to/from the Bay Trail.	Public Works; East Bay Regional Park District (EBRPD)
Conduct baseline usage counts & surveys	Data-Driven Planning	Deploy temporary counters and brief intercept surveys at major access points to capture user patterns.	Transportation Planning; Community Volunteers
Organize community clean-up & beautification events	Community Engagement & Maintenance	Partner with neighborhood groups for litter pick-ups, mural painting, and planting along connectors.	Neighborhood Services; Local NGOs or CBOs

Table 20: Mid-Term Infrastructure Recommendations

Intervention or Action	Intended Impact	Notes/Description	Responsible Parties
Upgrade crossings with signals or pedestrian beacons & refuges	Intersection Safety	Install HAWK signals/RRFBs, add curb extensions and median islands to shorten wide crossings.	Public Works; Cal-trans Transportation Eng.
Implement permanent traffic calming & protected bikeways	Traffic Safety & Comfort	Redesign lanes or road diets to add buffers, cycle tracks, speed humps, and raised crossings.	Public Works; Transportation Dept.
Fill sidewalk & trail link gaps	Connectivity & Continuity	Construct missing sidewalk segments or short trail spurs to create unbroken walking/cycling paths.	Public Works; Planning Dept.
Enhance streetscapes (trees, lighting, benches, art)	Environmental Comfort	Plant street trees for shade, install pedestrian-scale lights, benches, and public-art treatments.	Public Works; City Planning
Deploy comprehensive way-finding signage	Wayfinding & User Legibility	Roll out consistent Bay Trail signs (post-mounted & pavement stencils) at every major turn and node.	Transportation Planning; Regional Trails Program
Create gateway treatments at Bay Trail trail-heads	User Experience & Identity	Build modest entry features (arches, kiosks, maps, art) at main access points to define "arrival."	Parks/Trails Division
I identify and upgrade underserved connector routes	Equity & Access	Prioritize sidewalk and bike lane improvements on streets serving Equity Priority Communities and BCDCs communities of concern	Planning & Public Works; County Health/Equity Programs
Strengthen transit–trail connections	Multi-modal Connectivity	Improve crossings, add bike racks/Share stations at BART/bus stops, and include Bay Trail info in stations.	Transportation; BART; AC Transit

Table 21: Long-Range Investments and Policy Action Recommendations

Intervention or Action	Intended Impact	Notes/Description	Responsible Parties
Construct grade-separated trail crossings	Barrier Elimination	Build pedestrian/bike overpasses or underpasses at major freeway or rail pinch points isolating neighborhoods.	Public Works; Caltrans; Railroad Companies
Complete major Bay Trail network gaps	Regional Connectivity	Plan and fund capital projects to close missing Bay Trail segments and add new connector spurs.	Planning Dept.; EBRPD; ABAG/MTC
Establish dedicated maintenance funding & agreements	Maintenance Sustainability	Secure annual budgets or grants and formalize "Adopt-a-Corridor" partnerships for routine corridor upkeep.	City Council; Public Works; EBRPD
Embed connector upgrades into city policy & plans	Policy Alignment & Equity	Update General Plan, Transportation & Capital Improvement Plans to require pedestrian/cycle provisions along connectors.	Planning Dept.; City Council
Implement ongoing trail use & safety monitoring	Data-Driven Evaluation	Install permanent counters, conduct annual safety audits and user surveys to track performance.	Transportation Planning; MTC (regional data support)
Strengthen inter-city & regional coordination	Network Continuity	Partner with neighboring jurisdictions to harmonize signage, design standards, and funding strategies.	City Planning; Adjacent Cities; Regional Planning Agencies

Richmond Wellness Trail

Completed phase o1at Marina Way South & Cutting **Blvd**

Appendix

APPENDIX 01: Segment Scoring Sheet dictionary

Parcel Frontage Quality

setback_l	
More than 20 feet	1
Some within 20 feet, some more than 20 feet	2
Some within 20 feet, some within 2 feet	3
Within 2 feet	4

parcel_and_building_access_l	
No doors or parcel access/Inactive	1
Few doors or parcel access/Limited	2
Several doors or parcel access/Moderate	3
Frequent doors or parcel access/Active	4

facade_articulation_l	
No articulation	1
Some articulation	2
Mix of some articulation and highly articulated	3
Highly articulated	4

building_parcel_maintenance_l	
Poor	1
Fair	2
Mixed/Fair and good	3
Good	4

setback_r	
More than 20 feet	1
Some within 20 feet, some more than 20 feet	2
Some within 20 feet, some within 2 feet	3
Within 2 feet	4

parcel_and_building_access_r	
No doors or parcel access/Inactive	1
Few doors or parcel access/Limited	2
Several doors or parcel access/Moderate	3
Frequent doors or parcel access/Active	4

facade_articulation_r	
No articulation	1
Some articulation	2
Mix of some articulation and highly articulated	3
Highly articulated	4

building_parcel_maintenance_r	
Poor	1
Fair	2
Mixed/Fair and good	3
Good	4

Bikeability

bike_facility_type	1
No bike lane	2
Class III (Bike Route)	3
Class II (Bike Lane)	4
Class IV (Separated Bikeway)	

surface_condition	
Major potholes on the sidewalk/failed	1
A lot of bumps and cracks/poor	2
A few bumps and cracks/fair	3
No bumps and cracks/good	4

surface_cleanliness	
Dirty/Significant debris, broken glass or litter affecting walking	1
Somewhat Dirty/A lot debris, broken glass and litter	2
Moderately Clean/Small amounts of debris, broken glass and litter	3
Clean/No noticable debris, broken glass and litter	4

signage_and_wayfinding	
No visible signage and wayfinding	1
Some signage is present but faded or illegible	2
Some signage is present and legible	3
Frequent and legible signage present	4

General Street Experience

degree_of_enclosure	
No enclosure (no structural elements or trees on either side)	1
Little enclosure (structural elements or trees on one side)	2
Some enclosure - structural elements or trees on both sides	3
Highly enclosed (elements or trees with at least 2-1 streetwidth to building he	4

shade_and_comfort	
No shade present	1
Limited shade - 25% coverage of the sidewalk	2
Moderate shade - 25 - 75% coverage of the sidewalk	3
Consistent shade - over 75 %	4

sitting_opportunities	
None	1
Few (one or two benches)	2
Several (more than two benches)	3
Plenty (several mix of chairs benches and alternatives)	4

trees_present	
None	1
Few (one or two trees on each side)	2

Road Attributes

Volume	
High (more than 4 lanes)	1
Moderate (3 to 4 lanes)	2
Low (2 lanes)	3
None (pedestrian and bicycles only)	4

Posted_speed_limit	
More than 40 mph	1
No posted speed limit	2
26 to 40 mph	3
25 mph or less	4

On_street_parking_bays	
Entire street edge is parking on both sides	1
Several on both sides	2
A few or on only side	3
None	4

Pedestrian Movement

path_or_sidewalk	
None	1
Only on one side of the street	2
On both sides of the street	3
On both sides of the street with a softscape or hardscape buffer	4

path_width	
The lesser is less than 5 feet	1
The lesser of between 5 and 8 feet intermittent	2
The lesser of between 5 and 8 feet along entire length	3
The lesser is More than 8 feet continuous	4

path_obstructions	
Frequent obstructions	1
Occasional major obstructions	2
Rare minor obstruction	3
None	4

path_condition	
Major potholes on the sidewalk/failed	1
A lot of bumps and cracks/poor	2
A few bumps and cracks/fair	3
No bumps and cracks/good	4

path_cleanliness	
Dirty/Significant debris, broken glass or litter affecting walking	1
Somewhat Dirty/A lot debris, broken glass and litter	2

Overall subjective experience

pedestrian_safety	
It feels very unsafe to walk here	1
It feels somewhat unsafe to walk here	2
It feels somewhat safe to walk here	3
It feels very safe to walk here	4

bicycling_safety	
It feels very unsafe to ride/roll here	1
It feels somewhat unsafe to ride/roll here	2
It feels somewhat safe to ride/roll here	3
It feels very safe to ride/roll here	4

pedestrian_comfort	
It feels very uncomfortable walking here	1
It feels somewhat uncomfortable walking here	2
It feels somewhat comfortable walking here	3
It feels very comfortable walking here	4

bicycling_rolling_comfort	
It feels very uncomfortable to ride/roll here	1
It feels somewhat uncomfortable to ride/roll here	2
It feels somewhat comfortable to ride/roll here	3
It feels very comfortable to ride/roll here	4

attractiveness	
This street is very unattractive	1
This street is somewhat unattractive	2
This street is somewhat attractive	3
This street is very attractive	4

APPENDIX 02: Intersection Scoring Sheet dictionary

Infrastructure

traffic_control	Field Score
No stop sign or traffic lights	1
Basic stop sign or traffic lights present and visible to all road users	2
Traffic control present includes dedicated pedestrian signal or signage	3
Traffic control present includes dedicated pedestrian and bicycle signal or signage	4

crosswalks	
No crosswalks present on any leg	1
Crosswalk present on only one leg	2
Crosswalk present on 2 or 3 legs	3
Crosswalks present on all legs	4

curb_cuts	
No curb cuts present	1
Curb cuts present but poorly located designed or misaligned	2
Curb cuts are well placed and properly aligned with crosswalks	3
Curb cuts have tactile warning pavers for visually impaired users	4

cyclist_crossing	
No cyclist crossing marking aid present	1
Cyclist crossing aid marking present on 1 or 2 approaches or transition	2
Cyclist crossing aid marking present on all approaches and transition but awkward design	3
Cyclist crossing aid marking present on all approaches and transition and well designed	4

pedestrian_and_cyclist_alert_signage	
No signage alerting drivers to pedestrians or cyclists.	1
Signage present for pedestrians or cyclists	2
Signage present for both pedestrians and cyclists but only minor issues	3
Signage alerting drivers to both pedestrians and cyclists clearly visible and appropriately placed	4

crosswalk_and_cycle_marking_visibility	
Heavily faded almost invisible	1
Markings present but very faded or hard to see	2
Markings moderately clear (but showing signs of wear)	3
Markings highly visible (bright fresh and clearly guiding users)	4

Experience and Comfort

length_of_crossing_without_median_or_safe_zone	Field Sc
Very long unsafe crossing (over 60 feet)	1
Long crossing (45 to 60 feet)	2
Moderate crossing (30 to 45 feet)	3
Short crossing (less than 30 feet)	4

ease_of_crossing	
Very difficult (few safe gaps or yield or long waits)	1
Difficult (moderate waits and inconsistent yielding)	2
Manageable (reasonable gaps and yielding behaviour)	3
Easy (frequent crossing opportunities)	4

crossing_safety_time	
Very little time (users must rush)	1
Limited time (fast users only)	2
Adequate crossing time for most	3
Ample time (no rushing needed)	4

obstructions_and_blindspots	
Any major obstructions block views (walls vegetation cars).	1
Any moderate obstructions (partially block views)	2
Any minor obstructions (mostly clear)	3
No obstructions (clear sightlines)	4

surface_condition	
Good (No bumps and cracks)	1
Fair (A few bumps and cracks)	2
Poor (A lot of bumps and cracks)	3
Fail (Major potholes on the sidewalk)	4

overall_comfort_and_legibility	
Very confusing and stressful to navigate	1
Difficult but navigable with caution	2
Generally understandable and usable	3
Highly intuitive comfortable and user-friendly	4