



TRANSPORTATION and INFRASTRUCTURE COMMISSION REGULAR MEETING AGENDA

Thursday, June 20th, 2024, 6:15 pm – *new time*

Mission: The Berkeley City Council established this Transportation and Infrastructure Commission to advise the City Council on matters related to transportation and public works infrastructure policies, facilities, and services in the City. In addition, the commission functions as the City of Berkeley's Bicycle and Pedestrian Advisory Committee (BPAC).

**North Berkeley Senior Center
Aspen Room
1901 Hearst Avenue
Berkeley, CA 94709**

A. PRELIMINARY BUSINESS

1. Elect meeting chair – **6:15 pm**
2. Call to order – **6:20 pm**
3. Roll call – **6:20 pm**
4. Public comment on items not on the agenda – **6:20 pm**
5. Approval of minutes from May 16th, 2024 meeting – **6:30 pm**
6. Approval and Order of Agenda – **6:35 pm**
7. Update on administration and staff – **6:40 pm**
8. Announcements – **7:00 pm**

B. DISCUSSION/ACTION ITEMS – 7:10 pm

* Written material included in packet

** Written material to be delivered at meeting

The public may speak at the beginning of any item.

1. Alameda County Transportation Commission (ACTC) Rail Safety Enhancement Program (RSEP)* – Action requested – 7:10 pm

Alameda County Transportation Commission staff

This is a follow up to the [April 20, 2023 informational presentation to the Berkeley Transportation and Infrastructure Commission](#). The Rail Safety Enhancement Program (RSEP) proposes to implement pedestrian and roadway safety improvements at 27 existing at-grade rail crossings and two trespass areas within Alameda County, including five at-grade crossings in Berkeley. Staff requests Commission action to support the project.

2. North Berkeley BART Station Bike Access Improvements – Virginia Street Bike Boulevard* – Action requested – 7:45 pm

BART staff

BART staff will present two design options for a new cycle track on Virginia Street adjacent to the North Berkeley BART station, to be constructed as part of the upcoming Transit-Oriented Development housing project, with recommendation for one option for consideration by Transportation and Infrastructure Commission to recommend to the Berkeley City Council for approval. BART staff requests that the Commission take action to recommend the preferred alternative to the Berkeley City Council for approval.

C. INFORMATION ITEMS AND SUBCOMMITTEE REPORTS – 8:25 pm

Information items can be moved to Discussion or Action by majority vote of the TIC

1. Subcommittee reports & assignments: verbal reports from subcommittees
2. TIC [Work Plan](#)
3. TIC Mission Statement (enclosed)
4. Public Works' [Top Goals and Projects](#) and [progress report](#)
5. Council Summary Actions 2022*
6. [Link to Council and Committee Agendas and Minutes](#)

D. COMMUNICATIONS – 8:35 pm

1. First Draft [Local Hazard Mitigation Plan](#) (LHMP) public review – See attached. Send written feedback to mitigation@berkeleyca.gov by July 31, 2024

E. FUTURE AGENDA ITEMS – 8:40 pm

F. ADJOURNMENT – 8:45 pm

Agenda Posted: June 14th, 2024

The next meeting of the Transportation and Infrastructure Commission is scheduled for Thursday, August 15th, 2024 at 6:15 pm.

A complete agenda packet is available for public review at the Main Branch Library and at the Transportation Division and Engineering Division front desks.

ADA Disclaimer

 *This meeting is being held in a wheelchair accessible location. To request a disability-related accommodation(s) to participate in the meeting, including auxiliary aids or services, please contact the Disability Services specialist at 981-6418 (V) or 981-6347 (TDD) at least three business days before the meeting date. Please refrain from wearing scented products to this meeting.*

SB 343 Disclaimer

Any writings or documents provided to a majority of the commission regarding any item on this agenda will be made available for public inspection at the Public Works Transportation Division offices located at 1947 Center Street, 4th Floor.

Communications Disclaimer

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TRANSPORTATION and INFRASTRUCTURE COMMISSION
REGULAR MEETING
DRAFT MINUTES

Thursday, May 16th, 2024, 6:15 pm

North Berkeley Senior Center
1901 Hearst Avenue
Berkeley, CA, 94709

A. PRELIMINARY BUSINESS

1. Call to order

6:16 pm: Chair Fixler called the meeting to order.

2. Roll call

6:16 pm:

Commissioners Present: Noelani Fixler, Barnali Ghosh, Adrian Leung (arrived at 6:20 pm) Liza Lutzker, Karen Parolek, Kim Walton, Ray Yep

Excused: None

Commissioners Absent: Alison Bernstein

Staff Present: Wahid Amiri, Ron Nevels, Noah Budnick, Eric Anderson, Dani Dynes, Sadie Graham (BART), Darin Ranelletti (BART)

3. Public comment on items not on the agenda

6:17 pm: Two public comments.

4. Approval of minutes from April 18th, 2024

6:21 pm Action: It was Moved / Seconded (Parolek / Lutzker) to approve the minutes.

6:21 pm: Vote:

Ayes: Fixler, Ghosh, Leung, Lutzker, Parolek, Walton, Yep

Noes: None

Abstain: None

Absent: Bernstein

Recused: None

6:21 pm Motion passed 7-0-0-1-0

5. Approval and Order of Agenda

6:22 pm: No changes.

6. Update on administration and staff

6:22 pm: Engineering Manager Ron Nevels provided updates and answered Commissioner questions about the Engineering Division's hiring and the status of the sewer program. Transportation Manager Hamid Mostowfi provided updates and answered Commissioner questions about the Transportation Division's hiring and recruitments.

7. Announcements

6:26 pm: Commissioner Lutzker wished everyone a happy Bike to Wherever Day. Commissioner Ghosh gave an update on the Watershed Management Plan subcommittee meeting. Vice Chair Parolek announced that two groups are collecting signatures for parcel tax measures that could go on this fall's ballot, and that both groups have collected enough signatures for review. Commissioner Ghosh announced that there will be a measure to support transit on this fall's ballot.

B. DISCUSSION / ACTION ITEMS

1. Active Transportation Program (ATP) grant applications – Action requested

6:32 pm: Public Works staff gave a presentation on two proposed grant applications to the Caltrans Active Transportation Program (ATP) for the following projects: Southwest Berkeley Bike Boulevards for up to \$4 million; Adeline Street Quick-Build for up to \$1.05 million. Staff requested commission action to authorize the chair to write a letter of support for the grant in the Commission's capacity as the City of Berkeley Bicycle and Pedestrian Advisory Committee (BPAC).

6:43 pm: Commissioners asked clarifying questions about the projects' budgets and funding sources.

6:53 pm: Public comment – One public comment.

6:55 pm: Commissioners commented on public outreach and how these projects relate to future projects.

7:07 pm Action: It was Moved / Seconded (Parolek / Fixler) for the Transportation and Infrastructure Commission to support the City Manager and Department of Public Works' request to the Berkeley City Council for authorization to submit grant applications to the Caltrans Active Transportation Program (ATP) for the following projects: Southwest Berkeley Bike Boulevards for up to \$4 million; Adeline Street Quick-Build for up to \$1.05-million; authorize the Chair of the Transportation and Infrastructure Commission to write a letter of support for the grant, in the Commission's capacity as the City of Berkeley Bicycle and Pedestrian Advisory Committee (BPAC).

7:07 pm: Vote:

Ayes: Fixler, Ghosh, Leung, Lutzker, Parolek, Walton, Yep

Noes: None

Abstain: None

Absent: Bernstein

Recused: None

7:07 pm Motion passed 7-0-0-1-0

2. Informational update on the Link21 Program

7:08 pm: BART staff gave a presentation on Link21, which aims to create a faster, more connected, equitable, and accessible network of train service that focuses on passengers, improving the environment, and our quality of life for generations to come. This includes a new train crossing between Oakland and San Francisco, unlocking better travel possibilities across the 21-county Northern California Megaregion.

7:15 pm: Commission Ghosh left.

7:28 pm: Commissioners asked clarifying questions about how freight rail traffic affects the Link21 plans; if Link21 is looking at transit oriented development and densification around stations; high speed rail; restoring rail service on the lower deck of the Bay Bridge; rail service under Mission Bay and in relation to UCSF; increasing inter-city travel speed; looking at how other metropolitan rail services are trying to increase economic competitiveness; eminent domain; what “access to job opportunities” means; racial and economic equity; displacement vs. creating new housing; how fare costs would differ in each proposal; how BART tunnel designs have improved in relation to earthquakes.

No public comments.

C. INFORMATION ITEMS AND SUBCOMMITTEE REPORTS

Subcommittee reports & assignments: verbal reports form subcommittees

8:10 pm: Commissioner Yep reported on the Watershed Management Subcommittee’s meeting with Public Works staff.

8:15 pm: Commissioner Walton left.

8:15 pm: Vice Chair Parolek reported on the Bike Plan Update Subcommittee’s meeting with Public Works staff. Commissioner Lutzker reported that the Vision Zero Subcommittee plans to meet with Public Works staff on May 31. Vice Chair Parolek reported that the Paving Policy Subcommittee is waiting to add another member before it schedules a meeting.

D. COMMUNICATIONS

None.

D. FUTURE AGENDA ITEMS

8:19 pm: Chair Fixler stated that they are moving to Oakland and resigning from the Commission effective at the end of May. Commissioners stated that at the start of the June 20 meeting, they will have to elect a commissioner to chair that meeting.

Transportation and Infrastructure Commission
Thursday, May 16th, 2024

E. ADJOURNMENT

8:45 pm: It was Moved / Seconded (Parolek / Leung) to close the meeting

8:45 pm: Vote:

Ayes: Fixler, Ghosh, Leung, Lutzker, Parolek, Walton, Yep

Noes: None

Abstain: None

Absent: Bernstein

Recused: None

7:07 pm Motion passed 7-0-0-1-0

The next meeting of the Transportation and Infrastructure Commission is scheduled for Thursday, June 20th, 2024 at 6:15 pm, at the North Berkeley Senior Center, 1901 Hearst Ave, Berkeley, CA 94709.

Administrative Procedures

From the City of Berkeley Commissioners' Manual, 2019 Edition, page 70 regarding minutes:

Although the Brown Act does not require minutes, except for closed sessions, the Commissioners' Manual does require minutes of commission meetings but not for subcommittee meetings. When required, minutes are limited to action minutes only. Minutes are unofficial until approved by the commission. The minutes are converted to PDF and posted on the City's website.

The secretary shall keep an accurate record of the commission's proceedings and transactions. The secretary shall provide action minutes similar to those provided to the Council by the City Clerk. Action minutes list the date, time, and place of the meetings; the staff in attendance; the commissioners present and absent; and a clear and concise description of final actions taken. Approved motions are indicated by "moved, seconded, and carried" and include a breakdown of the vote. The vote breakdown includes the commissioners voting yes, no, abstain, absent, recused, and reason for recusal. Reasons for making a motion, debate, content of public comments, and audience reaction are not to be included.

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ALAMEDA COUNTY TRANSPORTATION COMMISSION

Rail Safety Enhancement Program (RSEP)



City of Berkeley Transportation and Infrastructure Commission

Angelina Leong, Alameda CTC Project Manager

Kevin Aguigui, Kimley-Horn Project Manager

June 20, 2024

Agenda

1. Program Overview
2. Needs and Benefits
3. Berkeley TIC and Public Engagement
4. Berkeley Crossing Improvements
5. County-Wide RSEP Schedule
6. Questions/Comments



Program Overview

2016

Countywide
Goods Movements
Plan Adopted

2018

Rail Strategy Study
At-Grade
Prioritization
Framework
Adopted

2019

Federal Railroad
Administration
Identifies Alameda
County as 4th Highest
County in Nation with
Injuries

2020

RSEP Split into
Phases – Phase A
Pre-Construction
Work Begins

2023

CEQA
Completed

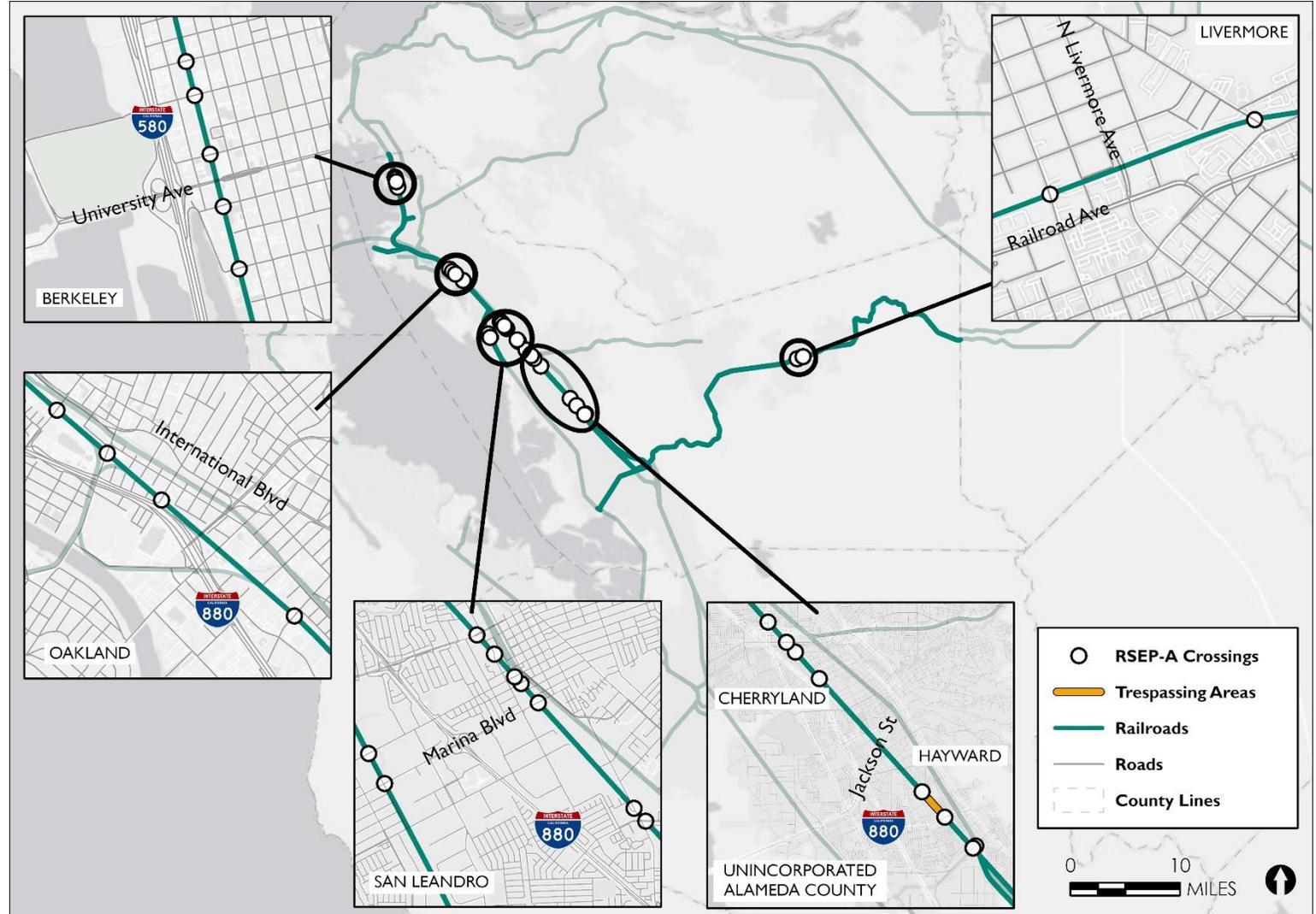
Program Overview

Enhancements to 27 crossings and two trespass areas

Project Partners



Project Stakeholders



Project Need

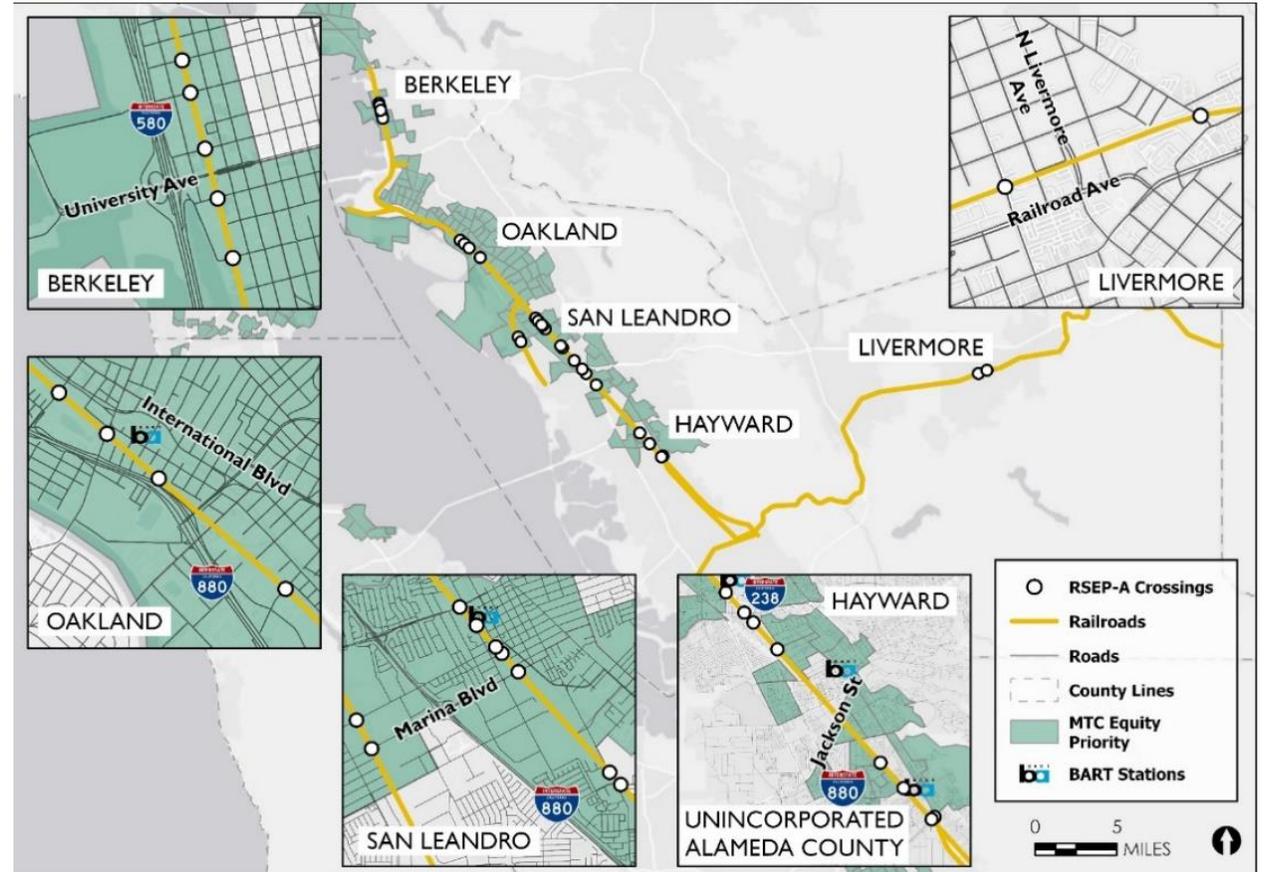
- Crossing Safety (2016-2021)
 - Overall RSEP: 28 incidents, resulting in 17 fatalities and 12 injuries.
 - In Berkeley: 5 incidents, resulting in 5 fatalities and 5 injuries.
- Additional Incidents (2022-2023)
 - Overall RSEP: 12 incidents, resulting in 3 fatalities and 6 injuries.
 - In Berkeley: 3 incidents, resulting in 1 fatality



Total Incidents Map
(2016-2021)

Project Benefits

- Improves pedestrian and vehicle user safety
- Increases reliability and efficiency of goods movement
- Real affect on Highest Equity Priority Communities (EPCs)
- Eliminates barriers to walking and encourages mode shifts from trucks to rail and cars to active transportation (walk and bike)



EPC Map

Berkeley TIC and Public Engagement

- **March 28, 2023** – Virtual public hearing for Hearst Avenue and Virginia Street (30-day public comment period)
- **April 13, 2023** – Virtual public hearing for Addison Street, Cedar Street, and Bancroft Way (30-day public comment period)
- **April 20, 2023** – In-person informational presentation to City of Berkeley Transportation and Infrastructure Commission (TIC)
- **May 22, 2024** – Virtual Public Information Meeting (14-day public comment period)
- **June 20, 2024** – In-person presentation to City of Berkeley TIC (Today's Item)

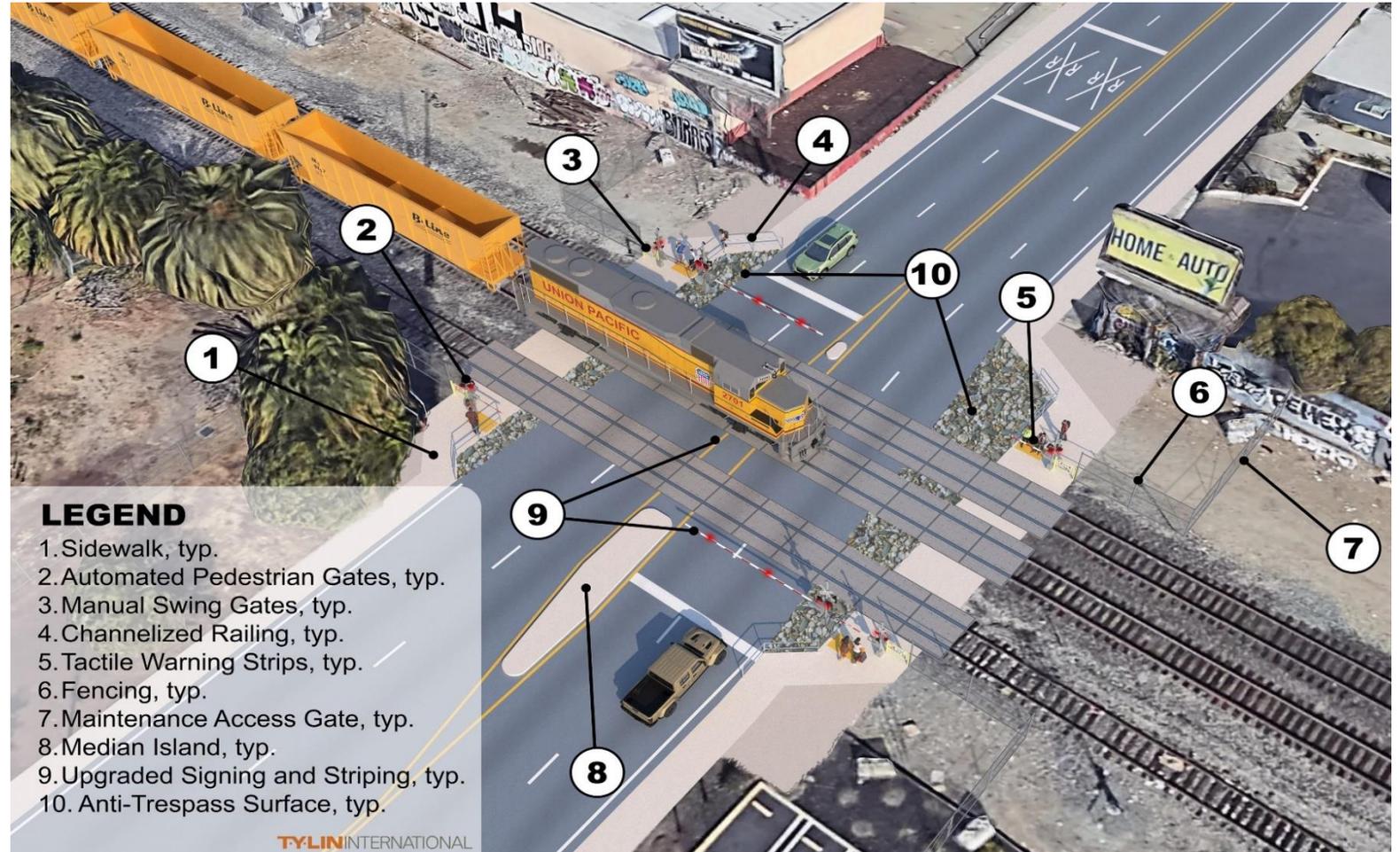
Typical Crossing Improvements

➤ Full Pedestrian Treatments

- Sidewalks through the Crossings
- Automated Gate Arms
- Emergency Exit Gates
- Channelization / Railing
- Crossing Panels
- Anti-Trespass Fencing

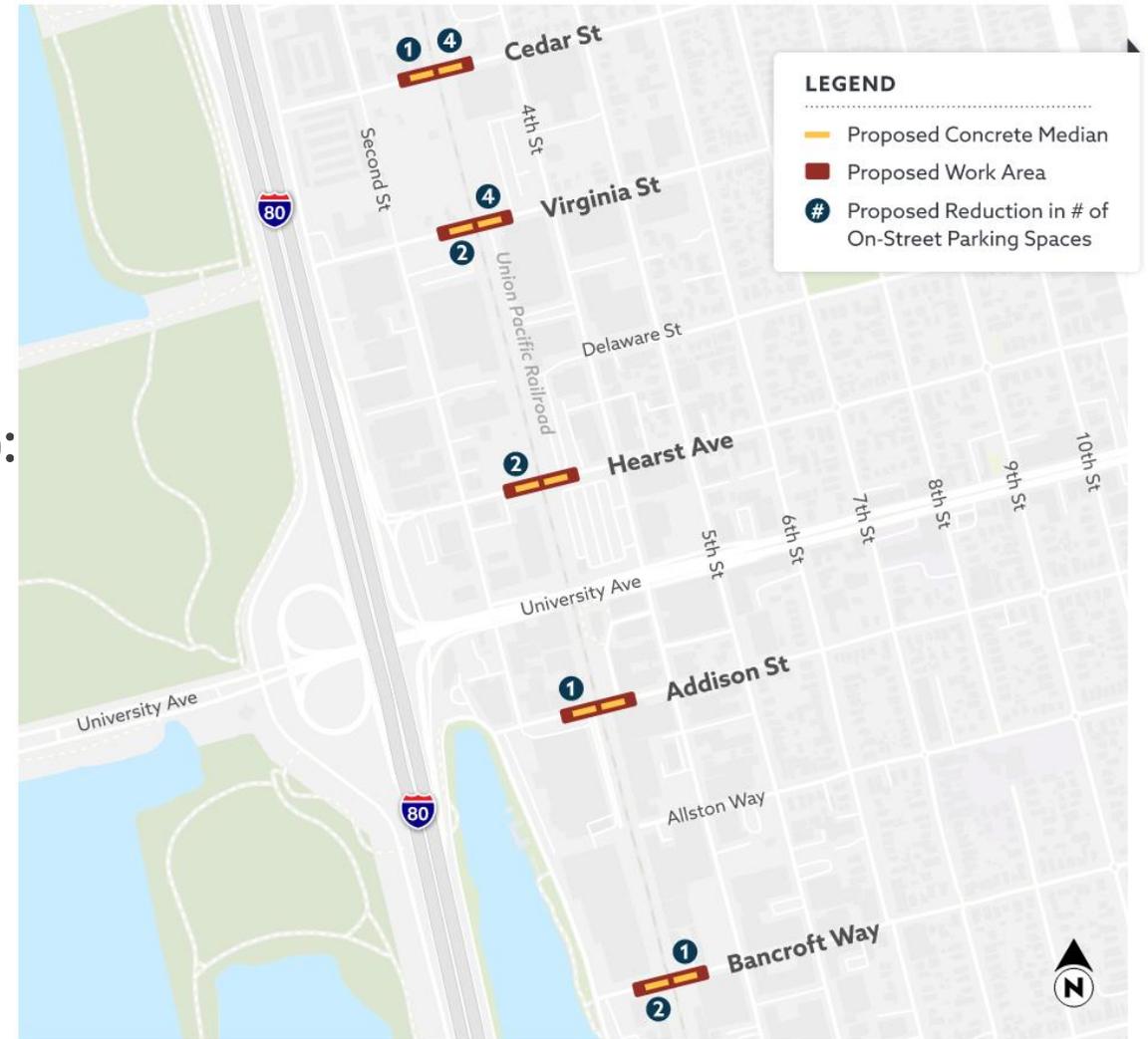
➤ Roadway Treatments

- Signing and Striping
- Automated Gate Arms
- Median Islands
- Lighting
- Parking Restrictions
- Curb Bulbouts



Crossing Improvements in Berkeley

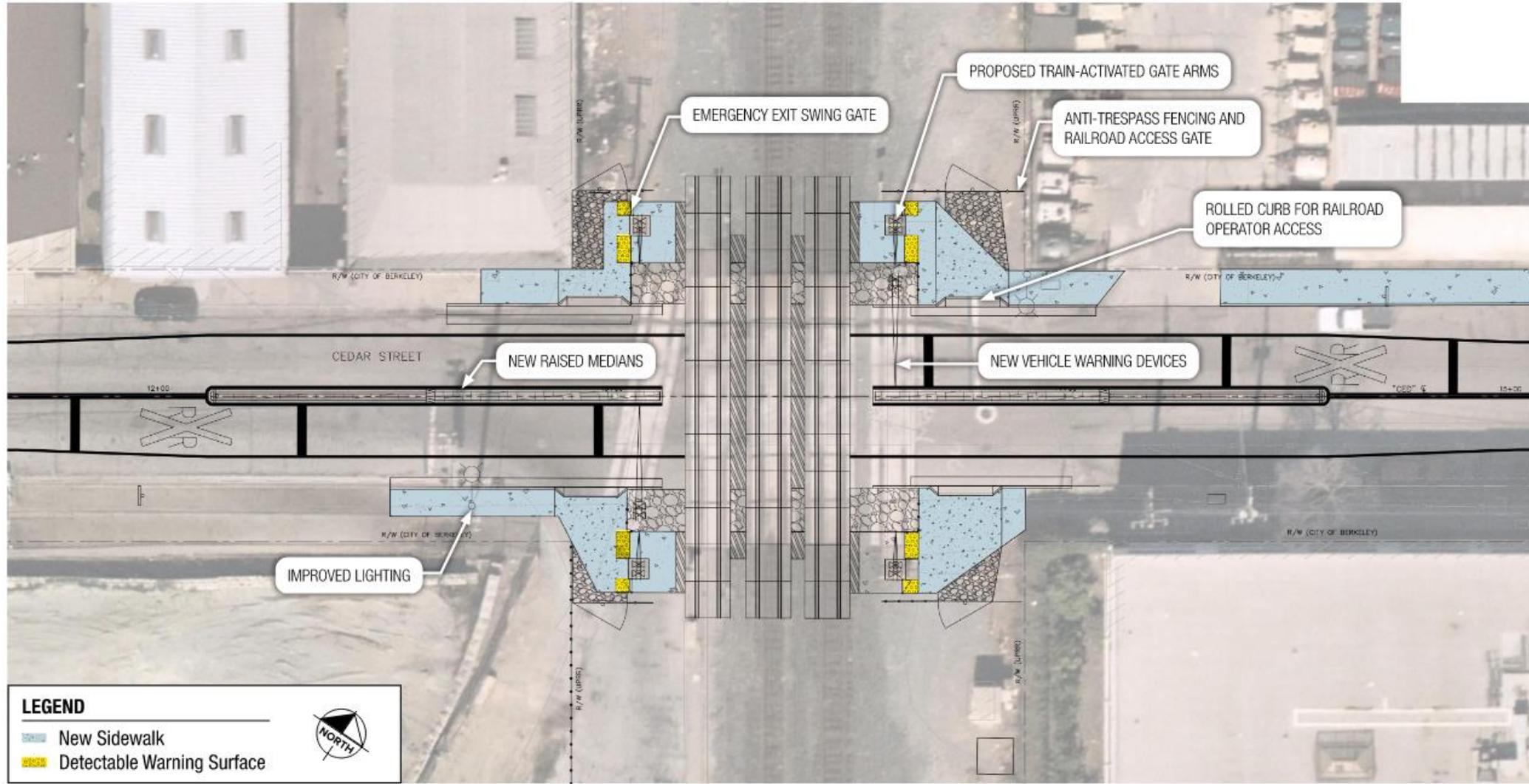
- Improvements developed by Field Diagnostic Meetings with the City of Berkeley, California Public Utilities Commission, Union Pacific Railroad, and Alameda CTC
- **5 Crossings (between 2nd Street and 4th Street):**
 - Cedar Street
 - Virginia Street
 - Hearst Avenue
 - Addison Street
 - Bancroft Way



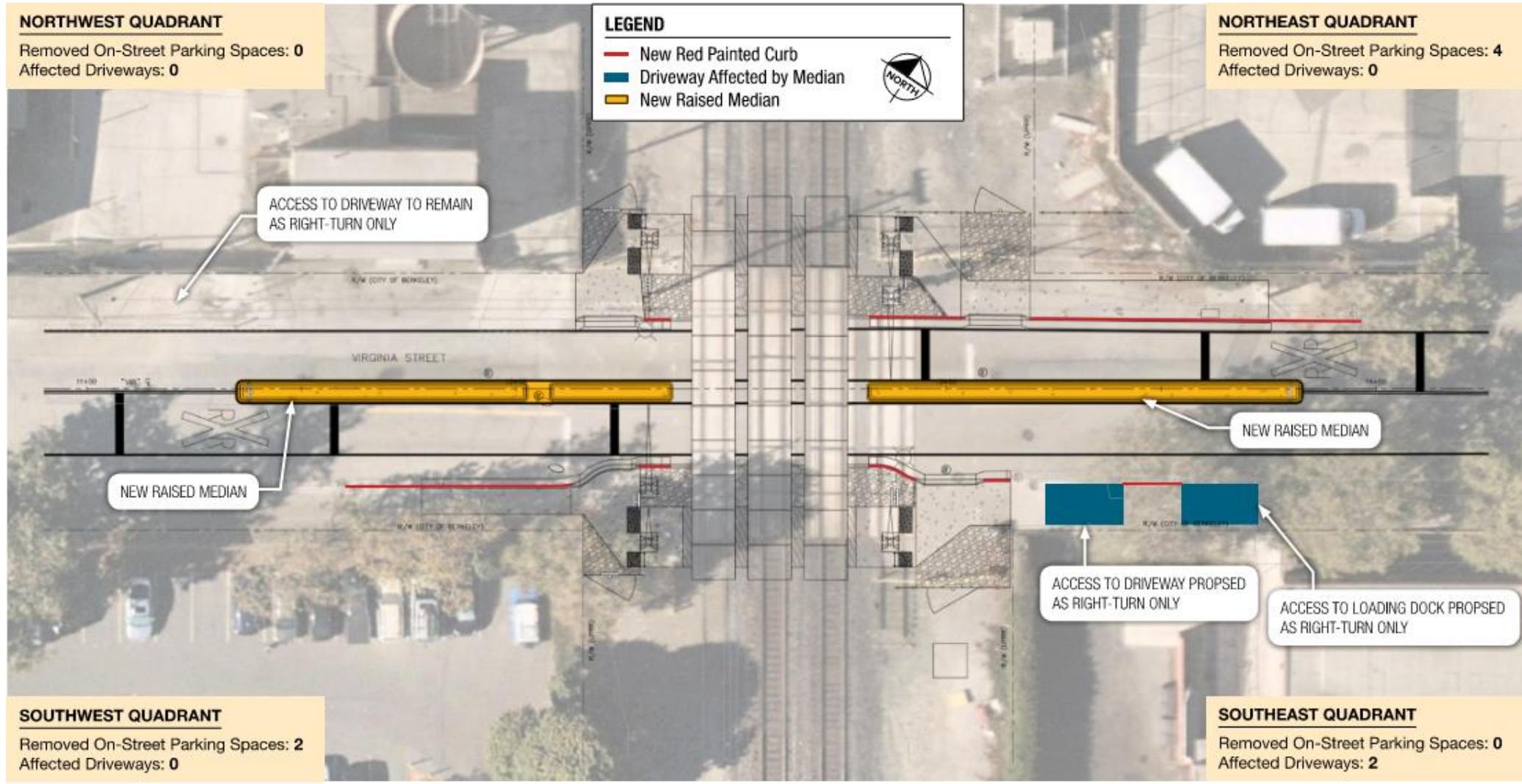
Crossing Improvements in Berkeley

Crossing Feature	Cedar Street	Virginia Street	Hearst Avenue	Addison Street	Bancroft Way
Pedestrian Treatments					
Sidewalks through the Crossing	X	X	X	X	X
Automated Gate Arms / Swing Gates	X	X	X	X	X
Channelization Fencing/Railing	X	X	X	X	X
Concrete Panels	X	X	X	X	X
Anti-Trespass Fencing	X	X	X	X	X
Roadway Treatments					
Signing and Striping	X	X	X	X	X
Median Islands	X	X	X	X	X
Lighting	X	X	-	X	X
Parking Restrictions	X	X	X	X	X
Curb Bulbouts	-	X	X	-	-

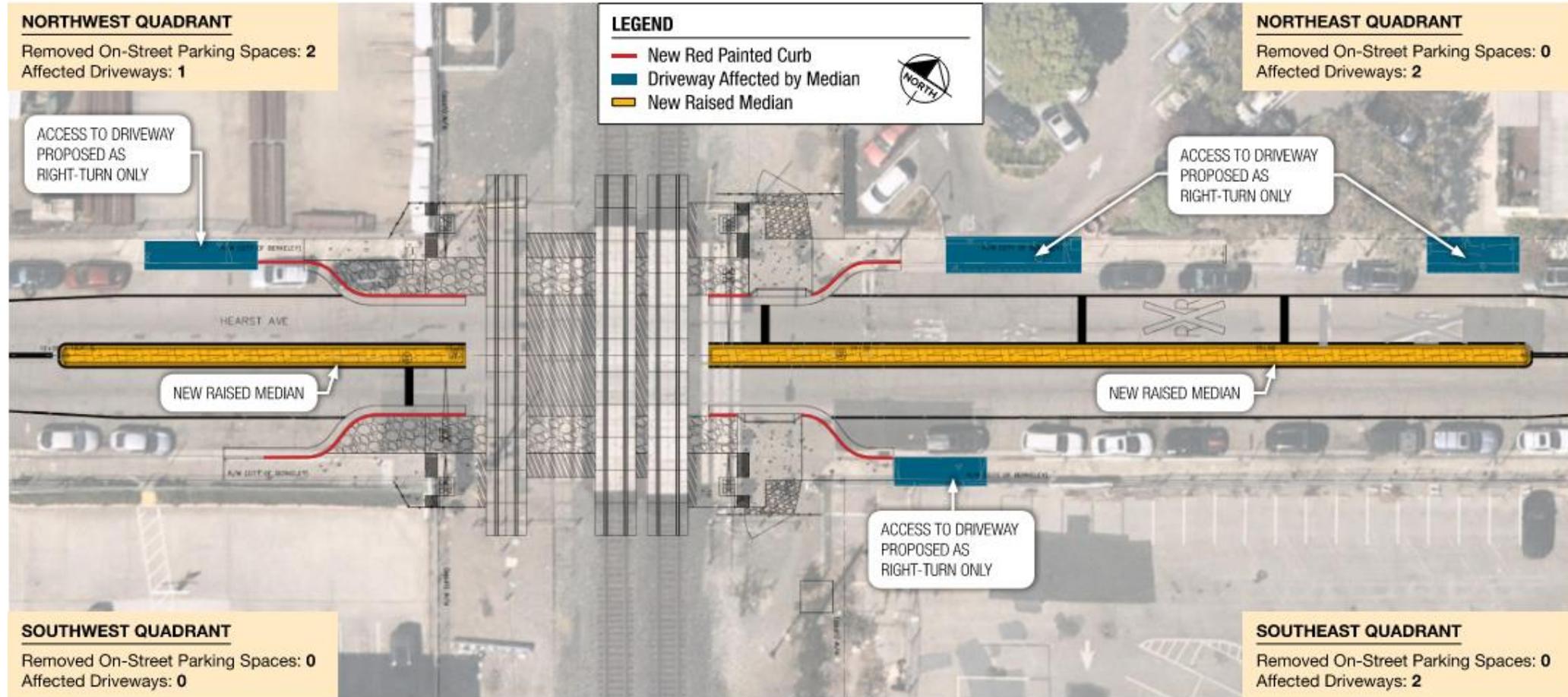
Crossing Improvements in Berkeley



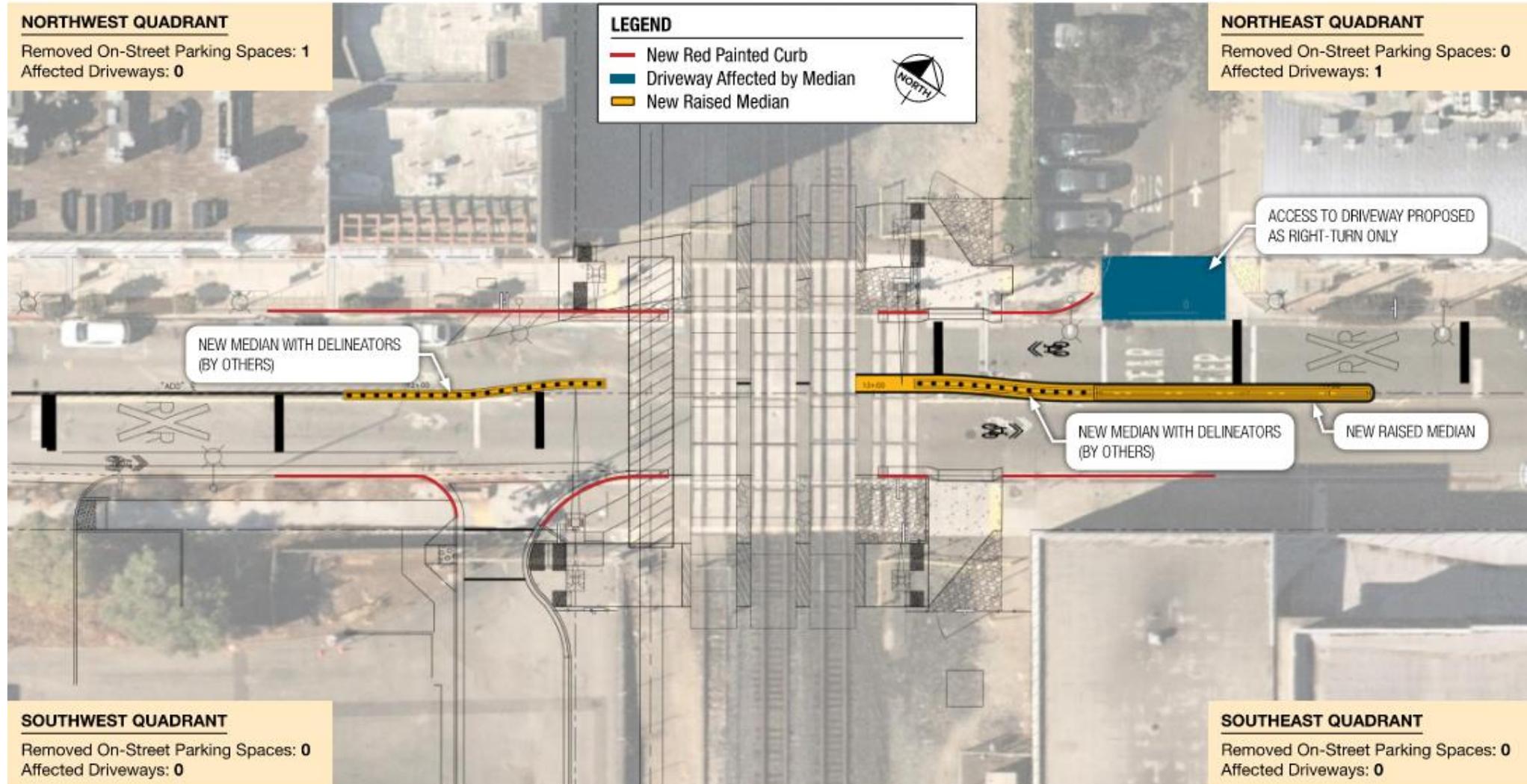
On-Street Parking and Driveways Access: Virginia Street



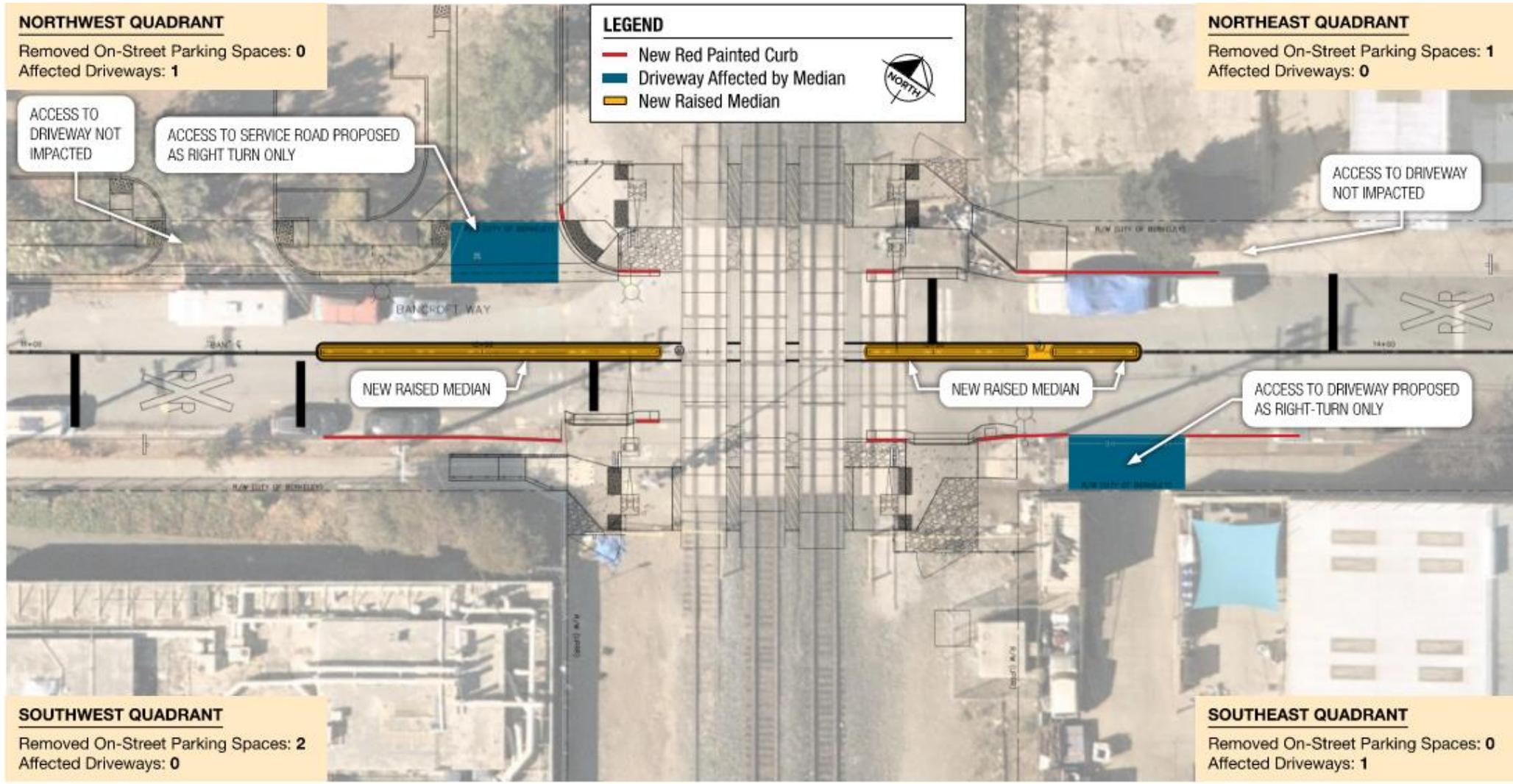
On-Street Parking and Driveways Access: Hearst Avenue



On-Street Parking and Driveways Access: Addison Street

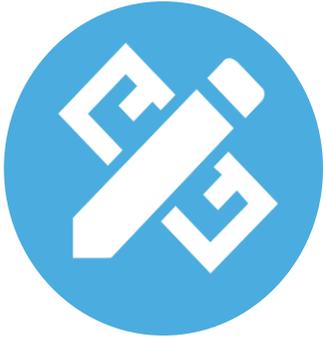


On-Street Parking and Driveways Access: Bancroft Way



County-Wide RSEP Schedule

Conceptual
Design



Complete

Environmental
Clearance



CEQA – Complete
NEPA – Fall 2024

Final Design



Summer 2023 –
Late 2025

Right-of-Way



Summer 2023 –
Late 2025

Advertise /
Award



Spring 2026

Construction



Beginning
Summer 2026*

*Construction schedule in Berkeley to be determined in coordination with UPRR forces and the City of Berkeley.

Recommended Action

- Staff requests that the TIC supports the project and allow the project to proceed with completing the final design.

Comments/Questions

For more information, please visit Alameda CTC's RSEP Website at:



<https://www.alamedactc.org/programs-projects/transit-and-rail/rail-safety-enhancement-program>

North Berkeley BART TOD Bicycle Access Improvements on Virginia Street Bicycle Boulevard

City of Berkeley Transportation and Infrastructure
Commission, June 20, 2024



Agenda

Requested Action

Public Engagement Activities
Summary

Site and Policy Context

Bikeway Options

Bikeway Design Standards and
Guidance

Parking Assessment Data Sources

Evaluation Framework

Bikeway Assessment

Requested Action



Requested Action

We request that the TIC recommend that the Berkeley City Council:

1. Adopt a Resolution approving the conceptual design for a 12-foot-wide bikeway (Option A) on Virginia Street between Acton Street and West Drive to be constructed in connection with the proposed Transit-Oriented Development housing project; and
2. Authorize the City Manager to direct staff to work with San Francisco Bay Area Rapid Transit (BART), their consultants, and developers on implementation of these changes to the public right-of-way.



Public Engagement Activities Summary

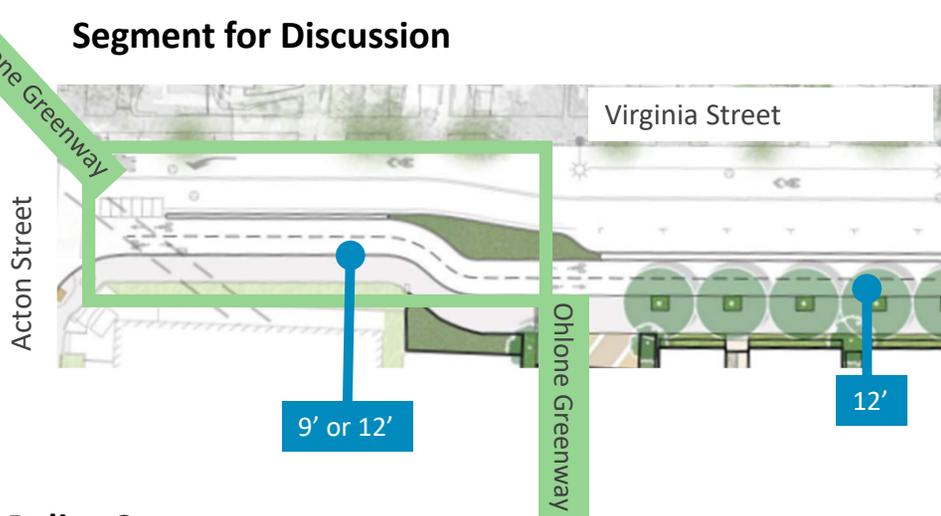
Public Engagement related to the Virginia Street Bike Boulevard has included:

- BART sent postcards to residences within 300 feet of the study area on Virginia Street
 - Per Public Works *Public Engagement Policy*
 - Postcards translated into Spanish & Chinese
- BART canvassed the properties along the study area on Virginia Street that could be directly affected by potential parking loss
 - BART provided a leave-behind flyer with project and TIC meeting information
- North Berkeley Housing Partners (NBHP) distributed flyers at the Taste Festival on 6/9 and the Farmer's Market on 6/13
- BART put up a poster in the North Berkeley BART Station in advance of this meeting



This bikeway segment is part of an updated concept for the Ohlone Greenway and Virginia Street Bikeway as part of the North Berkeley TOD.

Segment for Discussion

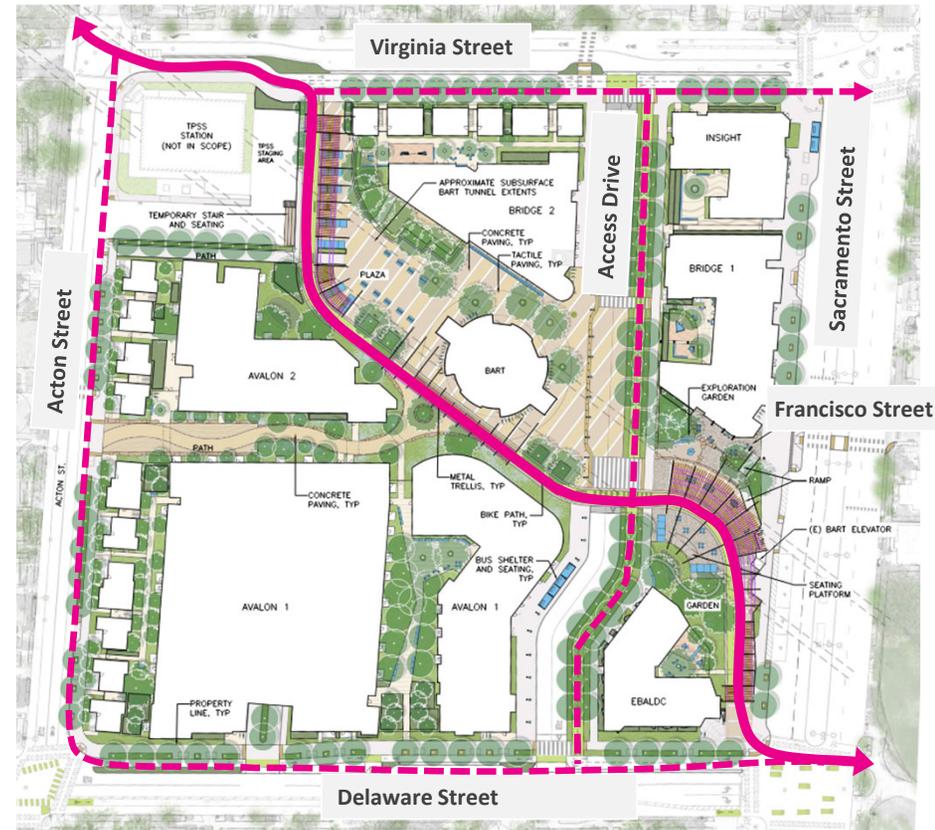


Site: Connecting the Ohlone Greenway through the site is a stated priority in the City of Berkeley and BART’s **Joint Vision & Priorities** for TOD for the Ashby and North Berkeley BART Stations.

City: The **City’s 2017 Bicycle Plan** lays out policy goals including promoting bicycle safety, encouraging mode shift, and supporting bicycle access for people of all ages and abilities

BART: **BART’s 2016 Station Access Policy** station access hierarchy and target station access modes prioritize walking and biking

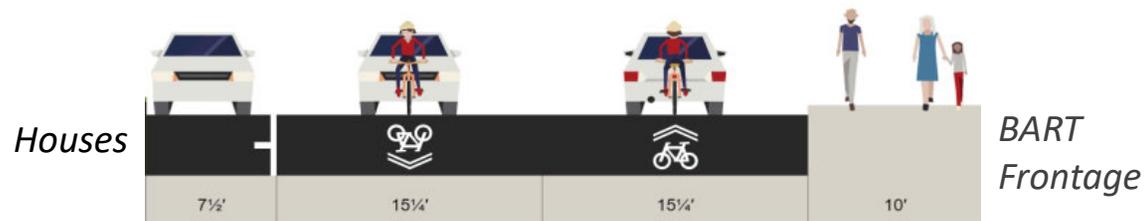
Future Site



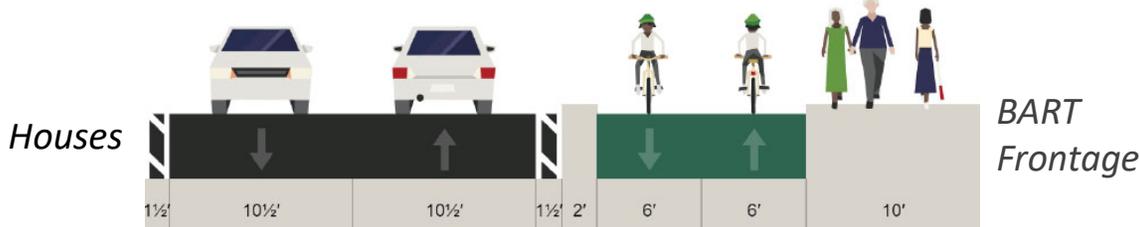
Ohlone Greenway Circulation

Existing On-Street Bike Boulevard and Bike Lane Circulation

There are two options under consideration for this 200' segment of Virginia.

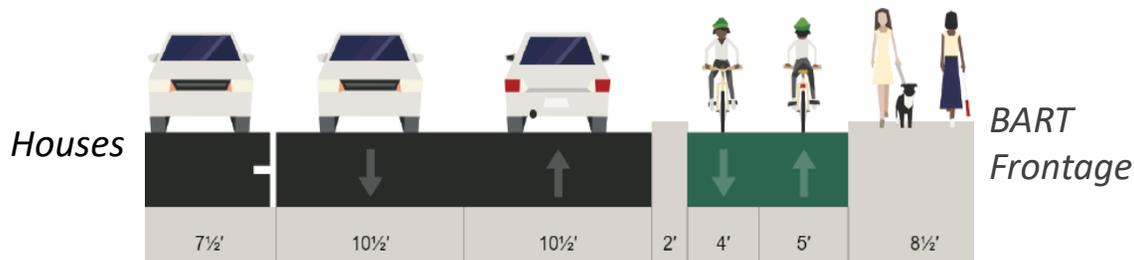


Existing Cross Section



Option A: 12-foot two-way separated bikeway

- Removes up to 5-8 on-street vehicle parking spaces on the north side of Virginia into additional space for walking and biking
- Maintains existing sidewalk width (10')



Option B: 9-foot two-way separated bikeway

- Narrows existing sidewalk to 8.5 feet
- Maintains parking spaces on the north side of Virginia
- Requires offset bike centerline to allow for 3' minimum from gutter pan (Caltrans Standard)

Bikeway Assessment: Design Standards and Guidance

Bikeway assessment should account for non-rideable width

	Width Standards and Guidance		Width Standards and Guidance Accounting for Non-Rideable Width			Design Vehicle
	Minimum Width	Preferred Width	Minimum Width	Preferred Width	Non-Rideable Width	
Current Caltrans Standards	8' ¹	-	8'	-	None	No Standard
Current Caltrans Guidance	-	10'	-	10'	None	No Guidance
Draft Caltrans Guidance (District 4)	10'	12'	12'	14'	2' Gutter Pan ²	No Guidance
National Association of Transportation Officials (NACTO) – Typical Bicycle	8'	10'	10'8"	12'8"	8" of Shy Distance and 2' Gutter Pan ³	Typical Bike
NACTO– Cargo Bicycle	9'	11'	11'8"	13'8"	8" of Shy Distance and 2' Gutter Pan ³	Cargo Bike
Massachusetts Department of Transportation (MassDOT) (150-400 bidirectional cyclists per hour)	10'	11'	10'	11'	No Guidance	No Guidance
Ohio Department of Transportation (ODOT) (<150 directional cyclists per hour)	10'	12'	12'	14'	2' Gutter Pan ¹	No Guidance

Notes:

1. The Caltrans minimum width is the statutorily required width
2. There is a 2' gutter pan along the study segment of Virginia Street
3. NACTO recommends 8" of shy distance from a vertical curb under 6". Proposed Bikeway would be between two curbs under 6".

Parking Assessment: Occupancy Targets and Data Sources

- The **Parking Occupancy Target** for Berkeley is 65-84% and is sourced from the GoBerkeley parking program.
- **Parking Supply and Occupancy** data is sourced from a BART on-street parking survey, collected weekdays through June and July 2020 for the area within a 10-minute walk of the North Berkeley BART Station.
- **Availability of Alternate Residential Loading** is based on a review of whether residences along the impacted segments have driveways or garages that can be used for loading activities.



The Evaluation Framework considers 3 equally weighted criteria

	Key References	Evaluation Benchmark*	Notes
Bikeway Width Design Standards and Guidance	Current Caltrans Design Standards and Guidance	Bikeway Width: 8' Minimum, 10' Preferred	
	NACTO Best Practice from "Designing for Small things with Wheels"	Bikeway Width: 11'8" Minimum, 13'8" Preferred	<i>Based on cargo bike design vehicle</i>
Existing and Forecasted Future Bicycle Volumes	MassDOT Separated Bikeway Design Guide	Bikeway Width: 10' Minimum, 11' Preferred	<i>Based on forecast of up to 170 bidirectional cyclists during the peak hour</i>
	ODOT Multimodal Design Guide	Bikeway Width: 12' Minimum, 14' Preferred	<i>Based on forecast of up to 170 bidirectional cyclists during the peak hour</i>
Parking and Loading Impacts	GoBerkeley On-Street Parking Occupancy Targets	Target on Street Parking Occupancy: 65-84%	
	Alternate Residential Loading	Availability of driveways and garages for residential loading	

*Bikeway width assessment accounts for non-rideable area along the study segment

Design Standards and Guidelines

Option A meets Caltrans standard width, as well as Caltrans guidance and industry best practice

	Option A: 12-foot Bikeway
Caltrans Standard – Minimum Width (8')	✓
Caltrans Current Guidance – Preferred Width (10')	✓
NACTO – Cargo Bicycle Design Vehicle (11'8")	✓
NACTO – Typical Bicycle Design Vehicle (10'8")	✓

Design Standards and Guidelines

Option B meets Caltrans standard width, falls short of Caltrans guidance and industry best practice

	Option B: 9-foot Bikeway
Caltrans Standard – Minimum Width (8')	✓
Caltrans Current Guidance – Preferred Width (10')	✗
NACTO – Cargo Bicycle Design Vehicle (11'8" – 13'8")	✗
NACTO – Typical Bicycle Design Vehicle (10'8" – 12'8")	✗



Existing and Forecasted Future Volumes

Option A meets volume-based, industry best practice width recommendations

Approximately 65-75 cyclists are observed along Virginia Street today

Up to **170 bidirectional peak hour cyclists** are forecast along Virginia Street in 2035

	Option A: 12-foot Bikeway
MassDOT– 150-400 bidirectional cyclists per hour (10'-11')	✓
ODOT – <150 directional cyclists per hour (12'-14')	✓

Additional detail on peak hour forecast methodology can be found in the technical analysis documentation



Existing and Forecasted Future Volumes

Option B does not meet volume-based, industry best practice width recommendations

Approximately 65-75 cyclists are observed along Virginia Street today

Up to **170 bidirectional peak hour cyclists** are forecast along Virginia Street in 2035

	Option B: 9-foot Bikeway
MassDOT – 150-400 bidirectional cyclists per hour (10'-11')	X
ODOT – <150 directional cyclists per hour (12'-14')	X

Additional detail on peak hour forecast methodology can be found in the technical analysis documentation



Parking and Loading

Option A impacts on-street parking spaces in front of residences but is not expected to impact parking occupancy or residents' ability to meet loading needs

	Option A: 12-foot Bikeway
Maintains existing on-street vehicle parking	X
Maintains neighborhood level parking occupancy and parking availability at 65-84% occupancy target	✓
Maintains loading capabilities at adjacent residences	✓

Additional detail on the parking analysis methodology can be found in the technical analysis documentation



Parking and Loading

Option B would result in no changes to parking and loading for residences or the neighborhood

	Option B: 12-foot Bikeway
Maintains existing on-street vehicle parking	✓
Maintains neighborhood level parking occupancy and parking availability at 65-84% occupancy target	✓
Maintains loading capabilities at adjacent residences	✓

Additional detail on the parking analysis methodology can be found in the technical analysis documentation



Option A is the preferred alternative and outperforms Option B on 2 out of 3 evaluation criteria

	Option A: 12-foot Bikeway	Option B: 9-foot Bikeway
Bikeway Width Design Standards and Guidance	✓	
Existing and Forecasted Future Bicycle Volumes	✓	
Parking and Loading Impacts		✓

Requested Action

We request that the TIC recommend that the Berkeley City Council:

1. Adopt a Resolution approving the conceptual design for a 12-foot wide bikeway (Option A) on Virginia Street between Acton Street and West Drive to be constructed in connection with the proposed Transit-Oriented Development housing project; and
2. Authorize the City Manager to direct staff to work with San Francisco Bay Area Rapid Transit (BART), their consultants, and developers on implementation of these changes to the public right-of-way.





Department of Public Works
Transportation Division

June 20, 2024

To: Berkeley Transportation and Infrastructure Commission

From: Wahid Amiri, Deputy Director Public Works
Hamid Mostowfi, Transportation Manager
Eric Anderson, Principal Transportation Planner

Re: North Berkeley BART Transit Oriented Development Bicycle Access
Improvements on Virginia Street Bicycle Boulevard

Staff Recommendation

Recommend that the Transportation and Infrastructure Commission (TIC):

1. Review the two proposed design options for bicycle access on the Virginia Street Bicycle Boulevard as part of the North Berkeley BART Transit Oriented Development (TOD), and
2. Recommend one of the two design options for bicycle access on the Virginia Street Bicycle Boulevard to the Berkeley City Council.

Background

The memorandum and materials from the Bay Area Rapid Transit (BART) staff report provide background and discussion on this item. As stated in the BART memo, BART, in consultation with City of Berkeley staff from multiple departments, is leading the redesign of streets around the perimeter of the proposed North Berkeley BART TOD project. This TIC item concerns proposed changes to Virginia Street that are part of that effort. Proposed changes to Delaware Street, Acton Street, and Sacramento Street are not part of this item, nor are any other element of the North Berkeley BART TOD project.

As described below, BART staff have identified two design options for bicycle access along the segment of Virginia Street between Acton Street and the West Drive (access road into the North Berkeley BART station area). BART staff is seeking TIC recommendation to the Berkeley City Council to approve the BART-preferred Option A.

- Option A: A 12-foot wide bikeway:
 - Pros:
 - Meets Caltrans recommended bikeway design widths for higher-volume bikeways (exceeds minimum standards)
 - Provides additional width for larger cargo/family bicycles
 - Preserves existing adjacent sidewalk width at 10'
 - Cons:
 - Eliminates five to eight on-street residential vehicle parking spaces*

- Option B: A 9-foot-wide bikeway:
 - Pros:
 - Preserves five to eight on-street residential vehicle parking spaces*
 - Meets Caltrans minimum standard bikeway widths
 - Cons:
 - Requires narrowing of existing adjacent sidewalk from 10' to 8.5'

**Parking supply is expressed as a range because separate parking stalls are not marked; depending on size of vehicles, five to eight vehicles might be parked along the affected curb.*

Per City of Berkeley Department of Public Works *Public Engagement Policy*, BART staff has notified affected property owners and residents within 300 feet of the subject area by mailing postcards in advance of this meeting. Postcards were mailed on Tuesday, June 4, 2024. Additionally, on June 10, 2024, BART staff canvassed the properties along Virginia Street that would be directly affected by potential parking loss under Option A. As part of canvassing, BART staff distributed flyers with project details and TIC meeting information to ensure these residents are well-informed.

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

MEMORANDUM

TO: Berkeley Transportation and Infrastructure Commission

DATE: June 20, 2024

FROM: Rachel Factor, Principal Planner in Station Area Planning

SUBJECT: North Berkeley BART Transit Oriented Development Bicycle Access Improvements on Virginia Street Bicycle Boulevard

Recommendation

It is requested that the Transportation and Infrastructure Commission recommend that the Berkeley City Council:

1. Adopt a Resolution approving the conceptual design for a 12-foot-wide bikeway (“Option A”) as part of bicycle access improvements on Virginia Street between Acton Street and West Drive to be constructed in connection with the proposed Transit-Oriented Development housing project; and
2. Authorize the City Manager to direct staff to work with San Francisco Bay Area Rapid Transit (BART), their consultants and developers on implementation of these changes to the public right-of-way.

Summary

The proposed transit-oriented development (TOD) housing project planned for the North Berkeley BART station will incorporate multimodal access improvements which include connecting the Ohlone Greenway through the BART site. To plan for these access improvements, BART and North Berkeley Housing Partners (NBHP) engaged transportation planning consultant Fehr & Peers (F&P). F&P has recommended a 12-foot wide, two-way bikeway on Virginia Street between Sacramento and Acton Streets, forming part of both the future Virginia Street Bikeway (Bikeway) and the Ohlone Greenway. According to F&P’s analysis, the recommended bikeway would improve access to the North Berkeley BART station and the future TOD by providing a more comfortable connection, as well as improve the east-west connection to/from the Ohlone Greenway along the Bikeway.

The 200 foot segment of Virginia Street between Acton Street and West Drive narrows due to BART’s Traction Power Substation, so F&P evaluated two options for the recommended bikeway for this segment:

- **Option A:** A 12-foot bikeway, matching the prevailing width of the Ohlone Greenway, which would result in the loss of five to eight on-street parking spaces. Under this option the sidewalk would be maintained at 10 feet.
- **Option B:** A 9-foot-wide bikeway that maintains the on-street parking on the north side of Virginia Street. Under this option the sidewalk would be narrowed to 8.5 feet.

F&P evaluated each option against three equally weighted criteria:

- Bikeway width design standards and guidance
- Existing and future (forecasted) bicycle volumes
- Parking and loading impacts

Using these criteria, F&P concluded that Option A is the preferred and recommended option.

Background

Public Engagement

Per City of Berkeley Department of Public Works public participation policy implemented on July 15, 2021, BART notified affected property owners and residents within 300 feet of the subject area by mailing postcards in advance of this meeting.

- Additional efforts included:
- BART translated postcards into Spanish and Chinese
- BART canvassed the properties along Virginia Street that would be directly affected by potential parking loss. As part of the attempt to contact these residents, BART provided a leave-behind flyer with project and TIC meeting information.
- NBHP distributed flyers at the Taste Festival on 6/9 and the Farmer's Market on 6/13
- BART put up a poster in the North Berkeley BART Station in advance of this meeting.

Context and Bikeway Options

North Berkeley BART Transit Oriented Development (TOD):

In close partnership with the City of Berkeley and BART, NBHP will develop the North Berkeley BART station parking lot into five residential buildings as well as 55,000 square feet of publicly accessible open space including a new transit plaza with landscaping. The new housing will comprise roughly 740 apartments and flats, and 50% will be affordable to lower income households. The site currently has 620 parking spaces for BART riders, of which up to 120 BART rider spaces will be replaced in a garage as part of the TOD. The TOD will also include public-serving ground floor spaces such as a childcare center, a café, and retail. It will also close a key gap in the Ohlone Greenway, a regionally significant, 5.3-mile bike and pedestrian path; connecting the Ohlone Greenway is a high priority for the community.

City of Berkeley-BART Joint Vision and Priorities (JVP):

The city laid the foundation for the project with an extensive multi-year community engagement process led by a Community Advisory Group (CAG). The dozens of community meetings and public hearings during this period resulted in the [City of Berkeley-BART Joint Vision and Priorities \(JVP\)](#) that was unanimously adopted by Berkeley City Council and BART Board in June 2022. The JVP included access elements relevant to the project under discussion:

Ohlone Greenway Connection:

- Connect the disjointed ends of the Ohlone Greenway to each other and BART and provide a primary access route that enables a prioritized bicycle and pedestrian connection across the site.

Street Design:

- Design streets to accommodate public space needs, increase the tree canopy and improve safety for pedestrians and bicyclists.
- Build upon City and BART complete streets and roadway improvement projects in the area.

Bikeway options

- **Option A: 12-foot two-way separated bikeway**
 - Maintains existing sidewalk width (10 feet)
 - Removes five to eight on-street vehicle parking spaces on the north side of Virginia
 - Public parking spaces are within a Residential Parking Permit (RPP) zone, and located in front of single-family residences each of which has a driveway or garage
 - 12-foot width includes 2-foot-wide gutter pan for roadway drainage
- **Option B: 9-foot two-way separated bikeway**
 - Narrows existing sidewalk by 1.5 feet
 - Maintains the on-street parking spaces on the north side of Virginia
 - Requires offset bike centerline to allow for 3 foot minimum from gutter pan (Caltrans Standard)
 - 9-foot width includes 2-foot-wide gutter pan for roadway drainage

City of Berkeley and BART Goals and Policies

Option A, the 12-foot two-way bikeway segment, would help the City achieve its policy goals laid out in the City of Berkeley's 2017 Bicycle Plan, including promoting bicycle safety, encouraging mode shift away from more polluting modes of transportation, and supporting bicycle access for people of all ages and abilities.

[BART's 2016 Station Access Policy](#) goals to prioritize non-motorized access modes over cars and provide a safer, more comfortable experience for BART riders are fully consistent with the recommended Option A.

Evaluation Framework

The two bikeway options were evaluated against the following framework that equally considers design standards and guidance, existing and future (forecasted) bikeway volumes, and impacts to parking.

	Key References	Evaluation Benchmark
Bikeway Width Design Standards and Guidance	Current Caltrans Design Standards and Guidance	Bikeway Width: 8' Minimum, 10' Preferred*
	National Association of Transportation Officials (NACTO) Best Practice from "Designing for Small things with Wheels"	Bikeway Width: 11'8" Minimum, 13'8" Preferred*
Existing and Future (Forecasted) Bicycle Volumes	Massachusetts Department of Transportation (MassDOT) Separated Bikeway Design Guide	Bikeway Width: 10' Minimum, 11' Preferred*
	Ohio Department of Transportation (ODOT) Multimodal Design Guide	Bikeway Width: 12' Minimum, 14' Preferred*
Parking and Loading Impacts	GoBerkeley On-Street Parking Occupancy Targets	Target on Street Parking Occupancy: 65-84%

*Accounts for non-rideable width including the 2-foot gutter pan and shy distance.

Design Standards and Guidance

F&P reviewed bikeway design recommendations from multiple sources including Caltrans, National NACTO, MassDOT and ODOT. The Caltrans minimum width is the statutorily required width, while all other design guidelines cited (including the Caltrans preferred width and draft Caltrans Guidance) are guidance and industry best practices.

	Width Standards and Guidance		Width Standards and Guidance Accounting for Non-Rideable Width			Design Vehicle
	Minimum Width	Preferred Width	Minimum Width	Preferred Width	Non-Rideable Width	
Current Caltrans Standard	8'	-	8'	-	None	No Standard
Current Caltrans Guidance	-	10'	-	10'	None	No Guidance
NACTO – Typical Bicycle	8'	10'	10'8"	12'8"	8" of Shy Distance and 2' Gutter Pan ²	Typical Bicycle
NACTO– Cargo Bicycle	9'	11'	11'8"	13'8"	8" of Shy Distance and 2' Gutter Pan ²	Cargo Bicycle

Notes:

1. There is currently a 2' gutter pan along the study segment of Virginia Street
2. NACTO recommends 8" of shy distance from a vertical curb under 6". Proposed Bikeway would be between two curbs under 6".

Evaluation: Option A is the preferred option. Option A and Option B both meet the Caltrans standard, but Option A is preferred since it also meets Caltrans guidance and industry best practice from NACTO.

	Option A: 12-foot Bikeway	Option B: 9-foot Bikeway
Caltrans Standard – Minimum Width (8')	✓	✓
Caltrans Current Guidance – Preferred Width (10')	✓	✗

NACTO – Cargo Bike Design Vehicle (11’8”)	✓	X
NACTO – Typical Bike Design Vehicle (10’8”)	✓	X

Existing and Future (Forecasted) Bikeway Demand

Existing bicycle demand on Virginia Street between Acton Street and Sacramento Street is sourced from:

- 2017 bicycle and pedestrian counts
- 2024 bicycle and pedestrian counts

The 2017 counts show 69 bicycles on Virginia Street during the AM Peak hour (8:00 AM - 9:00 AM). More recent count data from May 2024 shows 75 people using 64 bicycles (including several people using cargo bikes) on Virginia Street outside the AM peak hour (between 8:30 AM and 9:30 AM). As a result, it is estimated that 65-75 bicycles utilize Virginia during the peak hour under existing conditions.

If the City of Berkeley meets the 2035 bicycle mode share target from the City of Berkeley 2017 Bicycle Plan of 20%, 172 bicycle trips are forecast for Virginia Street during the peak hour in 2035. It is likely that bicycle trips along Virginia Street will be even higher given the segment’s overlap with the Ohlone Greenway, and its proximity to BART and the planned TOD.

Existing and Projected bicycle volume is shown in the table below.

	Citywide Mode Share	AM	PM
2017 Baseline Virginia Bicycle Volume	8.0%	69	56
2017 Baseline Virginia Bicycle Volume + TOD Bicycle Trips*	--	120	90
2025 Forecast from the 2017 Bicycle Plan	15% Goal	129	105
2035 Forecast from the 2017 Bicycle Plan	20% Goal	172	139

*Based on Trip Generation and mode share data from Ashby and North Berkeley BART Stations Transit-Oriented Development Zoning Project Draft Environmental Impact Report (2021).

Fehr & Peers consulted the following industry best practices to determine the appropriate bikeway width for forecast bike volumes:

- MassDOT’s volume-based design guidelines recommend a minimum width of 10 feet and a recommended width of 11 feet for two-way separated bicycle lanes that serve 150 to 400 bidirectional bicyclists during the peak hour.
- ODOTs multi-modal design guidelines recommend a minimum of 10 feet -12 feet 150 or fewer single directional peak hour bicyclists. Since ODOT does not consider the gutter pan a rideable surface, applying ODOT guidance would result in a 12 feet - 14 feet bikeway along Virginia Street.

Evaluation: Option A is the preferred alternative based on projected bicycle volumes of approximately 170 bidirectional bicyclists during the peak hour.

	Option A: 12-foot	Option B: 9-foot
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	Bikeway	Bikeway
MassDOT – 150-400 bidirectional cyclists per hour (10'-11')	✓	X
ODOT – <150 directional cyclists per hour (12'-14')	✓	X

Parking and Loading

Parking occupancy data on the segment was sourced from occupancy counts collected by BART in June and July 2020. Counts were collected on weekdays during the middle of the day.

Parking occupancy data shows that parking is below the City of Berkeley’s stated vehicle parking occupancy goal target of 65-84%. Within a 10-minute walk of the North Berkeley BART station, midday occupancy is 56%.

On the three blocks near the studied segment of Virginia Street, parking occupancy does not exceed 84%. Parking occupancy is as follows:

- Franklin/Cedar/Acton/Virginia block: 40%
- Acton/Cedar/Sacramento/Virginia (+Lincoln, Short) block: 40%
- Franklin/Virginia/Acton/Delaware (+Francisco) block: 44%

Fehr & Peers calculated the parking occupancy impacts associated with removing 8 parking spaces from the north side of Virginia Street between Sacramento Street and Acton Street. With 8 parking spaces removed, parking occupancy on the Acton/Cedar/Sacramento/Virginia block would increase from 40% to 43%. This remains below the target occupancy rate of 65%.

Fehr & Peers also assessed potential impacts to loading at residences along the studied segment of Virginia Street. 4 of the 5 residences adjacent to the parking removal have 2-car driveways that may be used for guest parking and loading/unloading; the fifth house has a two-car garage.

Evaluation: Although parking occupancy remains in an acceptable range at the neighborhood level with both options and residences adjacent to the impacted segment would be able to use driveways and garages for loading and unloading, Option B is the preferred alternative because it results in no parking impacts.

	Option A: 12-foot Bikeway	Option B: 12-foot Bikeway
Maintains existing on-street vehicle parking	X	✓
Maintains neighborhood level parking occupancy and parking availability at 65-84% occupancy target	✓	✓
Maintains loading capabilities at adjacent residences	✓	✓

Bikeway Evaluation

	Option A: 12-foot	Option B: 9-foot
--	-------------------	------------------

	Bikeway	Bikeway
Bikeway Width Design Guidance	✓	
Existing and Future (Forecasted) Bicycle Volumes	✓	
Parking Impacts		✓

While Option A impacts on-street parking, it is the preferred option since it outperforms Option B on 2 out of 3 evaluation criteria and:

- Meets the preferred width recommendations from a range of design guidelines
- Accommodates existing and projected bike volumes including increased demand projected in the City's 2017 Bicycle Plan
- Is designed to comfortably accommodate cargo bikes and larger bikes which are frequently observed on Virginia Street

Schedule and Next steps

Upon receipt of approval from key partner agencies, described above, NBHP will incorporate the concept design for the 12-foot two-way bikeway along Virginia between Sacramento and Acton Streets. The City and NBHP have applied for Affordable Housing Sustainable Communities (AHSC) grant funds that would pay for the Virginia bikeway among many other access elements and contribute funding towards the first phase of affordable housing.

BART, the City and NBHP are also currently exploring other grant sources including the state's Transit Intercity Rail Capital Program (TIRCP) and Infill Infrastructure Grant (IIG) to support the bikeway and other transportation infrastructure associated with the TOD.

The City of Berkeley is currently reviewing NBHP's entitlements package. Subsequent approval will inform construction timeline for the TOD and all access-related elements. Updated TOD project information can be found here: <https://www.northberkeleyhousingpartners.com/>

Attachments

1. Presentation: North Berkeley BART TOD Bicycle Access Improvements on Virginia Street Bicycle Boulevard
2. Appendix: North Berkeley BART TOD Bicycle Access Improvements on Virginia Street Bicycle Boulevard
3. Postcard mailed to properties within 300 feet of project site
4. Flyer distributed to Virginia Street properties which would be directly impacted by parking removal

APPENDIX

North Berkeley BART TOD Bicycle Access Improvements on Virginia Street Bicycle Boulevard

TECHNICAL ANALYSIS

City of Berkeley Transportation and Infrastructure
Commission, June 20, 2024



Agenda

Context and Bikeway Options

Bikeway Width Design Guidelines

- *Caltrans*
- *National Association of Transportation Officials (NACTO)*

Volume Based Design Guidelines

- Ohio Department of Transportation (ODOT)
- Massachusetts Department of Transportation (MassDOT)

Existing and Future Bikeway Demand

Parking Demand

Bikeway Evaluation and Recommendation



Context and Bikeway Options



The proposed TOD at North Berkeley BART will advance Berkeley's housing, transportation, and climate goals

~740 New
Homes

50%
Affordable

~175
Residential
Parking
Spaces

55,000 KSF
Publicly
Accessible
Open Space

Joint Vision and Priorities – Access Elements

- **Ohlone Greenway Connection**

- Connect the disjointed ends of the Ohlone Greenway to each other and BART and provide a primary access route that enables a prioritized bicycle and pedestrian connection across the site.

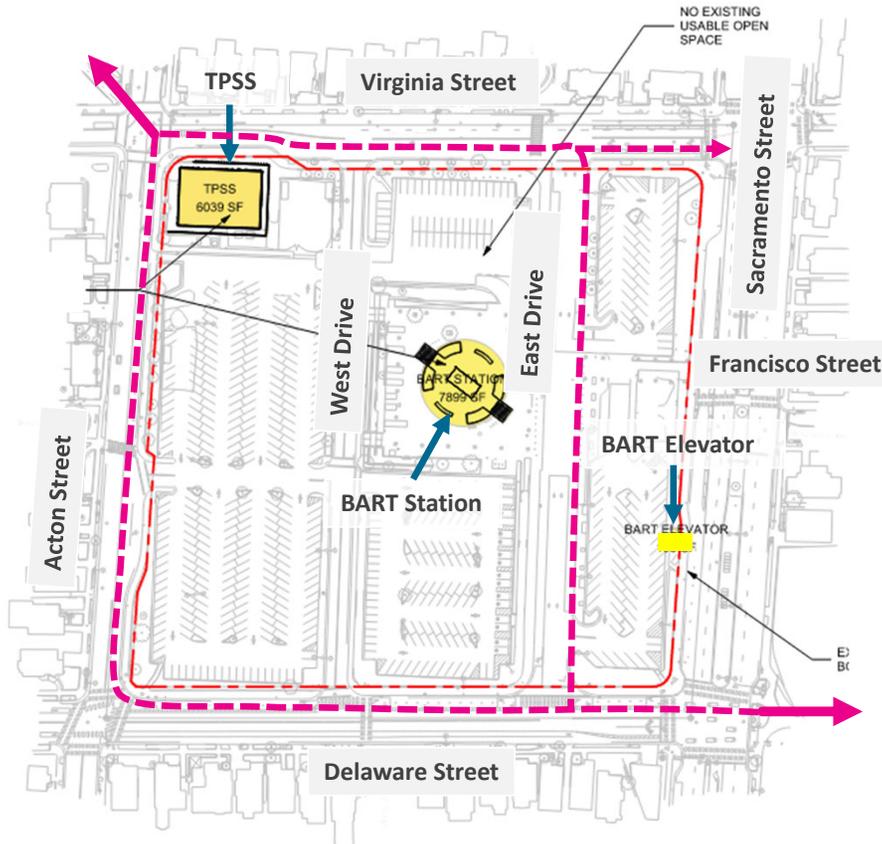
- **Street Design**

- Design streets to accommodate public space needs, increase the tree canopy and improve safety for pedestrians and bicyclists.
- Build upon City and BART complete streets and roadway improvement projects in the area.

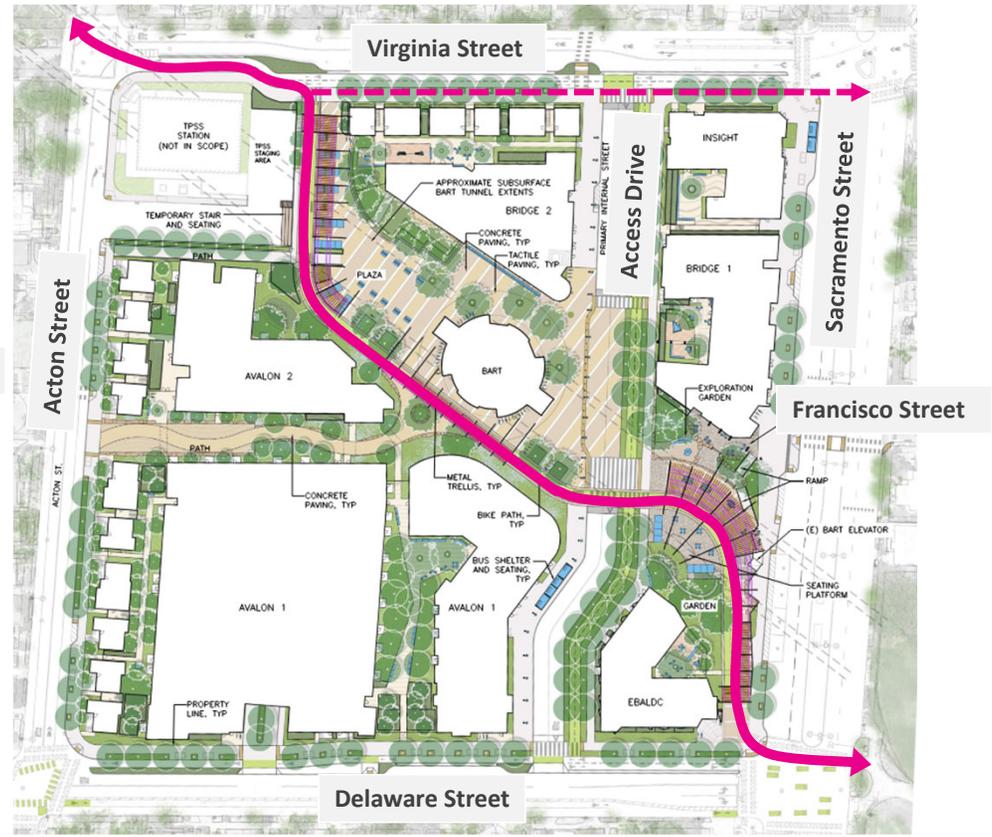


Existing and Future Bicycle Circulation

Existing Site



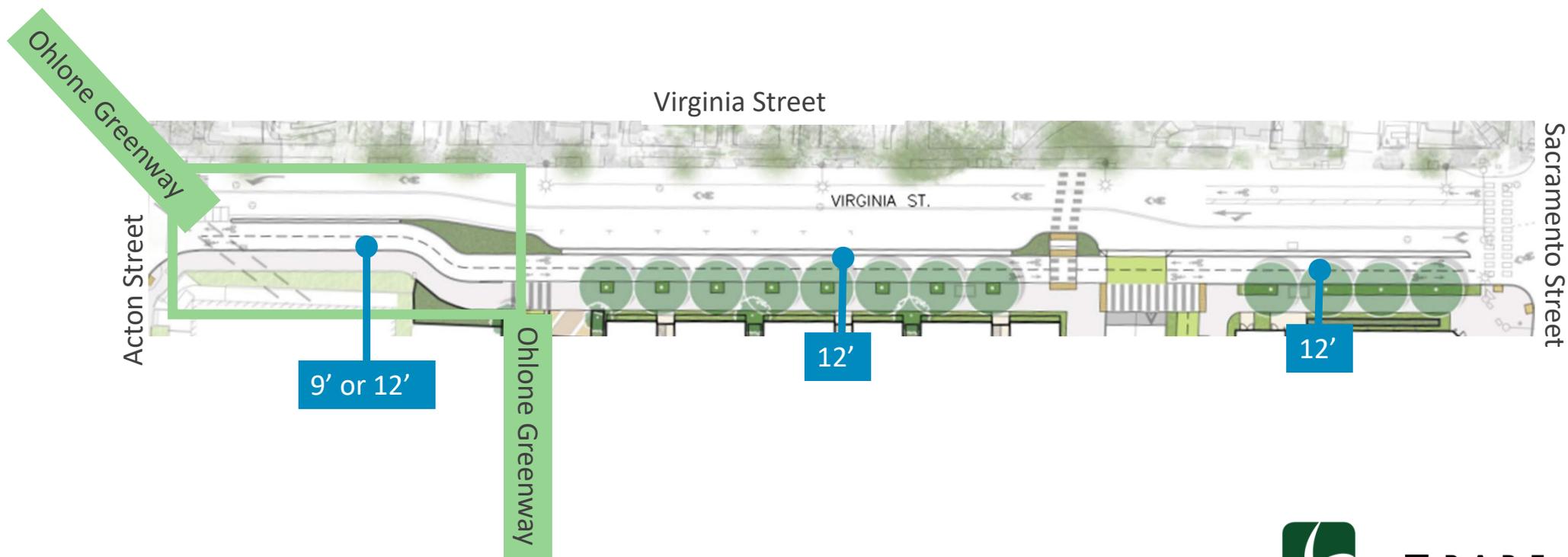
Future Site



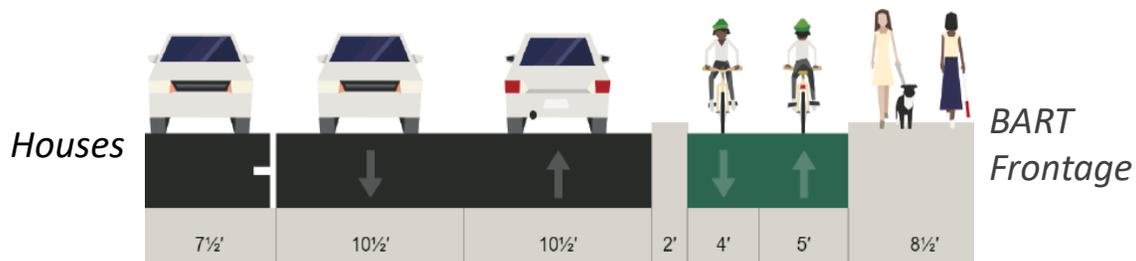
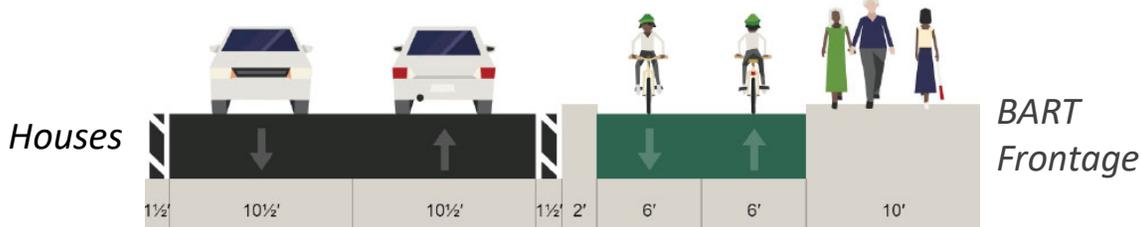
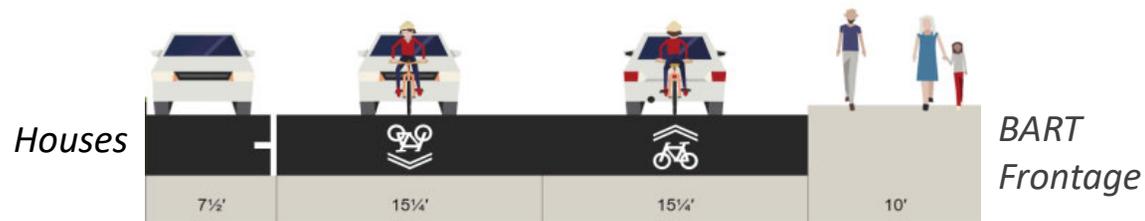
Ohlone Greenway Circulation

On-Street Bike Boulevard and Bike Lane Circulation

This bikeway segment is part of an updated concept for the Ohlone Greenway and Virginia Street Bikeway.



There are two options under consideration for this 200' segment of Virginia.



Option A would result in 5-8 parking spaces being removed in front of residences on Virginia Street



Key Observations

- 5-8 Residential Parking Permit (RPP) on-street parking spaces impacted
- Spaces are within Residential Parking Permit (RPP Zone)

 Approximate Parking Impact



City of Berkeley and BART Goals and Policies support increased bicycle access

City of Berkeley Goals from the 2017 Bicycle Plan

Goal 1, Safety First: Achieve zero bicycle-involved fatalities by 2025 and zero bicycle-involved severe injuries by 2035.

Goal 2, Strength in Numbers: Increase Berkeley's bicycle mode share by 50 percent by 2025 and by 100 percent by 2035.

Goal 3, All Ages and Abilities: Complete the Tier 1 Bikeway Network (including the Ohlone Greenway) by 2025 and the Tier 2 and Tier 3 Bikeway Network by 2035.

BART's 2016 Station Access Policy

Prioritize non-motorized access modes such as walking and biking over cars

Increase walking and biking access mode share across all stations from 44% in 2015 to 52% in 2025



Bikeway Width Design Standards and Guidance

Caltrans

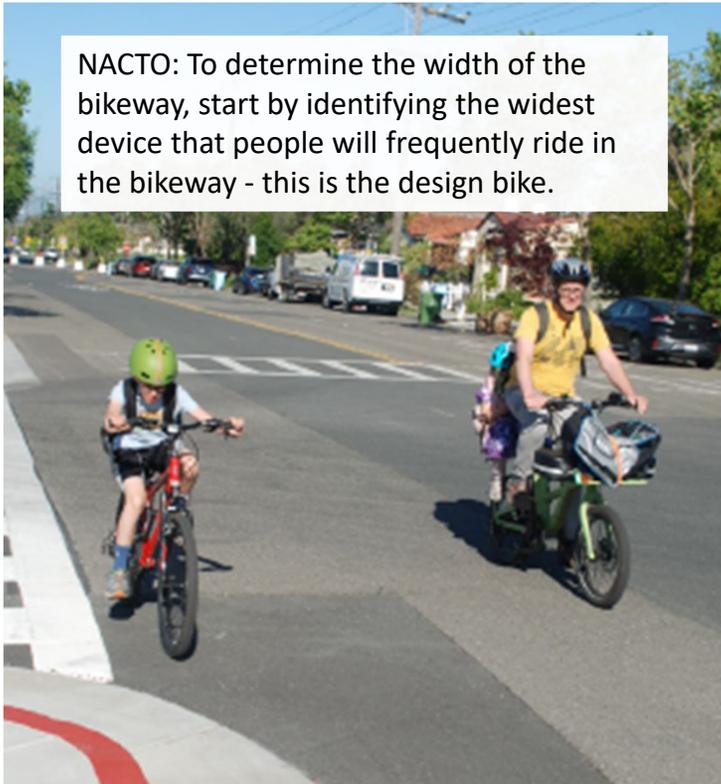
National Association of City Transportation Officials (NACTO)



Bikeway Width Design Standards and Guidance

A cargo bike is the appropriate design bicycle given observed bicycle activity on Virginia Street.

NACTO: To determine the width of the bikeway, start by identifying the widest device that people will frequently ride in the bikeway - this is the design bike.



Electric car vs. E-bike sales, 2018–2022 (National)

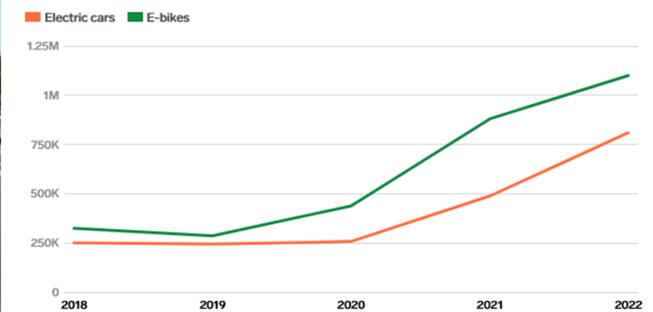


Chart: Ricki Lee/Insider • Source: Kelley Blue Book; Light Electric Vehicle Association

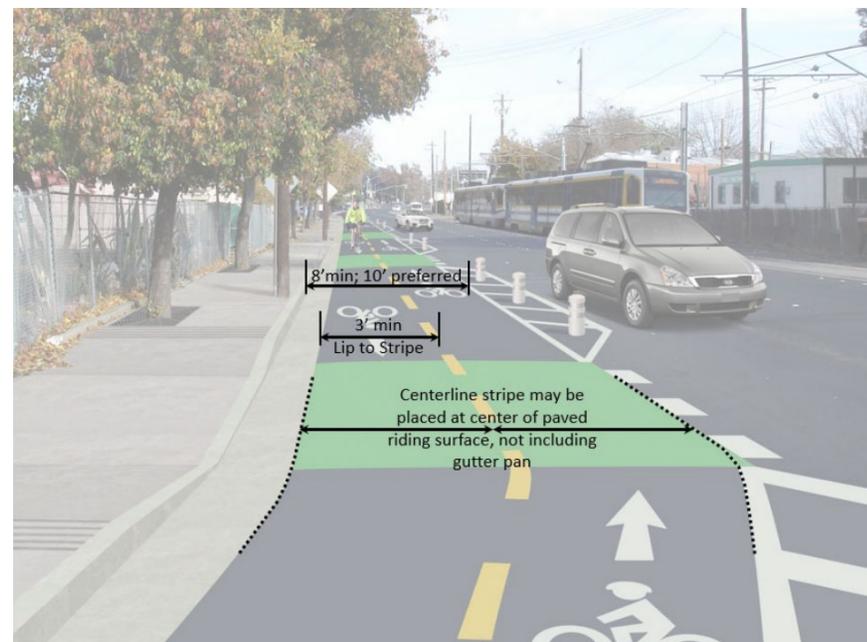
INSIDER

Source: BART, taken on Virginia Street between 8:45 and 9:00 on 5/10. This is a major school route with multiple elementary and pre schools in the area as well as King Middle School and is also a route for people going to BHS and Cal.

Bikeway Width Design Standards and Guidance: Caltrans

Caltrans Standards and Guidance

- For a two-way separated bikeway, the Caltrans standard is 8 feet width at minimum for the paved travel way, with guidance recommending 10 feet.
- Where the two-way bikeway is at street-level adjacent to a gutter pan, the standard is a minimum paved width of 3 feet provided in the lane next to the gutter.
- Caltrans guidance recommends greater than 10 feet under the following conditions:
 - *Anticipated bicycle volumes, need for passing, bicycle commuting route, and availability of right-of-way are some of the factors where the separated bikeway widths may exceed the minimum or preferred (DIB89-02)*
- Caltrans does not develop guidance around a particular design vehicle.
- **Draft** Caltrans Bicycle Best Practices for District 4 (May 2024) recommends 10-foot minimum width for two-way separated bikeway connectors, not including the gutter (typically 2 feet), for a total of 12 feet including the gutter, to facilitate space for passing.



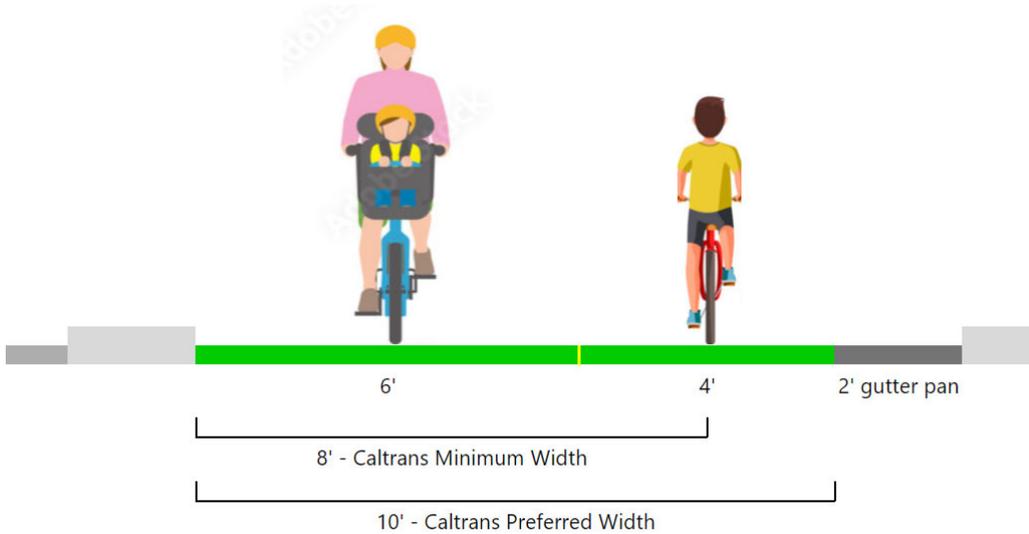
Source: CA DOT, "Design Information Bulletin 89-02"



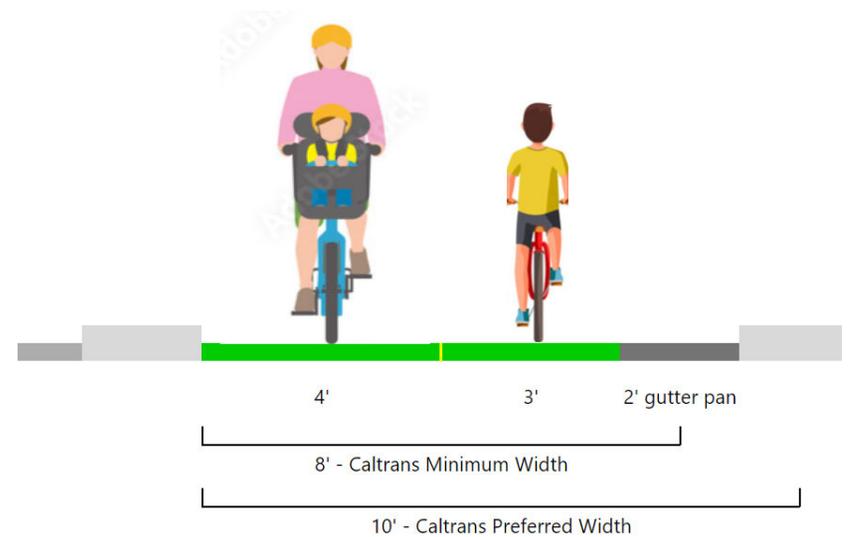
Bikeway Width Design Standard and Guidance: Caltrans

Both options meet current Caltrans standard; 12-foot bikeway meets current Caltrans guidance

Option A – 12-foot bikeway



Option B – 9-foot bikeway

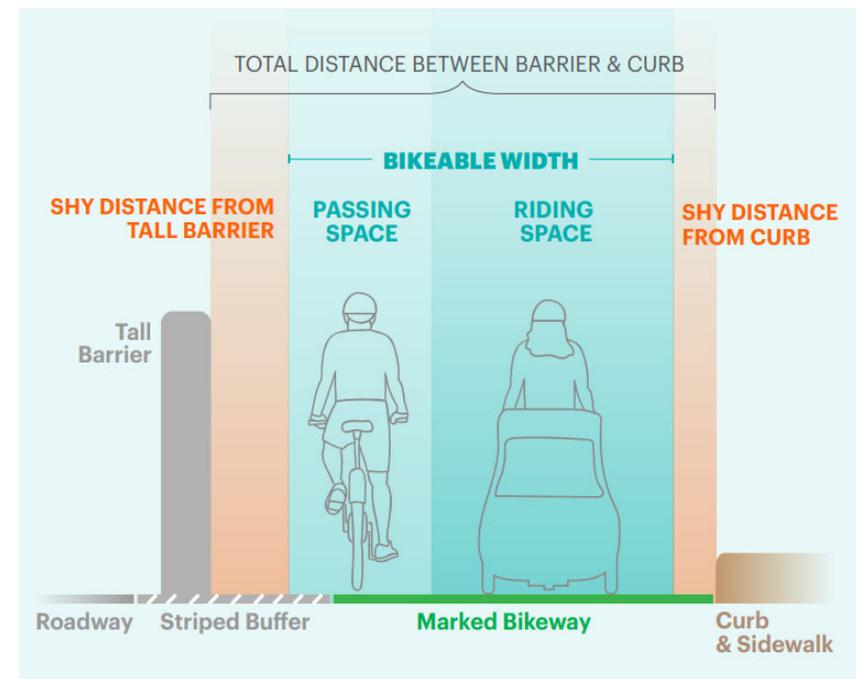


Option B would not meet Caltrans minimum width guidance per DRAFT May 2024 Caltrans District 4 guidance

Bikeway Width Design Standards and Guidance: NACTO

Industry best practice: NACTO recommends distinguishing between bikeable width and shy distance

- NACTO is the only source with recommendations for how to address the cargo bike as a design vehicle.
- NACTO recommends bikeway width include both the **bikeable width** and the **shy distance**.
- The **bikeable width** is the distance between barriers, minus the shy distance from each barrier.
- The **shy distance** is the space that feels unrideable because it is too close to a wall, post, curb, or gutter.
- Note: The City of Berkeley has not adopted NACTO guidelines.



Source: National Association of City Transportation Officials, "Designing for Small Things With Wheels"

Bikeway Width Design Standards and Guidance: NACTO

NACTO recommends at least 9-11 feet of bikeable width for comfortable two-way cargo bicycle operations

	Bikeable width needed for comfortable two-way operations	Along busy bikeways accommodate passing and side-by-side riding
Control bike: One-way riding space is 4-5 ft (1.2-1.5 m)	Double the one-way riding space	Two-way operations plus 3 ft (0.9 m)
Typical bike One-way riding space is 4-5 ft (1.2-1.5 m)	8-10 ft (2.4-3 m)	11-13 ft (3.3-3.9 m)
Cargo bike One-way riding space is 4.5-5.5 ft (1.4-1.7 m)	9-11 ft (2.8-3.4 m)	12-14 ft (3.7-4.3 m)
Extra-large bike One-way riding space is 6-7 ft (1.9-2.2 m)	12-14 ft (3.8-4.4 m)	15-17 ft (4.7-5.3 m)

The **bikeable width** is the distance between barriers such as curbs, minus the shy distance from each barrier.

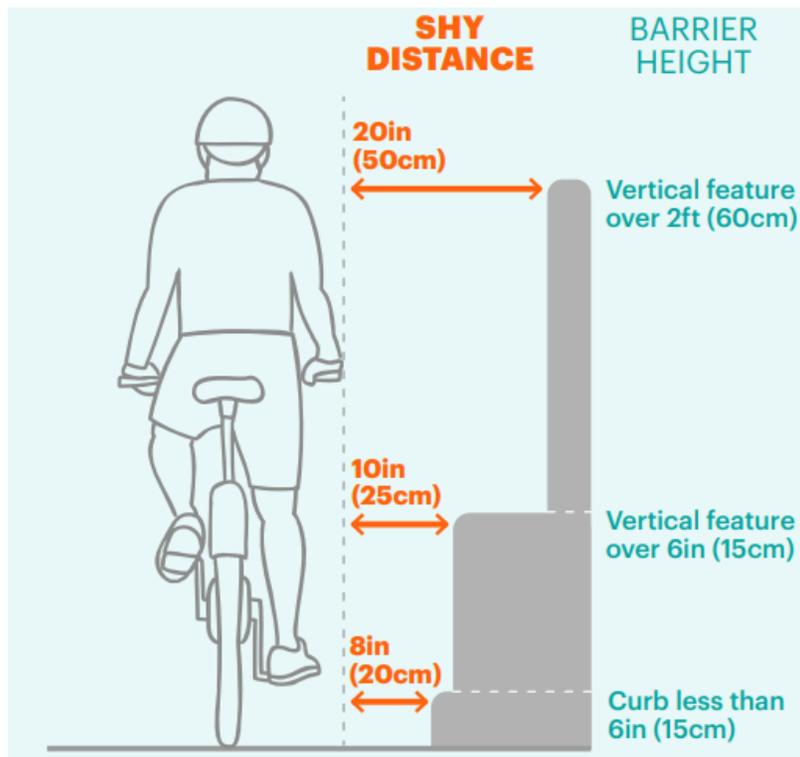
This bikeable width excludes the gutter pan.

Source: NACTO, "Designing for Small Things With Wheels"



Bikeway Width Design Standards and Guidance: NACTO

NACTO recommends 8 inches of shy distance from a curb under 6 inches



The **shy distance** is the space that feels unrideable because it is too close to a wall, post, curb, or gutter

The proposed bikeway on Virginia would be between two curbs. Because one curb is adjacent to a gutter pan, 8 inches of shy distance is recommended in addition to the bikeable width.

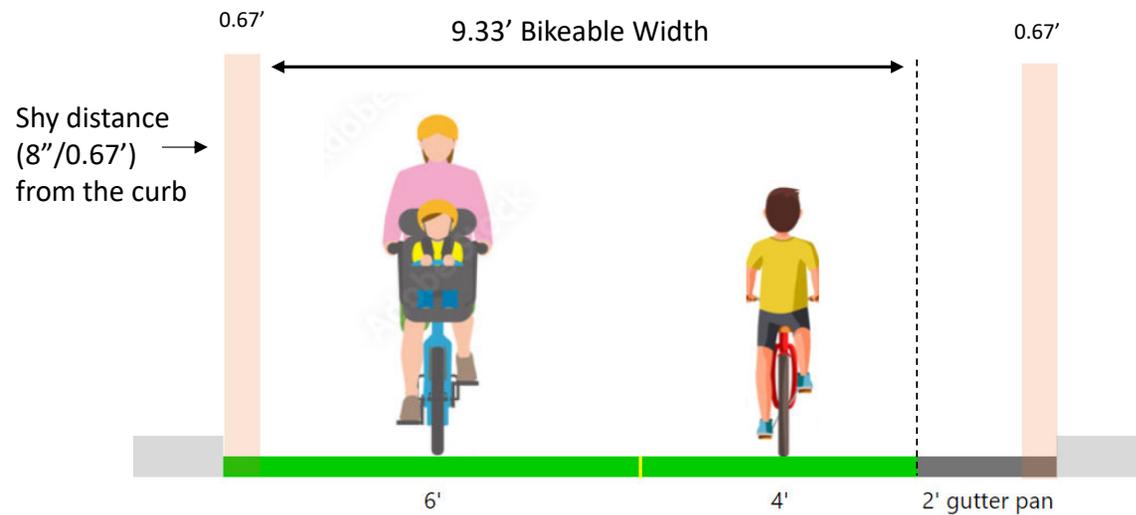
Source: NACTO, "Designing for Small Things With Wheels"



Bikeway Width Design Standards and Guidance: NACTO

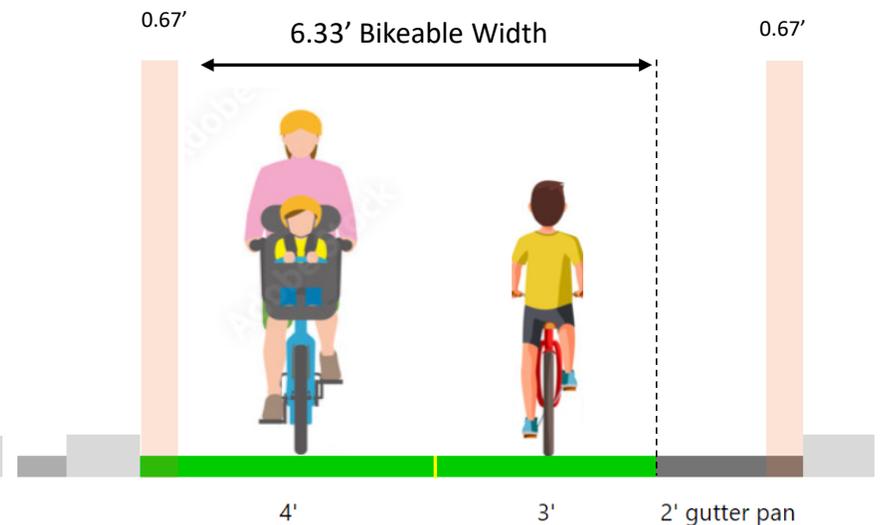
12-foot bikeway meets NACTO best practice guidelines for bikeable width for cargo bikes

Option A – 12-foot bikeway



- ✓ Meets bikeable width recommendation for cargo bikes (9')
- ✓ Meets bikeable width recommendation for typical bikes (8')

Option B – 9-foot bikeway

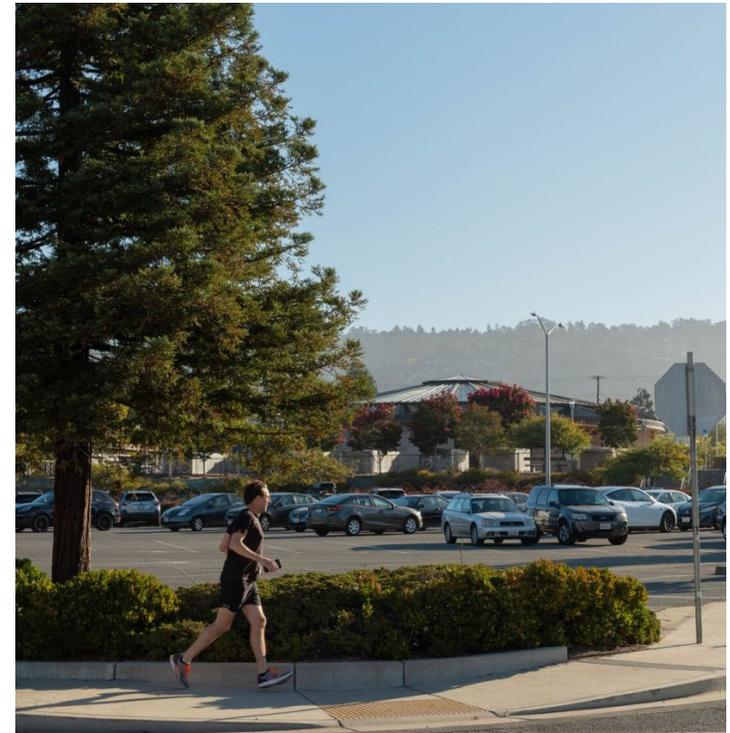


- × Does not meet bikeable width recommendation for cargo bikes (9')
- × Does not meet bikeable width recommendation for typical bikes (8')

Option A will also enable maintaining a 10-foot sidewalk on the south side of Virginia Street

The 2018 Oakland Great Streets Design Guide recommends a minimum width of 8 feet for sidewalks, as narrower sidewalks require opposing pedestrian traffic to walk single file, and it recommends 11.5 feet and wider for residential areas near a BART station.

- Option A maintains existing sidewalk width at 10'
- Option B narrows the existing sidewalk to 8.5'



Volume Based Bikeway Design Guidelines

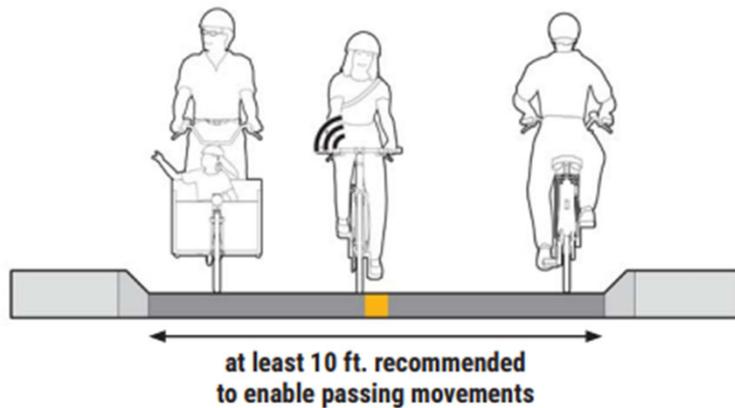
MassDOT

ODOT



Existing and Forecast Future Bike Volumes: MassDOT

MassDOT uses width guidelines based on Peak Hour volumes.



Bidirectional Bicyclists/ Peak Hour	Bike Lane Width (ft.)	
	Rec.	Min.*
<150	10.0	8.0
150-400	11.0	10.0
>400	14.0	11.0

* A design exception is required for designs below the minimum width.

- For two-way bike lanes with low volumes of bicyclists (less than 150 per peak hour), MassDOT recommends a 10' wide bike lane, with a minimum width of 8'
- For two-way bike lanes with >150 bicyclists per peak hour, MassDOT recommends a 11' wide bike lane, with a minimum width of 10'
- The guide is silent on the use of the gutter as a riding surface.
- MassDOT does not develop recommendations around a particular design vehicle.

Source: MassDOT Separated Bikeway Planning and Design Guide, 2015



Existing and Forecast Future Bike Volumes: Ohio DOT

Ohio DOT recommends a minimum bikeway width of 10'

Peak Hour Directional Bicyclist Volume	Minimum Two-Way Bike Lane Width (ft)		
	Between Vertical Curbs	Adjacent to One Vertical Curb	Between Sloped Curb or at Sidewalk Level
<150	10 - 12	9.5 - 11.5	9 - 11
150-350	12 - 16	11.5 - 15.5	11 - 15
>350	≥16	≥15.5	≥15
Constrained Condition*	8.5	8	7.5

*Peak Hour Directional Bicyclist Volume not applicable

“The widths in these tables should be measured from the relevant edge of the bike lane striping, face of curb, or edge of the gutter pan”

Source: Ohio DOT, Multimodal Design Guide, 2024



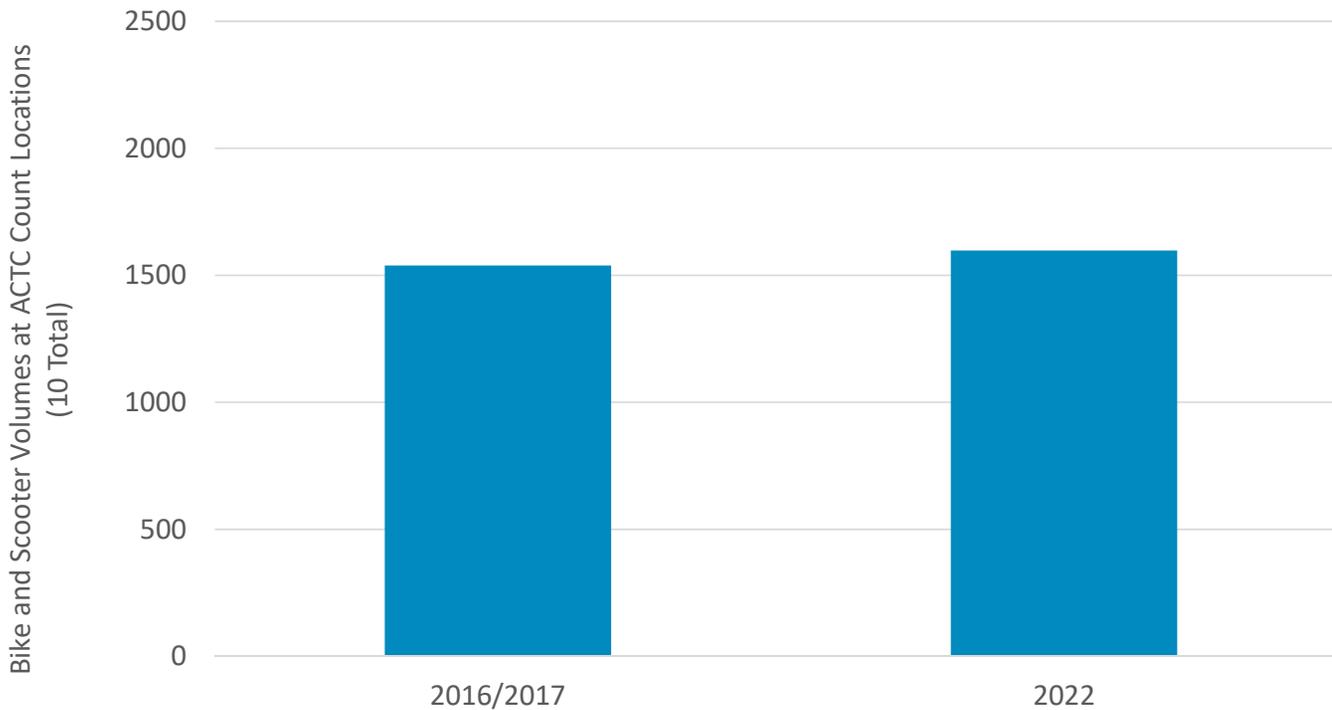
Existing and Forecast Bikeway Demand



Existing Bike Volumes

Measured citywide bicycle volumes were 3% higher in 2022 than in 2016/2017

Measured Bike & Scooter Volumes in Berkeley



Measured citywide bicycle and scooter volumes in 2022 were 3% higher than in 2016/2017.

The peak hour bicycle counts for Virginia Street at NB BART are from 2017.

2022 counts are expected to be similar to or slightly higher than counts taken in 2017.

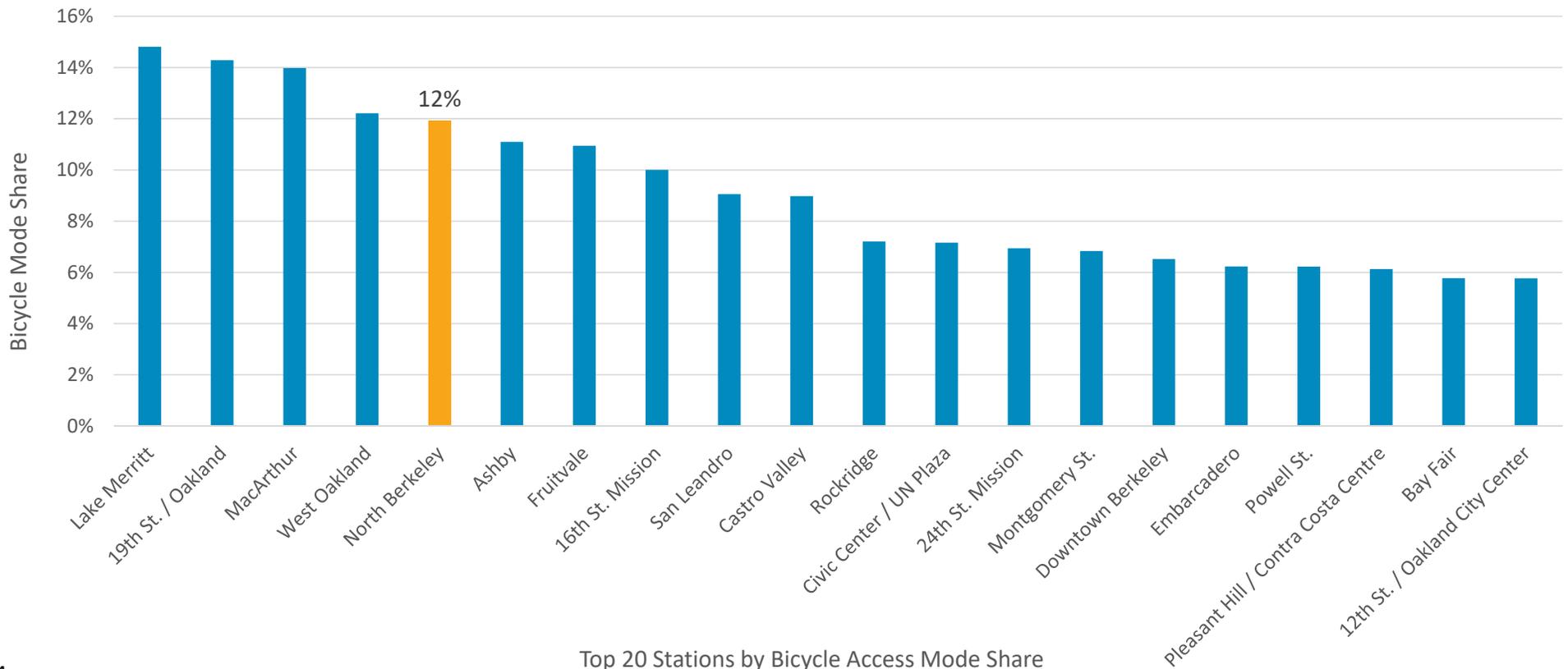


Source: Alameda CTC Bike Count Program

Existing Bike Volumes

The North Berkeley BART Station has the fifth highest bicycle access share in the BART system

BART Access Mode Share – Bicycle



Top 20 Stations by Bicycle Access Mode Share

Existing Bike Volumes

Up to 53% of bicycle trips into/from the BART station travel on Virginia Street at the Ohlone Greenway

Trip Distribution for Bicycle Trips to/from North Berkeley BART (2017*)

	Morning Commute		Evening Commute	
	Trips	Share	Trips	Share
North (Virginia)	134	53%	136	47%
West (Acton)	48	17%	50	17%
South (Delaware)	60	24%	88	30%
East (Sacramento)	11	4%	18	6%

Source: BART counts, 2017



Existing Bike Volumes

BART counts show 69 bicycle trips on Virginia Street during the AM peak hour in 2017

AM Peak (2017)

	WB	EB	Total
07:00	3	2	5
07:15	1	0	1
07:30	5	4	9
07:45	6	9	15
08:00	7	11	18
08:15	8	9	17
08:30	4	8	12
08:45	3	19	22
2017 AM Peak Hour	22	47	69

PM Peak (2017)

	WB	EB	Total
16:00	5	0	5
16:15	9	2	11
16:30	4	1	5
16:45	2	3	5
17:00	5	7	12
17:15	6	4	10
17:30	9	9	18
17:45	11	5	16
2017 PM Peak Hour	31	25	56

 Peak Hour

Source: BART counts, March 2019

*Alameda CTC count data suggests 2022 peak hour volumes are similar to or slightly higher than those measured in 2017



Existing Bike Volumes

May 2024 data shows biking is the dominant mode on Virginia Street



Observed mode share on Virginia Street on 5/28 between 8:30-9:30 AM (Since the peak hour is 8-9 AM, it is likely that peak hour counts are slightly higher):

- **75** people on **64** bicycles
- **24** people walking
- **12** people in **8** automobiles*
- **2** people on scooters

*Assumes occupancy of 1.5 people per car per the National Household Travel Survey

Source: Collected Tuesday May 28, 2024, 8:30AM – 9:30AM



Forecasted Future Bike Volumes

The TOD is expected to generate 80-100 peak hour bicycle trips to/from the station area

Projected North Berkeley BART TOD Peak Hour Trips, by Mode

	AM Peak Hour				PM Peak Hour			
	In	Out	Total	Share	In	Out	Total	Share
Auto	149	216	365	37%	158	116	273	36%
Transit	138	200	338	34%	146	107	253	34%
Walk	32	47	79	8%	34	25	59	8%
Bike	42	62	97	10%	44	33	78	10%
Other	48	70	118	12%	50	38	88	12%

Source: Ashby and North Berkeley BART Stations Transit-Oriented Development Zoning Project Draft Environmental Impact Report, 2021

Trip Generation Methodology from the DEIR:

Project person-trip estimates are calculated by factoring ITE vehicle-trips by a multiple of 1.18 to convert vehicle-trips to person-trips (this factor is consistent with the factor applied in the West Berkeley Circulation Master Plan) and then converts back to trips by mode using mode share adjustment rates derived from US Census.

Given the proximity of the project sites to a variety of land uses within walking distance, multiple high frequency transit routes, casual carpool, dedicated bicycle facilities, and the availability of rideshare service, a modal split adjustment was applied to the external person trip generation estimates to account for carpool, transit, walk, bike, and taxi/transportation network company (e.g., Uber, Lyft) trips. Mode share was estimated based on data available from the United States Census for the project's census tracts.

28 Auto: 36.4%, Transit: 33.7%, Bike: 10.3%, Walk: 7.9%, Other: 11.7%



Forecasted Future Bike Volumes

If Berkeley hits mode share targets, up to 170 bicycle trips are forecast for Virginia during the AM Peak hour in 2035

Projected Virginia Street Bicycle Volumes

	Citywide Mode Share	AM	PM
2017 Baseline Virginia Bicycle Volume	8.0%	69	56
2017 Baseline Virginia Bicycle Volume + TOD Bicycle Trips*	--	120	90
2025 Forecast (Based on the 2017 Berkeley Bicycle Plan)	15% Goal	129	105
2035 Forecast (Based on the 2017 Berkeley Bicycle Plan)	20% Goal	172	139

* Assumes TOD Trips have the same distribution as BART trips with 53% of AM trips accessing the site from Virginia and 47% of PM trips accessing the site from Virginia

Given the proximity of the bikeway to the BART station and the planned TOD, and the segments overlap with the Ohlone Greenway, it would not be surprising if bicycle trips along Virginia are even higher than projected



Parking and Loading Demand



Parking and Loading Impacts

Option A would impact 5-8 parking spaces in front of residences on Virginia Street



- 5-8 Residential Preferential Parking (RPP) on-street parking spaces removed
- Parking occupancy along this segment was 100% at the time of data collection in 2020
- RPP parking regulations are in effect Monday through Friday, 8am to 7pm, restrict parking to 2-hours for non-permit holders
- 4 of the 5 residences adjacent to the parking removal have driveways that can be used for guest parking and loading/unloading; the fifth house has a two-car garage.

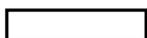


Approximate Parking Removal

Parking and Loading Impacts

Most vehicle parking around the impacted segment of Virginia Street is regulated and only available to residents

- 2,950 parking spaces w/in a 10-min walk and 56% of spaces are occupied midday.

 Approximate Study Segment



Parking Regulations
 - No Parking
 - Unregulated
 - School loading
 - Timed - less than 30 min

- Metered
 - RPP

○ BART TOD Station
 - 10 Min Walk From BART
 (Walk Speed of 3 mph)

**Existing Parking Regulations
 North Berkeley BART Station**



Parking Occupancy
 - 85% or higher
 - 65% - 84%
 - 64% or lower
 - Parking Prohibited

○ BART TOD Station
 - 10 Min Walk From BART
 (Walk Speed of 3 mph)

**Figure 2. North Berkeley BART Station
 Weekday Midday Parking Occupancy**

Source: Satellite imagery collection from February 2020 (Fehr & Peers)

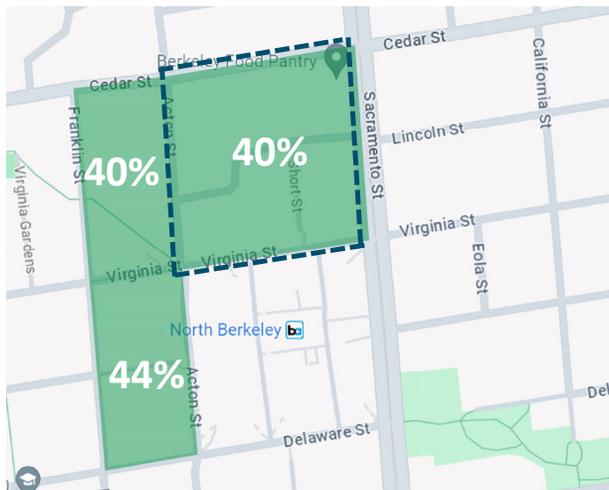
Parking and Loading Impacts

With parking impacts, parking occupancy would still fall below the target range of 65-84% on the impacted block

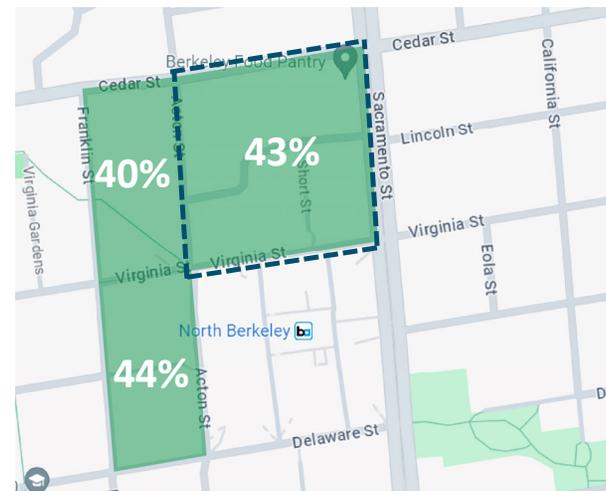
Weekday midday parking occupancy data suggests nearby on-street parking is available:

- Franklin/Cedar/Acton/Virginia block: 40%
- Acton/Cedar/Sacramento/Virginia (+Lincoln, Short) block: 40%
- Franklin/Virginia/Acton/Delaware (+Francisco) block: 44%

Existing Parking Occupancy



Parking Occupancy with 8 Spaces Removed



Parking Occupancy

- 85% or higher (above target)
- 65% - 84% (target)
- 64% or lower (below target)
- ▭ Impacted block



Bikeway Evaluation and Recommendation



Detailed evaluation demonstrates that Option A meets more evaluation benchmarks than option B

Criteria	Evaluation Benchmark	Option A: 12-foot Bikeway	Option B: 9-foot Bikeway
Bikeway Width Design Standards and Guidance	Caltrans Current Standard – Minimum Width (8')	✓	✓
	Caltrans Current Guidance – Preferred Width (10')	✓	✗
	Caltrans Draft Guidance – Minimum Width (10')	✓	✗
	Caltrans Draft Guidance – Preferred Width (12')	✓	✗
	NACTO – Cargo Bicycle Design Vehicle	✓	✗
	NACTO – Typical Bicycle Design Vehicle	✓	✗
Existing and Forecasted Future Bicycle Volumes	MassDOT – Existing Volumes (bidirectional)	✓	✓
	Ohio DOT – Existing Volumes (directional)	✓	✗
	MassDOT – Forecast Volumes (bidirectional)	✓	✗
	Ohio DOT – Forecast Volumes (directional)	✓	✗
Parking & Loading	No impacts to vehicle parking supply	✗	✓
	Maintains parking occupancy rates below 85%	✓	✓
	Maintains loading capabilities at adjacent residences	✓	✓

Option A is the preferred alternative and outperforms Option B on 2 out of 3 evaluation criteria

	Option A: 12-foot Bikeway	Option B: 9-foot Bikeway
Bikeway Width Design Standards and Guidance	✓	
Existing and Forecasted Future Bicycle Volumes	✓	
Parking and Loading Impacts		✓

Option A...

- Meets preferred width recommendations from a range of design guidelines.
- Accommodates existing *and* projected bike volumes including increased demand projected in the City's 2017 Bicycle Plan.
- Designed to comfortably accommodate cargo bikes and larger bikes.C



North Berkeley BART Station Bike Access Improvements— Virginia Street Bike Boulevard



Learn more about efforts to improve bicycle safety near North Berkeley BART Station. At an upcoming public meeting, BART will present options for enhancing bicycle infrastructure on Virginia Street. The improvements will be built as part of the planned Transit Oriented Development (TOD) at North Berkeley BART.



BERKELEY TRANSPORTATION AND INFRASTRUCTURE COMMISSION MEETING

Thursday, June 20, 2024 | 6:15 PM

North Berkeley Senior Center, Aspen Room

1901 Hearst Avenue

Agenda packet will be posted online by June 14th here: <https://tinyurl.com/4x5eh98n>

Virginia Street Study Area, approximately 200'



For more information about the future TOD, please visit northberkeleyhousingpartners.com.

COMMUNICATION ACCESS INFORMATION

To request a disability-related accommodation(s) to participate in the meeting, including auxiliary aids or services, please call (510) 981-6418 or email ADA@cityofberkeley.info at least three business days before the meeting date.

QUESTIONS OR COMMENTS?

Contact: Noah Budnick | Senior Management Analyst, Berkeley Public Works | nbudnick@berkeleyca.gov

If you need language assistance services, please call (510) 464-6752. Si necesita servicios de asistencia lingüística, llame al (510) 464-6752.

如果您需要語言輔助服務，請致電 (510) 464-6752。Nếu quý vị cần dịch vụ hỗ trợ ngôn ngữ, vui lòng gọi số (510) 464-6752.

언어 지원 서비스가 필요한 경우 (510) 464-6752로 전화하세요. Kung kailangan mo ng mga serbisyong pantulong sa wika, tumawag sa (510) 464-6752.

Если вам нужны услуги языковой поддержки, звоните по телефону (510) 464-6752.

Estación BART de North Berkeley

Mejoras de acceso para bicicletas—Virginia Street Bike Boulevard

Aprenda más sobre los esfuerzos para mejorar la seguridad de las bicicletas cerca de la estación BART de North Berkeley. En una audiencia pública que se celebrará próximamente, BART presentará opciones para mejorar la infraestructura para bicicletas en Virginia Street. Las mejoras serán construidas como parte del Desarrollo Orientado al Tránsito (TOD, por sus siglas en inglés) previsto en North Berkeley BART.



REUNIÓN DE LA COMISIÓN DE TRANSPORTE E INFRAESTRUCTURAS DE BERKELEY

Jueves 20 de junio de 2024 | 6:15 PM

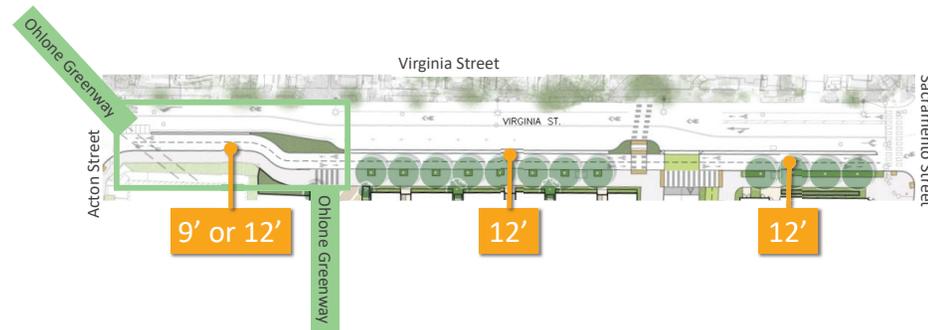
North Berkeley Senior Center, Aspen Room

1901 Hearst Avenue

La agenda será publicada en línea el 14 de junio aquí:

<https://tinyurl.com/4x5eh98n>

Área de estudio de Virginia Street, aproximadamente 200 pies



Para obtener más información sobre el futuro TOD, northberkeleyhousingpartners.com.

INFORMACIÓN DE ACCESO A LAS COMUNICACIONES

Para solicitar adaptaciones relacionadas con su discapacidad para participar en la reunión, incluyendo servicios o asistencia auxiliar, llame al (510) 981-6418 o envíe un correo electrónico a ADA@cityofberkeley.info al menos tres días laborables antes de la fecha de la reunión.

¿PREGUNTAS O COMENTARIOS?

Contacto: Noah Budnick

Analista superior de gestión, Obras Públicas de Berkeley

nbudnick@berkeleyca.gov

North Berkeley BART 捷運站

自行車通道改進舉措—Virginia Street Bike Boulevard (Virginia Street 自行車大道)

歡迎進一步瞭解 North Berkeley BART 捷運站附近為改善自行車安全所做的努力。在即將舉行的公開聽證會上，BART 將提出加強 Virginia Street 自行車基礎設施的方案。這些改進舉措將作為 North Berkeley BART 捷運站規劃中的、以交通為導向的開發 (TOD) 的一部分進行建設。



BERKELEY TRANSPORTATION AND INFRASTRUCTURE COMMISSION MEETING (BERKELEY 交通與基礎設施委員會會議)

2024 年 6 月 20 日 (週四) 6:15 PM

North Berkeley Senior Center, Aspen Room

1901 Hearst Avenue

日程安排資料將於 6 月 14 日線上發佈，網址為：

<https://tinyurl.com/4x5eh98n>

Virginia Street Study Area, 約 200 英尺



有關未來 TOD 的更多資訊，請造訪 northberkeleyhousingpartners.com。

獲取通訊資訊

若要申請與殘障相關的住宿以參加會議，包括輔助工具或服務，請在會議日期前至少三個工作日致電 (510)981-6418 或 ADA@cityofberkeley.info 發送電子郵件。

您有問題或意見？

請聯絡: Noah Budnick

資深管理分析師 (Berkeley Public Works)

nbudnick@berkeleyca.gov



North Berkeley BART Station

North Berkeley BART Transit Oriented Development Bicycle Access Improvements on Virginia Street Bicycle Boulevard

Berkeley Transportation and Infrastructure Commission Meeting

Meeting Details

Thursday, June 20, 2024 at 6:15 PM
North Berkeley Senior Center, Aspen Room
1901 Hearst Avenue

Disability Accommodations

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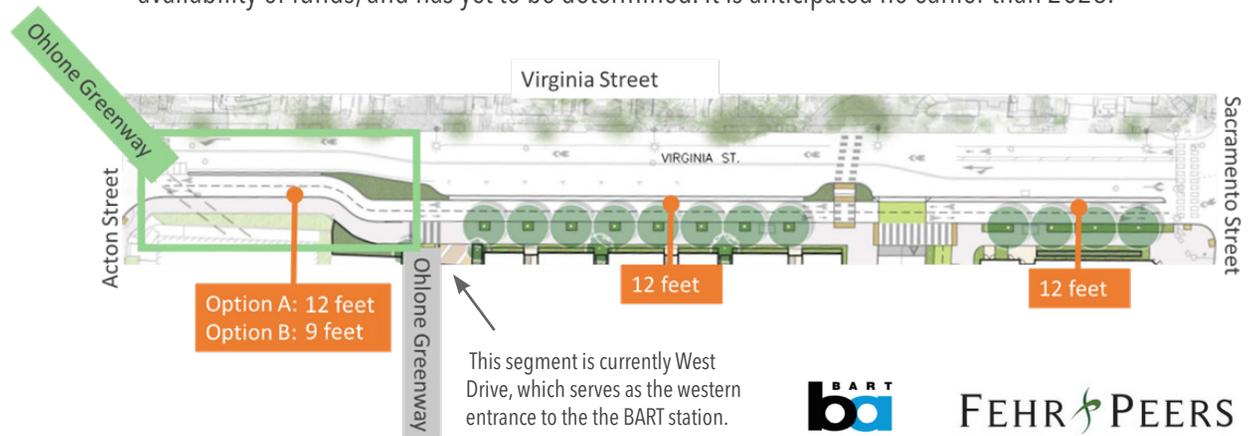
Questions or Comments?

Rachel Factor
Principal Planner
BART Planning & Development
rfactor@bart.gov

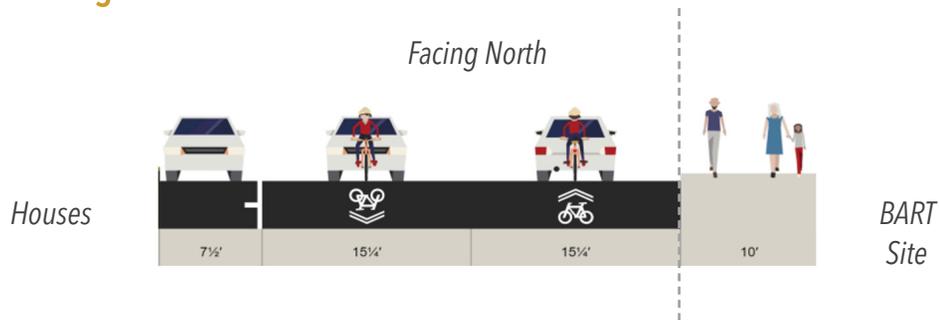
Agenda packet will be posted online by June 14th here:

<https://berkeleyca.gov/your-government/boards-commissions/transportation-and-infrastructure-commission>

Learn more about efforts to improve bicycle safety near North Berkeley BART Station. At an upcoming public meeting, BART will present options for enhancing bicycle infrastructure on Virginia Street. The improvements will be built as part of the proposed Transit Oriented Development (TOD) at North Berkeley BART. The implementation timeline is subject to availability of funds, and has yet to be determined. It is anticipated no earlier than 2026.

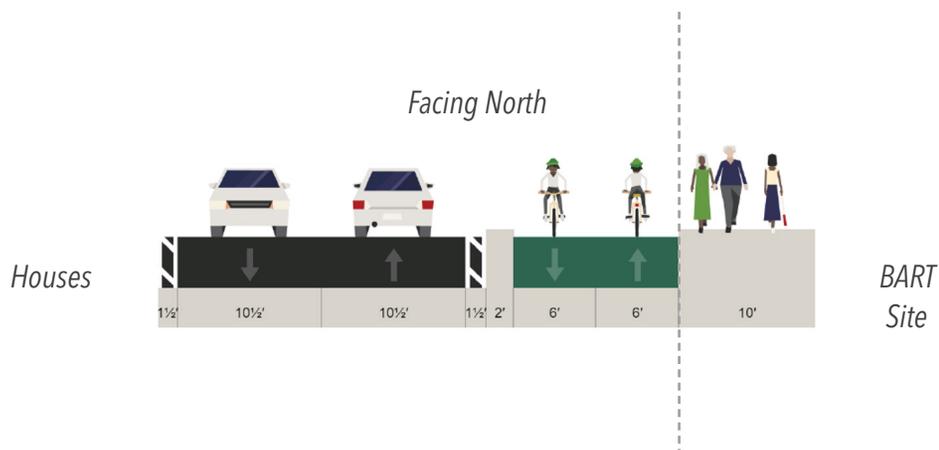


Existing Condition



The TOD at North Berkeley BART will improve bicycle connections from the Ohlone Greenway to and through the TOD. A critical improvement will be a protected two-way separated bikeway on the Virginia Street Bike Boulevard. The planned bikeway will be 12 feet wide between Sacramento Street and West Drive. Two options have been identified for the segment of the bikeway between West Drive and Acton Street since the bikeway needs to go around critical BART infrastructure at this location.

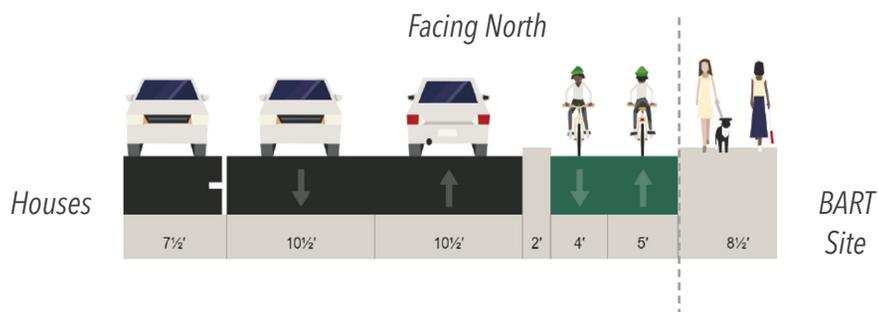
Option A (BART Recommended)



12-foot two-way separated bikeway would:

- Remove 5-8 on-street vehicle parking spaces on the north side of Virginia
- Public parking spaces to be converted are within a Residential Parking Permit (RPP) zone, and located in front of single-family residences
- Maintain existing sidewalk width (10 feet)
- Meet preferred width recommendations from a range of bike design guidelines
- Serve both existing and projected bicycle demand
- Comfortably accommodate cargo bikes and larger bikes

Option B (Alternative)



9-foot two-way separated bikeway would:

- Narrow existing sidewalk to 8.5 feet from 10 feet
- Maintain on-street parking spaces on the north side of Virginia
- Meet only Caltrans bikeway minimum width standards

-----Original Message-----

From: Sara Fain

Sent: Thursday, June 6, 2024 2:31 PM

To: Amiri, Wahid <WAmiri@berkeleyca.gov>

Subject: Protect bike lanes on Virginia

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

I write to express my support for full size protected bike lanes on Virginia st near North Berkeley BART. I am a Berkeley resident who commutes from NBB 3x a week, and I see how many people arrive by bike (myself included). I know how important protected bike lanes are to make people feel like biking is safe and convenient. For those who are not expert urban cyclists (again, myself included), prioritizing cars only makes cycling feel inaccessible and risky. As we strive to achieve our climate goals, the City should take action towards those goals by modifying our infrastructure to make more accessible cleaner forms of transportation beyond cars. Here, this requires protected full size bike lanes.

Thank you for your consideration,
Sara Fain

From: Phyllis Orrick

Sent: Thursday, June 6, 2024 1:31 PM

To: Amiri, Wahid <WAmiri@berkeleyca.gov>

Subject: Please recommend a full 12-foot protected bike lane on Virginia at NBB

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

Dear Commissioners,

I urge you to recommend that the city and BART construct a full width (12 feet), fully protected, bike lane for the section on Virginia that comprises the entire northern edge of the NBB parcel between Acton and Sacramento. To do anything short of this would undermine decades of work and hundred of thousands of dollars invested to date that is finally starting to knit together a usable, safe for all users mobility network for people who are traveling by foot, bike and assistive mobility device.

At present, the curb in question is nearly completely daylighted as part of the already built bicycle and pedestrian improvements running past the station's entrances on the west and the east. Some 7 parking spaces, which are off-limits 7-10 am weekdays, are all that remain on the side of the street across from an RPP curb.

As a longtime resident of D1 who lives less than half a mile from the station and half a block from Virginia, I travel Virginia on foot and on bike and with a household member who uses an electric assistive mobility device at least 10 times a week, and I commend the city and BART for the measures they have taken to date to improve our safety and mobility options.

Literally around the corner, BART is completing a major safety and path width upgrade on the Ohlone segment that runs by the satellite parking lots. It feeds directly into this Virginia segment and will be another extremely welcome link in a network that now connects the heavily used West Street path and part of a north-south network extending from El Cerrito to Oakland.

Adding to the projected demand for travel on this portion of Virginia, is the relatively new pedestrian and bicycle crossing light at Sacramento. Finally, the Alameda CTC safety and active transportation upgrades on San Pablo will be adding a second parallel bike boulevard east of San Pablo, which will bring more users to this stretch.

Dropping the path width down to a smaller size and eliminating the protections that make it safe for ALL skill levels and confidence levels would seriously undermine the value of all of these long-awaited infrastructure investments that have already been made. All for what? Parking for 7 cars?

Please see the photos taken recently showing the daylighting and parking restrictions, as well as a traveler on an assistive mobility device and a portion of the new BART bike lane improvements at the west station entrance.

Regards,

Phyllis Orrick

Assistive mobility device user on sidewalk next to where the protected mobility lanes would be built. Not also the extensive red curbs already in place.



BART bike lanes installed in the last few months.



From: Adam Rogers
Sent: Thursday, June 6, 2024 2:46:57 PM
To: Amiri, Wahid <WAmiri@berkeleyca.gov>
Subject: in support of 12-foot-wide bike lanes on Virginia

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

Hi. I'm writing to the Transportation and Infrastructure Commission to support the creation of a 12-foot-wide bike lane on Virginia St. near North Berkeley BART Station.

It's my understanding that constructing a lane this wide—necessary for the safety of cyclists going two ways—would require removing half a dozen parking spaces at the curb. Since all the nearby homes have driveways long enough to accommodate a car, and since the street is valuable city-owned space, that change in use shouldn't require a vote or even a public meeting.

The benefits to everyone in the city of a safe, 12-foot-wide bike lane far outweigh the potential downside of removing a scant half dozen curbside parking spaces. The number of people driving to the station has been declining for at least five years, but the number of people riding their bikes or walking has gone up. Adding bike capacity reduces car-related injuries and deaths, improves local air pollution, reduces car traffic congestion and time wasted sitting in traffic, and fights climate change. All those things are supposed to be city priorities, and, frankly, they trump the possible objections of a few adjacent homeowners accruing personal benefits from a publicly-owned right-of-way (particularly when, as BART studies note, those homes all have driveways big enough to accomodate a car).

Recent research also shows that in a typical city, every new mile of separated, safe bike lane added per square mile of city increases the number of people riding bikes by 1%. (I'm attaching an article for reference.) The more good bike lanes we build, the more people will use them. And we'll all be safer and healthier because of it.

Thanks for your attention.

Adam

--

Adam Rogers
814 Jones St.
Berkeley CA 94710
jetjocko@gmail.com
415-244-4557

From: Adam Rogers
Sent: Thursday, June 6, 2024 2:46:57 PM
To: Amiri, Wahid <WAmiri@berkeleyca.gov>
Subject: in support of 12-foot-wide bike lanes on Virginia

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Thanks for your attention.

Adam

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814 Jones St.
Berkeley CA 94710
jetjocko@gmail.com
415-244-4557

Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them – Another Look

Jennifer Dill and Theresa Carr, Portland State University

ABSTRACT

Some surveys indicate that providing bicycle lanes and paths may encourage more people to commute by bicycle. The presence of a striped lane or separated path can increase a cyclist's perception of safety. With growing concerns over traffic congestion and vehicle pollution, public policy makers are increasingly promoting bicycling as an alternative for commuting and other utilitarian trip purposes. States and local spending on bicycle facilities has increased significantly over the past decade. Previous studies have linked higher levels of bicycle commuting to various demographic and geographic variables. At least one analysis showed that cities with higher levels of bicycle infrastructure (lanes and paths) also saw higher levels of bicycle commuting. This research affirms that finding by analyzing data from 35 large cities across the U.S. This cross-sectional analysis improves on previous research by including a larger sample of cities, not including predominantly 'college towns,' and using consistent data from the Census 2000 Supplemental Survey. While the analysis has limitations, it does support the assertion that new bicycle lanes in large cities will be used by commuters.

INTRODUCTION

Increasing concern over vehicle congestion and pollution in urban areas has led to an interest in promoting bicycle use for non-recreation (utilitarian) purposes. This interest is evident at all levels of government. In the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the U.S. Congress opened up new sources of funding for bicycle facilities. These new funding sources continued with the Transportation Equity Act for the 21st Century (TEA-21) of 1998 and have impacted spending nationwide. In 1991, states and MPOs spent \$17.1 million in federal funds on stand-alone bicycle and pedestrian projects. This figure grew to \$339.1 million in 2001 (1). In addition, federal planning requirements now include consideration of bicyclists in state and MPO long-range transportation plans. Bicycle projects must be considered in conjunction with all newly constructed and reconstructed facilities where bicycling is permitted (2). Promoting bicycle travel for utilitarian purposes is a federal objective. In 1994, the U.S. Department of Transportation released the National Bicycling and Walking Study (NBWS). One of the goals of the NBWS was to double the share of trips made by foot or bicycle (3).

With an increased public policy focus on bicycling, researchers and planners are trying to better comprehend what motivates people to use a bicycle instead of a motorized vehicle. The 1994 NBWS reviewed existing literature to understand why bicycling is not used more extensively (4). Reasons were categorized as either "1. Subjective factors which have less to do with measurable conditions than with personal perception and interpretation of one's needs" or "2. Objective, physical factors which exist for everyone, though they may not be weighed equally by everyone" (p. 6). Subjective factors include distance, traffic safety, convenience, cost, valuation of time, valuation of exercise, physical condition, family circumstances, habits, attitudes and values, and peer group acceptance. Objective factors include climate, topography, presence of bicycle facilities and traffic conditions, access and linkage, and transportation alternatives. Pucher et al identify eight factors that affect the level of cycling in North America: public attitude and cultural differences; public image; city size and density; cost of car use and public transport; income; climate; danger; and cycling infrastructure (5).

Public policy can influence most of these factors, to varying degrees. Current U.S. policy has focused largely on providing bicycle infrastructure, mainly through new funding made available through ISTEA and TEA-21 (5). Based on studies from the late 1970s and early 1980s, the NBWS concluded that bikeways (i.e., lanes and paths) "will significantly affect subjective perceptions of safety" (p. 11). The study also cited surveys conducted by a variety of sources. For example, 12 – 17 percent of the active bicyclists surveyed in Phoenix, AZ, Seattle, WA, and Portland, OR identified a 'lack of facilities' as a reason for not commuting to work by bicycle. Trip distance was the most frequently cited reason. A Harris Poll conducted in 1991 found that 49 percent of active bicycle riders who did not currently commute by bicycle said they would sometimes commute by bicycle if there were safe bike lanes. Similar surveys in Davis, CA and Seattle, WA found that 12 and 41 percent, respectively, of cyclists would

commute by bicycle if there were safer routes. The results of these types of surveys, however, are influenced by the wording of the questions and they only reveal what people *might* do, rather than what they actually do.

EMPIRICAL RESEARCH

Of course, actual behavior does not always reflect stated preferences or desired choices. Using attitudinal surveys to predict shifts in travel due to bicycle improvements can overestimate demand for new facilities (6). While Pucher et al agreed that separate bike lanes and paths make cycling more attractive to non-cyclists, they did not find any “rigorous statistical studies” that demonstrated their impact on cycling. They also speculated that, to some extent, the provision of such facilities could be a response to the level of cycling in an area, rather than a cause.

Bicycling is predominantly a recreational activity in the U.S. Data from the Bureau of Transportation Statistics (BTS) Omnibus Survey for 2002 reveals that 14.3 percent of the adult respondents rode a bicycle in the previous month (7). Of those, 53.9 percent did so primarily for recreation and 31.2 percent did so primarily for exercise. Only 4.9 percent bicycled primarily for commuting to work or school and 7.5 percent for personal errands. The survey did not ask for secondary purposes. Also, those people bicycling primarily for exercise might be going to work. Of the bicycle commuters, 11.0 percent rode primarily on bike lanes, compared to 5.6 percent of the recreational cyclists. McDonald and Burns (8) found that regular bicycle commuters in Phoenix adjusted their routes to use bicycle facilities, lending support to the argument that providing facilities impacts behavior.

Nelson and Allen (9) used data from the NBWS to explain the relationship between bicycle commuting and bicycle pathways, controlling for extraneous variables. The data included 18 U.S. cities and used five explanatory variables: mean high temperature; number of days per year with more than one-tenth an inch of rain; terrain; miles of bikeways per 100,000 residents; and the percentage of college students as compared to the overall resident population. Their final linear regression model included bikeway mileage, rain days, and percent students as significant variables, with an adjusted R-squared of 0.825. They found that each additional mile of bikeway per 100,000 people is associated with a 0.069 percent increase in bicycle commuting, holding the other factors constant. The authors did not, however, interpret this as a cause-effect relationship.

Other researchers have explored the effect of additional variables on bicycle commuting. Baltes (10) used Census journey-to-work data from 284 metropolitan statistical areas (MSAs) to explore the relationship between bicycle commuting and various demographic and geographic factors. The analysis did not include data on bikeways, as this information is not included in the U.S. Census. A series of regression equations identified several significant variables, including the following: age (16-29 years); vehicle availability; race (Asian and non-white); household owner occupancy; unemployment; percent students; poverty; agricultural and manufacturing employment; and the share of workers and population living in the central city. Baltes found that several variables were not significant, including population density and median income, though some of the significant variables are likely to be highly correlated with these two variables. The analysis was conducted at the MSA level for each Census region and all the MSAs combined and found that the variables explained at least half of the variation in the level of bicycle commuting. The author did conclude that bicycle commuting was most prevalent in MSAs with unique communities, such as universities or colleges. Nankervis (11) found that short-term and long-term weather patterns impacted cycling levels, though not to the extent that he originally anticipated.

Overall, the empirical evidence explaining the link between bicycle facilities and commuting is limited. Nelson and Allen (9) made several recommendations on how to improve on their analysis, including a larger data set, time-series data, before-and-after studies, and including additional factors that influence mode choice. Moreover, the quality of the original data used for the analysis may be problematic. The NBWS noted that “innumerable difficulties were encountered when assembling the data” and that “the quality of the data varies so much” (p. 32, note 43). This was particularly true for the bicycle commuting data and bikeway mileage. Finally, of the 18 cities included in the Nelson and Allen study, the top four in terms of bicycle commuting are “college towns” – Boulder, CO, Eugene, OR, Gainesville, FL, and Madison, WI. Though the percentage of people who are students was included as a control variable, these cities may be driving the results and might not be considered useful as models for larger cities without a university-focus.

DATA AND METHODOLOGY

This analysis attempts to build upon the work of Nelson and Allen (9) by using new Census data, a larger sample of cities, and additional explanatory variables. Much of the data used in this study comes from the Census 2000 Supplemental Survey (C2SS). The C2SS is a demonstration program to evaluate the feasibility of collecting economic, demographic, and housing data outside of the decennial census. C2SS sampled 700,000 housing units in 1,203 counties, sampling approximately 58,000 addresses each month. The C2SS sampling rate for most geographic areas was five percent(12). While the sample size is much smaller than that used for the long form decennial census, the C2SS was thought to be more useful for this analysis as it samples households throughout the calendar year, rather than on April 1st, as the decennial census does. If bicycle commuting is influenced by weather, a random sample throughout the year may present a more accurate picture of regular behavior. In addition, at the time we conducted this research, the U.S. Census had not released bicycle commute data at the city level.

The C2SS includes data for 64 incorporated or Census designated places with a household population of 250,000 or higher. Three U.S. cities have a population greater than 250,000 but were not included in C2SS – Lexington, KY; Louisville, KY; and Corpus Christi, TX. Bicycle commuting rates in the top 55 cities ranged from 2.63 percent (Minneapolis, MN) to 0.04 percent (Dallas, TX) (13). Nine cities had estimates of zero percent of the workers commuting by bicycle. This is likely a result of the sample size. We contacted bicycle coordinators or other staff at the top 40 cities to obtain information on the number of miles of Class I and Class II bike facilities at the end of the year 2000. Class I facilities (also known as bike paths or shared use paths) are defined as a bikeway physically separated from motorized vehicular traffic. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. Class II facilities (also known as on-street bicycle lanes) are defined as a portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists (14). Some cities also had bike routes, wide shoulders, bike boulevards, and other facilities. Although these other facilities may have some impact on bicycle commuting, we limited the analysis to Class I and II facilities to maintain consistency among cities, and focus the analysis on the highest level of facilities. We were able to obtain Class I and II facility data from 35 cities. We also asked whether or not the city had a designated bicycle coordinator on staff. This variable is an indicator of the level of policy support at the local level for bicycling, which may or may not be reflected in the level of facilities existing in 2000.

Based upon the previous research described above, we selected a number of other variables that could influence the level of bicycle commuting in a city. These are shown in Table 1.

FINDINGS

Data for the 35 cities appears in Table 2, sorted by the percentage of bicycle commuters. The rankings in the first column are from the original list of 64 cities from the C2SS. Looking at the data, there are few consistent trends. The top four cities have some of the highest numbers of bike lanes and paths per square mile, though cities further down the list (e.g., St. Paul, Long Beach, and San Jose) also have high numbers. The BTS data described above indicated that commuters are more likely than other cyclists to use bike lanes. Therefore, the number of Type 2 bike lanes per square mile is also included in the table. Three of the top six cities have over 100 days of rain per year, lending some doubt that rain is a significant deterrent to bicycle commuting. However, the bottom six cities all have over 100 days of rain. The maximum percentage of residents that are college students is 12.23 percent in Boston, significantly lower than that rates found in Boulder, Gainesville, and Madison in the Nelson and Allen data. Most cities have a relatively high rate of vehicle ownership – over one vehicle per household for all but three cities (Boston, Washington, DC and New York City).

Table 1: Variables and Data Sources

Variable	Source
Occupation/Employment	
Percentage of population that are college students	C2SS (15)
Percent of workers by industry category (Agriculture, construction, manufacturing, wholesale trade, retail trade, transportation/warehousing/ utilities, information, finance/insurance/real estate, professional/scientific, education, arts/entertainment/recreation, and public administration)	C2SS (16)
Percent of workers by occupation category (management/professional, service, sales/office, farm/forestry, construction, and production/transportation/manufacturing)	C2SS (16)
Availability/Attractiveness of Other Modes	
Mean number of vehicles per household	C2SS (17)
Percentage of households with zero vehicles	
Transit Availability -	National Transit Database 2000
Transit vehicle revenue miles per mile of service area	Transit Profiles
Gasoline price (state average, with taxes for 2000)	Energy Information Administration (18)
Land Use	
Percentage of housing units built before 1950	C2SS (19)
(a proxy for a grid-like street pattern)	
Population density	2000 Census (20)
Socio-economic Characteristics	
Median and mean household income	C2SS (16)
Percent of persons over 18 in poverty	C2SS (16)
Weather	
Average annual number of days of rainfall (.01 inches or more)	National Climatic Data Center
Average annual precipitation (total inches)	(21), Western Regional Climate Center (22)
(Data for next closest city if city data not available)	
Public Support for Bicycling	
Average per capita annual state spending on bicycle and pedestrian improvements, 1990-1999 (federal funds)	Surface Transportation Policy Project (23)

The percentage of people commuting by bicycle is significantly correlated with the three bicycle infrastructure variables in Table 2, but not with any other variables listed in Table 1 or 2. The strongest and most significant correlation was with the number of Type 2 bike lanes per square mile (Pearson Correlation = 0.45, $p < 0.01$). There was no significant correlation between state spending on bicycle and pedestrian projects and any of the three infrastructure variables. Several explanations are possible. First, the funding variable is for the state level and also includes pedestrian projects. Also, the funds could be spent on types of bicycle facilities and projects other than Type 1 or 2 paths and lanes, such as safety enhancements or intersection signals and detection equipment. The variable is included in this analysis as a possible indicator of states providing all types of bicycle facilities and overall public support for bicycling.

Table 2: Cities and Data Used in Analysis

Rank	City	% Commuting by bicycle	Lanes & Paths per sq. mi.	Lanes per sq. mi.	Lanes & Paths per 100,000 residents	Average State Spending per capita on ped/bike (1990-99)	Population Density (people/ sq mi land)	Days of Rain (historical average)	Percent College Students	Avg. Gas Price (state, with taxes)	Avg. # vehicles per household	Median Household Income
1	Minneapolis, MN	2.63%	1.44	0.47	20.65	\$0.45	6,970	116	8.14%	1.52	1.34	\$40,471
2	Sacramento, CA	2.59%	2.05	1.42	48.89	\$0.09	4,189	58	9.83%	1.62	1.54	\$37,216
3	Portland, OR	2.55%	1.44	1.05	36.48	\$0.94	3,939	153	6.88%	1.63	1.53	\$38,807
4	Tucson, AZ	2.22%	1.76	1.54	70.27	\$0.26	2,500	53	10.27%	1.51	1.50	\$30,248
5	Fresno, CA	1.96%	.13	0.00	3.23	\$0.09	4,098	45	8.34%	1.62	1.43	\$29,934
6	Tampa, FL	1.93%	.58	0.41	21.58	\$0.58	2,708	106	5.73%	1.49	1.46	\$34,194
7	San Francisco, CA	1.80%	.87	0.44	5.21	\$0.09	16,634	68	9.81%	1.62	1.15	\$57,417
8	Oakland, CA	1.77%	.20	0.09	2.75	\$0.09	7,127	63	7.93%	1.62	1.41	\$45,251
9	Mesa, AZ	1.64%	.37	0.36	11.61	\$0.26	3,171	36	7.17%	1.51	1.65	\$39,719
10	Anaheim, CA	1.59%	.45	0.29	6.78	\$0.09	6,702	32	5.67%	1.62	1.92	\$46,540
11	Boston, MA	1.48%	.28	0.01	2.29	\$0.42	12,166	127	12.23%	1.57	.98	\$42,117
12	Washington, DC	1.42%	.78	0.10	8.39		9,310	113	7.56%	1.50	.90	\$41,162
13	Seattle, WA	1.23%	.58	0.25	8.70	\$0.83	6,717	151	11.34%	1.60	1.43	\$44,954
14	Albuquerque, NM	1.16%	.61	0.31	24.74	\$1.29	2,482	61	8.33%	1.49	1.72	\$37,235
15	New Orleans, LA	1.14%	.06	0.00	2.06	\$0.29	2,682	114	7.17%	1.43	1.16	\$27,496
16	Oklahoma City, OK	0.90%	.02	0.01	2.20	\$0.45	83	83	5.55%	1.38	1.62	\$34,660
17	Phoenix, AZ	0.87%	.48	0.38	17.41	\$0.26	2,782	36	5.49%	1.51	1.60	\$40,003
19	St. Paul, MN	0.69%	1.93	0.65	35.49	\$0.45	5,442	116	7.41%	1.52	1.49	\$45,944
20	Long Beach, CA	0.66%	1.27	0.00	13.87	\$0.09	9,150	32	8.85%	1.62	1.42	\$35,220
21	Santa Ana, CA	0.65%	.36	0.04	2.88	\$0.09	12,452	32	5.19%	1.62	1.83	\$38,258
22	Los Angeles, CA	0.63%	.34	0.25	4.36	\$0.09	7,877	35	7.29%	1.62	1.50	\$35,611
24	Honolulu, HI	0.61%	.46	0.25	10.49	\$0.43	4,337	97	9.76%	1.75	1.43	\$46,776
25	Denver, CO	0.53%	.62	0.07	17.13	\$0.50	3,617	89	6.99%	1.54	1.57	\$42,060
26	Chicago, IL	0.51%	.35	0.22	2.76	\$0.24	12,750	125	7.01%	1.56	1.15	\$38,295
27	Pittsburgh, PA	0.48%	.31	0.05	5.08	\$0.21	6,019	152	7.91%	1.50	1.03	\$30,352
28	San Diego, CA	0.48%	.92	0.77	24.52	\$0.09	3,772	42	9.71%	1.62	1.66	\$47,088
29	San Jose, CA	0.42%	1.02	0.74	19.89	\$0.09	5,118	58	9.28%	1.62	2.07	\$72,173
30	New York City, NY	0.42%	.64	0.40	2.44	\$0.48	26,403	121	7.12%	1.57	.63	\$39,686
35	Houston, TX	0.35%	.43	0.32	12.80	\$0.17	3,372	105	5.28%	1.41	1.51	\$36,073
36	Raleigh, NC	0.34%	.21	0.02	8.64	\$0.35	2,409	113	11.08%	1.47	1.65	\$46,763
37	Milwaukee, WI	0.27%	.26	0.08	4.19	\$0.31	6,212	126	6.25%	1.55	1.31	\$34,375
39	St. Louis, MO	0.26%	.45	0.06	8.08	\$0.05	5,622	111	6.61%	1.42	1.22	\$27,213
40	Cincinnati, OH	0.25%	.16	0.06	3.65	\$0.47	4,249	137	8.49%	1.50	1.23	\$28,116
41	Riverside, CA	0.23%	1.10	0.85	33.55	\$0.09	3,267	32	8.13%	1.62	1.84	\$41,555
42	Columbus, OH	0.22%	.13	0.01	3.94	\$0.47	3,382	137	8.71%	1.50	1.52	\$37,041
	Average	1.05%	0.66	0.34	14.49	\$0.33	6,299	88	7.96%	1.55	1.44	\$39,715

We estimated a series of regression models with various combinations of independent variables. The results from the best models, based upon model and variable significance, are shown in Table 3. The first two models include 34 of the 35 cities. State spending information was not available for Washington DC, so that city was excluded from the models with the spending variable. The results for Model 1 indicate that vehicle ownership and the number of days of rain are negatively related to bicycle commuting, as expected, but the coefficients are not statistically significant. Removing them from the model (Model 2) reduces the explanatory power of the model very little, as indicated by the adjusted R². The coefficient for the state spending variable is positive, as expected, but is also not significant. Removing this variable from the model however, does reduce the explanatory power of the model slightly (Model 3).

Table 3: Results of Regression Models

	Model 1	Model 2	Model 3	Model 4 (NYC excluded)
Constant	1.971 (0.058)	0.594 (0.008)	0.761 (0.000)	3.339 (0.005)
Type 2 lanes per square mile	0.892 (0.008)	0.888 (0.006)	0.861 (0.007)	0.998 (0.002)
State spending per capita on bike/pedestrian	0.771 (0.144)	0.427 (0.328)		1.021 (0.047)
Vehicles per household	-0.698 (0.208)			-1.520 (0.020)
Days of rain	-0.005 (0.206)			-0.008 (0.020)
Adj-R ²	0.192	0.190	0.178	0.304
F-statistic	2.964 (0.036)	4.868 (0.014)	8.383 (0.007)	4.495 (0.006)
n	34	34	35	33

Dependent Variable: Percentage of workers commuting by bicycle
Beta-coefficient is shown in each cell. Level of significance is shown in parentheses.

Model 4 includes all four independent variables, but excludes New York City. In this model, all variables are significant and explain about 30 percent of the variation in the dependent variable, higher than any other model estimated. New York City is often considered an “outlier” in transportation-related research due to its high amount of transit use and population density. New York City may also be unique in terms of bicycling. Pucher et al (5) suggest that New York could be a leading cycling city, with its flat terrain and close destinations. However, obstacles such as heavy traffic, poor pavement, poor links on bridges, vehicle exhaust, lack of secure bicycle parking and theft likely discourage high levels of bicycle commuting.

The results from Model 4 indicate that for more typical U.S. cities over 250,000 population, each additional mile of Type 2 bike lanes per square mile is associated with a roughly one percent increase in the share of workers commuting by bicycle. This level of increase in Type 2 bike lane mileage is significant – almost four times the current average of 0.34 miles per square mile. However, increasing the share of workers commuting by bicycle by one percentage point would double the average number of bicycle commuters for many of these cities. Of course, as noted by Nelson and Allen and Pucher et al, the strong association between the existence of bike lanes and levels of bicycle commuting does not certify a cause-effect relationship. It does, however, imply that commuters will use bicycle lanes if they are provided.

In a regression analysis that includes only 33 – 35 cities, one city can influence the results significantly, as shown with New York City in Model 4. Therefore, it is also worth looking at the data for other anomalies and possible explanations. For example, Fresno, CA is ranked fifth, with 1.96 percent of the workers commuting by bicycle, yet they have few bicycle lanes or paths. However, nearly six percent of the workers are employed in the farming, fishing, or forestry occupations, more than ten times the rate in any of the other cities. Baltes had found that the percent of the population employed in agriculture is positively related to bicycle commuting at the MSA level. Boston also has a high level of bicycle commuting (1.48 percent) and a low number of bicycle lanes and paths. The

city also has the highest share of residents who are college students and a low rate of vehicle ownership – just less than one vehicle per household. The high density in Boston also indicates that destinations are closer than in many cities. These possible explanations do not apply to New Orleans, another city with a relatively high level of bicycle commuting and little infrastructure. One possible explanation is income; the median household income in New Orleans is over \$10,000 less than the average for the 35 cities. However, income in general was not significantly correlated with bicycle commuting across all 35 cities and, when included in regression models, was not a significant variable. At the other end of the list, there are some cities with higher than average bicycle infrastructure, but lower than average bicycle commuting – San Diego, San Jose, and Riverside, CA, for example. All three cities have low rainfall, which should be conducive to cycling. However, they also have lower than average densities and higher than average auto ownership rates. This might imply that providing bicycle lanes and paths in more auto-oriented cities may not correlate well with increased bicycle commuting. However, Sacramento, CA and Portland, OR have similar population densities and higher than average vehicle ownership rates, yet much higher bicycle commuting and infrastructure.

CONCLUSIONS

The analysis performed here affirms the results of Nelson and Allen. Higher levels of bicycle infrastructure are positively and significantly correlated with higher rates of bicycle commuting. Achieving consistent results with a larger, more uniform (e.g., no small or college towns) set of cities lends strength to this finding. While additional variables were tested, such as income, gas prices, and transit availability, they were not significant in the regression models. However, there are still several limitations to this analysis. As already discussed, the analysis does not indicate the existence or direction of a cause-effect relationship. People may be commuting by bicycle more because there are more lanes and paths. Alternatively, because people are commuting by bicycle, the city is building more bike lanes and paths. Both relationships may be occurring to varying degrees in each city. But, as Nelson and Allen state, “This analysis confirms the hunches of public policy makers that at least some, but perhaps not an inconsequential number, of commuters will be responsive to the bicycling option if only it were made available” (p. 82). The range in rates of bicycle commuting among the 35 cities indicates that improvements can be made. However, bicycle lanes and paths *alone* are not likely to increase bicycle commuting. Bike lanes and paths need to connect popular origins and destinations, greater efforts should be taken to educate commuters about bicycling as an option, and commuters need adequate and safe parking at work (4, 5).

Additional research could overcome some of the limitations of this analysis. For example, our data was collected at the city level. A disaggregate analysis looking at individuals and their proximity to bike lanes and paths may shed more light on the relationship between proximity and propensity to bicycle. Socioeconomic variables, such as income and age, might be significant at the disaggregate level. This type of analysis is possible when the Census releases data at the micro level – the public use micro sample (PUMS). Although C2SS PUMS data is available, the sample does not list the city of the household or person. In addition, the sample includes only 727 bicycle commuters, compared to over 150,000 people commuting in personal vehicles. The data do include weighting factors to help reflect the data to the population as a whole. These weighted data do indicate that there are differences between cyclists and other commuters. For example, 82 percent of the bicycle commuters were men and 21 percent were students, compared to 54 percent and 11 percent of all commuters, respectively. Bicycle commuters had lower incomes than vehicle commuters. Only 31 percent of the bicycle commuters had children of their own at home, compared to 42 percent of all commuters. This may indicate that commuting parents are less likely to use bicycles because they also need to transport children. It may also indicate that cyclists are more likely to be students. Thirty-five percent of bicycle commuters lived in homes built before 1950, compared to 21 percent of all commuters. This may indicate that people living in older neighborhoods, which are more likely to have a grid street pattern, are more likely to bicycle. However, additional statistical analysis to control for other variables, such as density and income, is necessary before drawing clear conclusions.

Two limitations of the data involve the dependent variable – the percent of workers that commute by bicycle. First, commuting is only one of many trip purposes. The BTS data described above indicates that more people bicycle to run errands. Personal travel surveys, such as the Nationwide Personal Transportation Survey (NPTS, now called the Nationwide Household Travel Survey) and regional surveys, would provide data on bicycling for all trip purposes. However, the NPTS does not include a large enough sample to analyze individual cities. Regional travel surveys could be used, but they are conducted at different times (ranging from every 5 to over 10 years) and employ

different methods. One advantage of the Census and C2SS is the consistency in data collection methods and that the data is all for the same year.

The second limitation with regards to the dependent variable is that the Census asks how the person usually got to work the previous week. Therefore, only regular bicycle commuters are captured in the data. Someone who rides a bike one or two days a week will not be listed as a bicycle commuter. For this reason, some bicycle advocates feel that the Census systematically undercounts cyclists. Again, a regional or citywide travel survey could overcome this limitation. Such surveys usually involve a one- or two-day travel diary. With a large enough sample, occasional cyclists will be included in the data.

Additional research could more clearly explain the relationship between cycling and infrastructure by including additional variables. For example, bicycle commuting may be correlated to the distance of travel, which is not collected by the U.S Census Bureau. In addition, changing the level of analysis (aggregate versus disaggregate) would allow for the use of variables such as sex, that don't vary by city significantly. Before-and-after studies and time-series data may help explain the direction and significance of causality.

REFERENCES

1. Federal Highway Administration. Summary of Federal Highway Administration (FHWA) Pedestrian and Bicyclist Activities Prepared for 2002 Transportation Research Board Meeting, <http://www.fhwa.dot.gov/environment/bikeped/sfhwapba.htm>, 2002 (last viewed 11/1/02).
2. Federal Highway Administration. FHWA Guidance Bicycle and Pedestrian Provisions of Federal Transportation Legislation, <http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm>, 1998 (last viewed 11/1/02).
3. Federal Highway Administration. National Bicycling and Walking Study Five Year Status Report by the U.S. Department of Transportation, <http://www.fhwa.dot.gov/environment/bikeped/study.htm>, 1999 (last viewed 11/1/02).
4. Federal Highway Administration. Case Study No. 1: Reasons Why Bicycling and Walking Are Not Being Used more Extensively As Travel Modes. U.S. Department of Transportation: Washington, DC, 1992.
5. Pucher, J., C. Komanoff, and P. Schimek. Bicycling renaissance in North America? Recent trends and alternative policies to promote bicycling. *Transportation Research Part A*, 1999. **33**: p. 625-654.
6. Porter, C., J. Suhrbier, and W.L. Schwartz. Forecasting Bicycle and Pedestrian Travel: State of the Practice and Research Needs. Presented at the Annual Meeting of the Transportation Research Board, Washington, DC. 1999.
7. Bureau of Transportation Statistics. Omnibus Survey - Household Survey (January 2002 - June 2002), <http://www.bts.gov/omnibus/household/2002/> (last viewed 11/1/02). Data analysis performed by author.
8. McDonald, C.H. and E.K. Burns. Cycling to Work in Phoenix: Route Choice, Travel Behavior, and Commuter Characteristics (Paper 01-2526). Presented at the Annual Meeting of the Transportation Research Board, Washington, DC. 2001.
9. Nelson, A.C. and D. Allen. If You Build Them, Commuters Will Use Them. *Transportation Research Record*, 1997. **1578**: p. 79-83.
10. Baltes, M.R. Factors Influencing Nondiscretionary Work Trips by Bicycle Determined from 1990 U.S. Census Metropolitan Statistical Area Data. *Transportation Research Record*, 1996. **1538**: p. 96-101.
11. Nankervis, M. The effect of weather and climate on bicycle commuting. *Transportation Research Part A*, 1999. **33**: p. 417-431.
12. U.S. Census Bureau. American Community Survey, <http://www.census.gov/acs/www/>, (last viewed 11/15/02).
13. Census 2000 Supplemental Survey. Means of Transportation to Work for Workers 16 Years and Older, Summary Table P047, U.S. Census, Washington, DC.
14. American Association of State Highway and Transportation Officials, Task Force on Geometric Design. Guide for the Development of Bicycle Facilities, 1999
15. Census 2000 Supplemental Survey. School Enrollment by Level of School for the Population 3 years and over, Summary Table P053, U.S. Census, Washington, DC.
16. Census 2000 Supplemental Survey. Profile of Selected Economic Characteristics, Table QT-03, U.S. Census, Washington, DC.
17. Census 2000 Supplemental Survey. Tenure by Vehicles available, Summary Table H041, U.S. Census, Washington, DC.

18. Energy Information Administration. Petroleum Marketing Annual 2000, Washington, DC. Tables A1 and EN1, 2002
19. Census 2000 Supplemental Survey. Profile of Selected Housing Characteristics, Table QT-04, U.S. Census, Washington, DC.
20. Census 2000 Summary File 1, Population, Housing Units, Area and Density, Geographic Comparison Table (GCT) PH1-R, U.S. Census, Washington, DC.
21. National Climatic Data Center. Mean Number of Days with Precipitation .01 inch or More and Mean Annual Precipitation, National Climatic Data Center, <http://lwf.ncdc.noaa.gov/oa/ncdc.html> (last viewed 11/1/02).
22. Western Regional Climate Center. San Jose, California, Period of Record Monthly Climate Summary, 1948-2001. Desert Research Institute: Reno, NV, 2002
23. Surface Transportation Policy Project. Transportation Facts for Your State, 2002, <http://www.transact.org/states/default.asp> (last viewed 11/1/02).

From: Jason Warriner <jason.jaywar@gmail.com>

Sent: Monday, June 10, 2024 5:09 PM

To: Rachel Factor <RFactor@bart.gov>

Subject: North Berkeley BART Transit Oriented Development Bicycle Access Improvements on Virginia Street Bicycle Boulevard

Dear Ms. Factor,

Please choose option B for dealing with the changes to the bicycle boulevard on Virginia street for the following reasons:

1) As BART eliminates more and more parking spots, parking will come under greater and greater stress in our neighborhood. Eliminating much needed parking will only make this worse (as much as I wish people wouldn't drive to BART, they will).

2) Those sidewalks are plenty wide and losing a couple of feet won't matter.

3) Bicyclists will ignore these lanes anyway, so why do more damage by removing much needed parking (and may I add *increasingly* needed as more and more people return to the office and the BART lot is more and more full.)

Also, can BART do some much needed maintenance? The property and sidewalks are full of weeds and are really starting to make things look bad.

Jason

From: Jason Warriner <jason.jaywar@gmail.com>

Sent: Thursday, June 13, 2024 5:16 PM

To: Amiri, Wahid <WAmiri@berkeleyca.gov>

Subject: North Berkeley BART Transit Oriented Development Bicycle Access Improvements on Virginia Street Bicycle Boulevard

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

I am advocating for option B for dealing with the changes to the bicycle boulevard on Virginia street for the following reasons:

1) As BART eliminates more and more parking spots, parking will come under greater and greater stress in our neighborhood. Eliminating much needed parking will only make this worse (as much as I wish people wouldn't drive to BART, they will).

2) Those sidewalks are plenty wide and losing a couple of feet won't matter.

3) Bicyclists will ignore these lanes anyway, so why do more damage by removing much needed parking (and may I add *increasingly* needed as more and more people return to the office and the BART lot is more and more full.)

Also, can BART do some much needed maintenance? The property and sidewalks are full of weeds and are really starting to make things look bad.

Jason

From: Andrea Altschuler

Sent: Thursday, June 13, 2024 10:47 AM

To: Budnick, Noah <NBudnick@berkeleyca.gov>; Kesarwani, Rashi <RKesarwani@berkeleyca.gov>; Shen, Alisa <AShen@berkeleyca.gov>; Rebecca Saltzman <rebecca.saltzman@bart.gov>; nbb@bridgehousing.com <nbb@bridgehousing.com>; North Berkeley Neighborhood Alliance <nbneighborhoodalliance@gmail.com>; rfactor@bart.gov <rfactor@bart.gov>

Subject: Either no new bike lane or definitely Option B for Virginia Street/Bike Boulevard

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

I will be out of town and unable to attend the public meeting considering BART's Virginia Street bike lane proposal on Thursday, June 20th.

It seems that this proposed change, especially Option A, is a solution in search of a problem. I live in a house that is in the affected area. Virginia Street is fully safe for cyclists. There is a traffic diverter at Acton and a stop light at Sacramento. In the 35 years I've lived here, I've never seen evidence of danger for cyclists. On what basis of evidence is this change being proposed?

There is fully sufficient space for bikes and cars to pass in both directions. I don't see how or why this would change once housing is added on the current BART parking lot. Especially since if anything, there will be FAR fewer cars driving into and out of the station. Nearly all parking will be eliminated for commuters and there will be very limited parking for residents, per various Bridge Housing presentations.

Also, with the traffic diverter at Acton, if a barrier-based bike lane is built, will that allow for the safe passage of fire trucks on this block? It seemed that this crucial issue wasn't considered until very late in the planning for the bike lanes on Hopkins Street.

If it is determined that the block needs to be made safer for cyclists, then Option B seems much more reasonable - especially since the sidewalk on the BART side of the street is at least 1.5 times wider than the sidewalk on the residential side. And if you include the wide planting strip in front of the substation, that greatly increases the available space for widening the street on the south side of Virginia Street and maintaining a sidewalk.

Also, isn't BART in significant danger of falling off a financial cliff? Why are they planning to use public money for an unnecessary project in times such as these?

Last, and certainly not least, so many people will be searching for parking after the housing is built on the BART parking lot - both new residents in the development and current area residents. It thus is important to maintain the parking that currently exists - especially since there is ample, ample room for both bikes and cars with the existing configuration. If something must be modified, please use option B and simply modify the existing sidewalk on the south side of Virginia as described - there is definitely usable space available for that purpose which will not negatively impact pedestrians, cyclists, or people trying to park their cars. .

Sincerely,
Andrea Altschuler
1417 Virginia Street

From: Lalo Maguire-Shashoua

Sent: Thursday, June 13, 2024 7:45:55 PM

To: Mostowfi, Hamid <HMostowfi@berkeleyca.gov>; Nevels, Ronald <RNevels@berkeleyca.gov>; Amiri, Wahid <WAmiri@berkeleyca.gov>

Subject: North Berkeley BART Plan

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

Dear Transportation and Infrastructure Commission, I've read about the plans for the BART station improvement and I'm very happy this is happening. I can't attend the meeting on June 20th since I will be traveling, however I would like to voice my support for Option A of the plan, which provides more space for bikers and pedestrians, while removing parking space. Option A will contribute to a more enjoyable and safe experience at North Berkeley BART which is very important considering the plans to make the area child-friendly. Thank you, Roan

From: Roan Shash

Sent: Thursday, June 13, 2024 6:57 PM

To: Mostowfi, Hamid <HMostowfi@berkeleyca.gov>; Nevels, Ronald <RNevels@berkeleyca.gov>; Amiri, Wahid <WAmiri@berkeleyca.gov>

Subject: North Berkeley BART Plans

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

Dear Transportation and Infrastructure Commission,

I've read about the plans for the BART station improvement and I'm very happy this is happening.

I can't attend the meeting on June 20th since I will be traveling, however I would like to voice my support for Option A of the plan, which provides more space for bikers and pedestrians, while removing parking space.

Option A will contribute to a more enjoyable and safe experience at North Berkeley BART which is very important considering the plans to make the area child-friendly.

Thank you,
Roan

From: Benjamin Fry
Sent: Thursday, June 13, 2024 6:21 PM
To: Amiri, Wahid <WAmiri@berkeleyca.gov>
Cc: rfactor@bart.gov <rfactor@bart.gov>
Subject: Options for Virginia next to North Berkeley BART

WARNING: This is not a City of Berkeley email. Do not click links or attachments unless you trust the sender and know the content is safe.

Dear Transportation and Infrastructure Commission,

I recently was reviewing the options offered from BART in regard to the road infrastructure to support multi-modal options on Virginia next to the North Berkeley BART station. I'd like to suggest a third option, one to make Virginia oneway Westbound from Sacramento to Acton for cars. There are a few points that I would like to offer for consideration based on my personal experience primarily riding a bike to access BART and other areas off Virginia.

1) Virginia is a primary route used for bicycles, generally outnumbering cars. These are both people riding to BART and also using Virginia to traverse the area. Many of these are parents with children on cargo bikes, which are generally wider than standard bikes.

2) After the BART access road was made oneway, there have been rarely (in my experience) any cars traveling Eastbound on this section of Virginia. In most cases there are only bikes and pedestrians waiting for the light to cross Sacramento and no cars.

3) Car traffic on this street is very light, as it is not a through street past Acton for car traffic.

Based on these observations, it seems imprudent to consider any option that will constrain bicycles, which would lead to congestion among different bike riders, some children, some on e-bikes, etc. This suggests that Option B is a poor choice. The residents of the street may be concerned with a loss of parking of Option A. Between Option A and B, A is the clear choice to accommodate the traffic conditions on the street. Offering a third option, one with car traffic restricted to oneway Westbound, a single car lane, would allow all existing on-street parking to be maintained. The cycle track and pedestrian paths would be as wide as needed to accommodate current and future traffic expectations, wider than in Option A. Any concerns about delivery vehicles would be easier to manage by removing the car traffic lane traveling Eastbound. This seems like it would be a win for the current residents on the street by maintaining their on-street parking, and a win for the safety of bicyclists and pedestrians as it wouldn't restrict their movement and safety through the area, all of this without impact traffic on the street.

This is in regard to this design:

<https://cityofberkeley.app.box.com/s/csnouo7qnkqhakebc8llscbu1e5r9fpj>

Thank you for your consideration,
Benjamin Fry, Berkeley, D5

From: Katie Miller

Sent: Thursday, June 13, 2024 3:00 PM

To: Rachel Factor <RFactor@bart.gov>

Subject: Comment: N. Berkeley BART - Virginia Street bicycle lanes

Good afternoon,

I'm writing to comment on the proposed bicycle lanes on Virginia Street near N. Berkeley BART. I'm unable to attend the 6/20 meeting, so I'm submitting my comments below.

I've lived near the intersection of Virginia/Acton (on Virginia, between Acton and West Street) for nearly four years. I also frequently ride my bike, most often down Virginia Street to the Amtrak station to commute to work. I ask that BART either adopt Option B (Alternative) or leave the street as-is.

As a cyclist, I am all too familiar with the safety concerns to bike riders across Berkeley. There are a lot of dangerous intersections. However, I would not count the Virginia/Acton intersection to Sacramento as one of them. The road barriers at Virginia/Acton have done a great job at calming traffic, and I feel very safe traveling from that intersection up Virginia to Sacramento.

On the other hand, I also utilize the street parking on Virginia. Based on the map provided, it appears that parking in front of my residence would be eliminated. I do not want to see this parking eliminated - I share my house with other renters, and between all of us, there are three cars. While we can fit 1-2 on the driveway, we can't fit them all. I also want to make sure that visitors can find parking. Considering that there will likely be more cars in the area when the BART housing is built (which I support), I would like to see this parking area maintained as-is.

Given all of the above, I would support Option B (Alternative) if BART wants to maintain continuity for the bike lane up Virginia Street or would otherwise ask that BART leave the street as-is.

Please let me know if I can provide additional information.

Best,

Katie Miller



Friends of Five Creeks

*Volunteers preserving and restoring watersheds of
North Berkeley, Albany, Kensington, south El Cerrito and Richmond since 1996
1236 Oxford St., Berkeley, CA 94709
510 848 9358 f5creeks@gmail.com www.fivecreeks.org*

May 30, 2024

Srinivas Muktevi, Supervising Civil Engineer, City of Berkeley
Ray Yep, City of Berkeley Transportation and Infrastructure Commission
Berkeley City Clerk
By email, for distribution to Commissioners and Wood Rogers Consultants

Dear Srinivas and Ray:

Friends of Five Creeks, a 27-year-old, all-volunteer group working for creeks and watersheds, has a longstanding interest in urban runoff as it affects pollution, habitat, and the built environment. Almost a generation ago, we partnered with Balance Hydrologics installing their first gauge on Codornices Creek, represented "Friends of" citizen groups on a Regional Board committee when hydromodification was introduced into NPDES permits, and created the bluegreenbldg.org web site documenting the first years of green infrastructure in Alameda and Contra Costa Counties.

Recently and in Berkeley, we have pressed for reducing flow of polluted stormwater into Codornices Creek, our area's only trout stream; urged maintenance of badly neglected green infrastructure; and [supported approval of this new, broadened stormwater plan](#). Aquatic Park Friends, Susan Schwartz developed the AquaticPark.org website, which among other things [explains and illustrates complexities of circulation and exchange in the park's three lagoons](#) and makes available [40 years of more or less fruitless reports on problems in the lagoons](#).

We are delighted with the broad range of elements and data-supported approaches in in "Proposal for Storm Water Master Plan, Specification No. 22- -11505-C." We are particularly pleased to see planning for maintenance and replacement (p. 12 and elsewhere), as well as development of a unified geodatabase (pp. 8-9) with greatly improved and updated detail on many elements of both built infrastructure and related conditions (pp. 10-12), making possible the prioritized modeling, planning, and action envisioned in Tasks 5 and 6.

We are also delighted with plans to incorporate sea-level rise, and to accurately map and consider the complex roles of open channels and flood plains. We are happy that the plan encourages exploring opportunities for regional facilities. Besides Aquatic Park's lagoons, these might include working with East Bay Regional Park District to lessen West Berkeley flooding and treat runoff from Schoolhouse Creek, or treating Codornices and Village Creek runoff in part of the soon-unused Golden Gate Fields property in Albany.

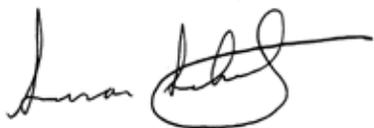
Friends of Five Creeks is a partner project of 501(c)3 Berkeley Partners for Parks

We have the following questions and concerns:

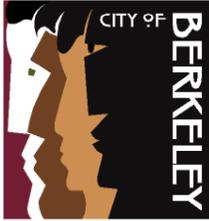
1. When will the promised “kickoff meeting” with city and stakeholders (p. 5) be held?
2. How may stakeholders contribute data and suggestions to “refine the project’s scope of work and budget,” including the three optional elements: tree canopy, bathymetry for Aquatic Park, and detailed planning for Aquatic Park? As an example of possible refinement: The plan contemplates bathymetry in the Aquatic Park lagoon (singular), and shows no recognition that there are three lagoons. Bathymetry probably is most needed in the middle Model Yacht Basin lagoon, which appears to be shallowing rapidly as it receives sediment and storm runoff from more than a third Berkeley. This lagoon’s becoming a wetland might benefit habitat, but loss of its capacity could significantly affect flooding in West Berkeley.
3. Will stakeholders or members of the public be able to attend “bimonthly status meetings”? How may monthly progress reports be accessed in a timely manner? If these avenues are not available, how may stakeholders or members of the public track progress or have input?
4. With regard to climate change: We are concerned that there is no mention of rising groundwater levels, which [recent studies suggest may be early and serious effects of sea-level rise](#) in the low-lying East Bay plain from San Leandro well into Richmond. Rising groundwater will increase flooding, decrease infiltration, and affect built infrastructure. Its effects are not lessened by flood or retaining walls, green infrastructure, and similar measures. We are also somewhat puzzled by the treatment if the rising probability of larger storms: It is not considered in the design storm, but is considered in modeling, with the apparent result that it is not considered in Task 5.9, Capacity deficiencies, but is considered in Task 6, critically needed capital improvements.
5. We are delighted that vegetation management for flood control is to be considered, but mindful that on open stream channels, there are overlapping concerns about fire hazard, erosion, slides, habitat, and aesthetics. Permits are complex and other jurisdictions are often involved. A striking example may be the deep Cerrito Creek canyon on the Berkeley-Kensington border. There are others. Cooperation, or at least recognition of complexities, is advisable.

Thanks for distribute these queries and comments to consultants and commissioners, as well as other staff members who may be interested.

Sincerely,

A handwritten signature in black ink, appearing to read "Susan Schwartz", with a stylized flourish at the end.

Susan Schwartz, President, Friends of Five Creeks



Office of the City Manager

May 31, 2024

To: Commission Secretaries

From: Dee Williams-Ridley, City Manager 
C1783A8ACD2246A...

Subject: 2024 Update to the Local Hazard Mitigation Plan;
Public Comment Process

The First Draft of the City's 2024 Local Hazard Mitigation Plan (LHMP) update has been released on the City's website (www.BerkeleyCA.gov/Mitigation). The document's Executive Summary and Actions are attached to this letter.

As a Commission Secretary, please:

- Include the attached material as an Information Item in your next Commission meeting packet
- If your Commission wishes to provide feedback on the plan, please send comments to mitigation@berkeleyca.gov by July 31.

Plan Content

The LHMP identifies natural hazards in Berkeley and outlines a five-year strategy to further protect Berkeley's people, buildings, infrastructure, and environment from those hazards. The City began updating the LHMP in early 2023. This update effort will allow Berkeley to apply for federal mitigation grant programs and State funding, and is anticipated to be complete at the end of 2024.

The content of the LHMP is dictated by State and federal requirements and focuses on City actions to reduce risks. In an effort to make the LHMP more relevant and accessible to community members, staff created a new section called "Berkeley Household Risk Reduction" to offer clear steps people can take to mitigate risks in their own households. Staff also wants to acknowledge all the work community members do to contribute to collective risk reduction in Berkeley by taking these actions.

Commission Review

All City Commissions are welcome to review the First Draft Plan. Commissions interested in providing feedback must submit it to mitigation@berkeleyca.gov by July

Page 2

May 31, 2024

Re: 2024 Update to the Local Hazard Mitigation Plan; Public Comment Process

31, 2024. Staff will review the feedback and incorporate appropriate edits into the Final Draft Plan.

Staff will present on the First Draft Plan at the Planning Commission's June 5 meeting and the Disaster and Fire Safety Commission's June 26 meeting.

Community Review

The First Draft Plan has been posted for review and comment on the City website (www.BerkeleyCA.gov/Mitigation). Staff recognize that it is difficult to engage with long documents, such as the LHMP. In an effort to support community review of the materials, the website also has detailed videos about each hazard included in the LHMP. The videos describe each hazard, its impacts, actions the City is taking to reduce risk, and recommend actions that community members can take to reduce risk in their own lives.

Members of the public are invited to provide written feedback on the document until July 31, 2024.

Written feedback can be submitted:

- a) Via email to mitigation@berkeleyca.gov
- b) Via postal mail to:
Fire Department – Office of Emergency Services
Attn: Mitigation Plan
2100 Martin Luther King, Jr. Way, 2nd Floor
Berkeley, CA 94704
- c) In-person during business hours to the Fire Department – Office of Emergency Services at the address above.
- d) In-person at Public Review Workshops:
 - a. Monday, June 3, 5:30 pm to 7:30 pm at the Central Library, in The Commons
 - b. Saturday, July 20, 10 am to 12pm at the Tarea Hall Pittman South Branch Library

Following the public review process for the First Draft Plan, staff will review community member feedback and will incorporate appropriate edits into the Final Draft Plan. Staff will concurrently develop an outline of edits made based on Commission and community feedback.

The Final Draft Plan will undergo review first by the State of California Office of Emergency Services, and then the Federal Emergency Management Agency (FEMA). Staff will make changes to the plan as required by these State and federal bodies.

Adoption

In winter 2024 (est.), staff will post the Final Draft Plan, including any State and federal edits, to the City website. At that time, staff will present the Final Draft Plan to the

Page 3

May 31, 2024

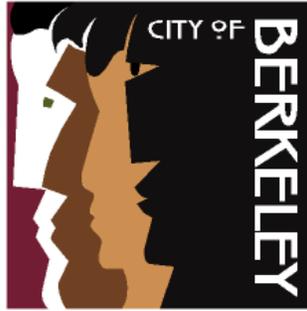
Re: 2024 Update to the Local Hazard Mitigation Plan; Public Comment Process

Disaster and Fire Safety Commission and the Planning Commission, requesting their recommendations to the Council on the plan. The Planning Commission meeting will also serve as the First Public Hearing for the plan. Staff anticipates bringing the Final Draft Plan to the City Council for review and adoption in December 2024.

Commission Secretaries will serve as their Commissions' point of contact for this project. Please contact Jamie Albrecht, Emergency Services Coordinator (<mailto:jalbrecht@berkeleyca.gov>x5514), with questions.

Attachment: 2024 Local Hazard Mitigation Plan: First Draft Executive Summary and Actions

cc: David Sprague, Fire Chief
LaTanya Bellow, Deputy City Manager
Anne Cardwell, Deputy City Manager
Jenny Wong, City Auditor
Farimah Brown, City Attorney
Mark Numainville, City Clerk
Matthai Chakko, Assistant to the City Manager



City of Berkeley

2024

Local Hazard Mitigation Plan

DRAFT

May 24, 2024

Executive Summary

Berkeley is a vibrant and unique community. But every aspect of the city – its economic prosperity, social and cultural diversity, and historic character – could be dramatically altered by a disaster. While we cannot prevent natural hazards, we can anticipate their many impacts and take steps to reduce those harms to our infrastructure, environment, and community. We can make sure that the Berkeley that emerges after a disaster continues to reflect our current values.

The federal Disaster Mitigation Act of 2000 (DMA 2000) calls for all communities to prepare mitigation plans every five years. City government and community members have been working together for years to address certain aspects of disaster risk – such as strengthening structures and managing vegetation to reduce fire risk. The 2004 Disaster Mitigation Plan formalized this process for the first time, ensuring that these activities continued to be explored and improved over time. The 2014 and 2019 Local Hazard Mitigation Plans continued this ongoing process to evaluate the risks that different hazards pose to Berkeley, and to engage the community in dialogue to identify the most important steps that the City, its partners, and residents should pursue to reduce these risks. Over many years, this constant focus on disasters has made the Berkeley community much safer.

The City adopted a plan that met the requirements of DMA 2000 on June 22, 2004, and an update in December 2014 and 2019. This is the first draft of the 2024 update to that plan, called the 2024 Local Hazard Mitigation Plan (2024 LHMP).

Plan Purpose

The 2024 LHMP serves four functions:

1. The 2024 LHMP documents our current understanding of the hazards present in Berkeley, along with our vulnerabilities to each hazard – the ways that the hazard could impact our buildings, infrastructure, community, and environment.
2. The document presents Berkeley City government’s Mitigation Strategy for the coming five years. The Mitigation Strategy reflects a wide variety of both funded and unfunded actions, each of which could reduce the Berkeley’s hazard vulnerabilities.
3. In addition to presenting a City-level mitigation strategy, the document outlines Actions that Berkeley community members can and do take at the household level to reduce their own vulnerabilities to hazards in Berkeley. While these household-level actions are not a requirement of the DMA 2000, including these details makes the plan’s risk assessment more immediately relevant to community members, also acknowledging the work they do to reduce our collective risk.
4. By fulfilling requirements of the DMA 2000, the 2024 LHMP ensures that Berkeley will remain eligible to apply for mitigation grant funding before disasters, and to receive federal mitigation funding and additional State recovery funding after disasters.

Plan Organization

The 2024 LHMP has been structured to specifically address DMA 2000 requirements as well as recent updates to these requirements from the Federal Emergency Management Agency. The 2024 LHMP is organized as follows:

Element A: Planning Process

This section of the 2024 LHMP describes the process used to develop the document, including how partners, stakeholders, and the community were engaged. It also addresses the City's approach to monitoring the 2024 LHMP over the five-year planning cycle.

Element B: Risk Assessment

This section of the 2024 LHMP outlines the different hazards present in Berkeley. Analysis of each hazard includes a description, the locations in Berkeley with exposure to the hazard, previous occurrences, probability of the hazard occurring in the future, Berkeley's vulnerabilities, and the potential impacts. This section also now includes actions that individual community members and households can take to reduce their risks.

Element C: Mitigation Strategy

The Mitigation Strategy section first documents the authorities, policies, programs, and resources that the City brings to bear in implementing mitigation actions. Second, this section outlines a comprehensive range of specific mitigation actions and projects designed to reduce Berkeley's hazard vulnerabilities. This section also describes how the 2024 LHMP is integrated with other City plans.

Element D: Plan Maintenance

This section describes how public participation in the plan maintenance process will continue as well as the methods and schedule for keeping the plan current. It also provides a detailed description of how the 2024 LHMP will be integrated into other planning mechanisms.

Element E: Plan Update

This section describes how changes in development and priorities have influenced updates to the 2024 LHMP. It also provides a detailed description of Berkeley's progress on the Mitigation Strategy adopted in the 2019 LHMP.

Element F: Plan Adoption

This section will be used to document formal adoption of the Final Draft 2024 LHMP by the Berkeley City Council.

Element G: Community Education

This section is new in the 2024 LHMP and is not a FEMA requirement. It includes information on what the City has done to make the risk assessment and mitigation strategy more applicable and accessible to community members. This section includes links to educational resources.

In the pages that follow, this Executive Summary describes highlights from Element B: *Risk Assessment* and Element C: *Mitigation Strategy*, as well as key updates that were made to the section since the 2019 version.

Element B: Risk Assessment

Berkeley is exposed to a number of hazards that vary in their intensity and potential impacts. This mitigation plan addresses the following hazards: earthquake, wildland-urban interface (WUI) fire, extreme heat, poor air quality, high wind, rainfall-triggered landslide, tsunami, flood, sea level rise, utility interruption, hazardous materials release, and infectious disease. Each of these hazards can occur independently or in combination, and can also trigger secondary hazards.

Climate change was included as a separate hazard of concern in the previous versions of this plan. However, in this update, climate change has been integrated throughout the plan and into every hazard of concern. Climate change will continue to increase the likelihood and the severity of the hazards outlined in this place.

Table 1. Summary of Hazard Analysis

Hazard	Likelihood	Severity of Impact
Earthquake	Likely	Catastrophic
Wildland-Urban Interface Fire	Likely	Catastrophic
Extreme Heat	Likely	Moderate to Catastrophic
Poor Air Quality	Likely	Minor
High Wind	Likely	Minor
Rainfall-Triggered Landslide	Likely	Minor to Catastrophic
Tsunami	Possible	Minor to Catastrophic
Floods	Likely	Minor
Sea Level Rise	Likely	Minor to Major
Utility Interruption	Likely	Minor to Major
Hazardous Materials Release	Likely	Minor to Catastrophic
Infectious Disease	Likely	Minor to Catastrophic

Earthquake

The United States Geological Survey states that there is a 72% probability of one or more M 6.7 or greater earthquakes from 2014 to 2043 in the San Francisco Bay Region. There is a 33% chance that a 6.7 or greater will occur on the Hayward fault system between 2014 and 2043.¹ This means that many Berkeley residents are likely to experience a severe earthquake in their lifetime.

A catastrophic earthquake on the Hayward Fault would cause severe and violent shaking and three types of ground failure in Berkeley. Surface fault rupture could occur in the Berkeley hills along the fault, damaging infrastructure and utilities that cross the fault. Landslides are expected in the Berkeley hills during the next major earthquake, particularly if the earthquake occurs during the rainy winter months. Landslide movement could range from a few inches to tens of feet. Ground surface displacements as small as a few inches are enough to break typical foundations. Liquefaction is very likely in the westernmost parts of the city and could occur in much of the Berkeley flats. Liquefaction can destroy pavement, dislodge foundations, and damage underground and aboveground infrastructure.

Shaking and ground failure are likely to create impacts that ignite post-earthquake fires. Firefighting efforts will be simultaneously challenged due to broken water mains and damage to electrical, transportation, and communication infrastructure.

In a 6.9 magnitude earthquake on the Hayward Fault, the City estimates that over 600 buildings in Berkeley will be completely destroyed and over 20,000 more will be damaged. One thousand to 4,000 families may need temporary shelter. Depending on the disaster scenario, one hundred people could be killed in Berkeley alone, and many more would be injured. Commercial buildings, utilities, and public roads will be disabled or destroyed. This plan estimates that building damage in Berkeley alone could exceed \$2 billion, out of a multi-billion-dollar regional loss, with losses to business activities and infrastructure adding to this figure.

Low-income housing units are expected to be damaged at a higher rate than other residences. Other types of housing, such as condominiums, may replace them when land owners rebuild. This could lead to profound demographic shifts in Berkeley.

Wildland-Urban Interface Fire

Fire has always been a natural part of the California and East Bay wildland ecosystem. Fire has historically been a way to maintain forest health, to control invasive species, and to provide a rich habitat for wildlife. In Berkeley, densely-built homes and vegetation have been introduced to hillside areas that otherwise required burning to maintain ecological balance. For many years people have tried to prevent fire in forests and developed areas, disrupting this balance. As a result, catastrophic fires are now occurring throughout the Bay Area and the world.

There are two primary types of wildfire: “wildland” fire and “wildland-urban interface” (WUI) fire. WUI fires, the primary concern in Berkeley, occur where the natural landscape and urban-built environment meet or intermix. It is especially difficult to control a fire in the wildland-urban interface, where homes and other infrastructure are close to and within wildland areas.

Increased structure density exacerbates wildland-urban interface fire risk. The rate of structure-to-structure ignitions increases when there are more structures per acre. More than two structures per acre is considered high density in the WUI; most areas of the Berkeley hills have at least 2 structures per acre.² Areas of the north Berkeley hills and around Panoramic Hill more than four structures per acre. The density of Berkeley's hills areas will be a critical factor in fire spread.

Minimal separation between structures also increase fire risk. Structures that are less than 25 feet apart are at extreme risk of directly spreading fire to one another, in a process called "structure-to-structure ignition." Fires in denser areas will have high rates of structure-to-structure ignition and high risk of losses. In Berkeley many structures are less than 25 feet apart, which places the community in the highest risk category.

Berkeley is vulnerable to a wind-driven fire starting along the city's eastern border. The fire risk facing the people and properties in the eastern hills is compounded by the area's mountainous topography, minimal access and egress routes, and location, overlaid upon the Hayward Fault. Berkeley's flatlands are also exposed to a fire that spreads west from the hills.

The extent and intensity of a WUI fire is closely tied to weather conditions and fuel moisture. Fires that ignite under periodic conditions of "Red Flag Warning" or "Extreme Fire Weather" may result in uncontrollable firestorms. During Extreme Fire Weather, when a fire builds to this magnitude and travels with such extreme speed and force, firefighters' primary focus often shifts from firefighting to supporting evacuations. This is because during this type of weather, some normally-available firefighting tools can be ineffective or even unusable – like planes and helicopters, which need to be grounded during high winds.

The Berkeley Hills have narrow, windy roads that make evacuation difficult, which is why the Berkeley Fire Department recommends that people leave the hills during Extreme Fire Weather. While the ignition risk is highest in the Berkeley Hills, a wind-driven fire under Extreme Fire Weather can blow through the Berkeley flats, all the way to the Bay.

Extreme Heat

In Berkeley, an extreme heat day is a day above 88.3 degrees Fahrenheit (F). Climate models from the Cal-Adapt tool³ from the California Energy Commission predict the average number of extreme heat days (above 88.3 degrees F) in Berkeley to continually increase by the end of the century. The specific number of extreme heat days expected in Berkeley depends on the level of greenhouse gases (GHGs) emitted from human activities into the atmosphere.

Extreme heat is a major public health concern with most impacts being on human health, especially on marginalized populations. Public health impacts associated with extreme heat events include premature death, cardiovascular stress and failure, and heat-related illnesses such as heat stroke, heat exhaustion, and kidney stones.⁴ Studies have also found links between rising temperatures and a range of mental health issues including mental fatigue, aggression, and even higher rates of suicide.⁵

Berkeley has regularly experienced extreme heat events since 2017, which have included impacts such as heat-related deaths, power outages, and poor air quality.

Poor Air Quality

Poor air quality is a growing concern in Berkeley and in California. According to the California Air Resources Board, 90% of Californians breathe unhealthy levels of outdoor air during some parts of the year. Poor air quality can irritate the eyes, nose, and throat, cause shortness of breath, aggravate asthma and other respiratory conditions, and affect the heart and cardiovascular system.

Poor air quality can last for a few hours or a few weeks, depending on its source. It can also be a chronic issue, for example in places near industry or highways. Southerland et al., published a study in 2021⁶ on the harmful impacts of pollution in the Bay Area. According to these estimates, more than 2,500 people die and 5,200 children develop asthma every year due to traffic-related air pollution exposure in the Bay Area.

Everyone in Berkeley can be impacted by poor air quality – some neighborhoods experience moderate or unhealthy air quality on a regular basis due to proximity to various sources of pollutants like highways and industry, and there have also been several extreme examples of poor air quality that impacted the entire City due to nearby wildfires. The air quality can also change quickly due to weather conditions, such as rain or wind.

High Wind

The National Weather Service (NWS) defines “high winds” as: sustained wind speeds of 40 miles per hour (mph) or greater lasting for one hour or longer, or wind gusts of 58 mph or greater for any duration.

In Berkeley, high wind events are typically associated with the seasons. In the winter, high winds come with weather systems and cold fronts, generally between November through March. In the summer, temperature and pressure differences between the Pacific Ocean and the interior valleys to Berkeley’s east create stronger afternoon and evening winds coming from the west.

Primarily in the fall, dry offshore foehn winds, known as the “Diablo Winds,” occur. Diablo Winds are associated with fire weather. Using data collected by observational instruments placed at the Lawrence Berkeley National Lab, we identified several days with sustained winds exceeding 25 miles per hour in Berkeley.

As temperatures increase worldwide due to climate change, changes in rising sea levels, humidity, and storminess are unavoidable as the physical processes are all interlinked. Given the prevalence of previous high-wind events, it is expected that each year will bring more.

High winds are dangerous to people, structures, and systems.

Rainfall-Triggered Landslide

Berkeley has a number of deep-seated landslides in the hills that continuously move, with the rate of movement affected by rainfall and groundwater conditions. Significant localized areas of the Berkeley hills face risk from landslide, and a major slide could endanger lives and impact scores of properties, utilities and infrastructure.

Tsunami

Tsunamis, though rare inside the San Francisco Bay, can occur from large offshore subduction style earthquakes around the Pacific Rim. Small, local tsunamis can also result from offshore strike-slip faults such as parts of the San Andreas Fault of the Peninsula and the Hayward Fault through San Pablo Bay. The March 2011 Japan earthquake generated a devastating tsunami, which reached the Bay Area and caused minor damage to docks and floats in the Berkeley Marina. A larger tsunami could impact much more of Berkeley's western shores. Berkeley's maritime community, which would be greatly impacted, includes low income individuals and households. Buildings, infrastructure, and roadways could be damaged, and debris and hazardous materials could cause post-tsunami fires. Deaths are possible if individuals choose not to evacuate hazardous areas, do not understand tsunami warnings, or are unable to evacuate.

Floods

In Berkeley, three types of flooding typically occur: coastal flooding, creek flooding, and storm drain overflow. Creek flooding in Berkeley has the potential to affect an estimated 675 structures, mainly in the western, industrial area of the city. It is unlikely that floodwaters will reach higher than three feet, but damages to homes, businesses, and their contents could total over \$201 million. Storm drain overflow creates localized flooding in many known intersections in Berkeley. With few properties covered by flood insurance, these costs would be borne primarily by Berkeley residents and businesses.

Sea Level Rise

Warmer temperatures associated with climate change are causing global sea levels to rise. Recent scientific studies have begun to evaluate the impact of the shallow groundwater rising in low-lying coastal areas (like Berkeley) combined with sea level rise. According to the San Francisco Estuary Institute and the Pathways Climate Institute⁷, as sea levels rise in San Francisco Bay, shallow groundwater underneath low-lying coastal communities will also rise. Sea level rise and rising groundwater can damage buildings, transportation infrastructure, sewer and water systems, natural resources and ecosystems. Sea level rise will have disproportionate impacts on disadvantaged communities in Berkeley. The areas most likely to experience flooding with increased sea level rise are in West Berkeley, which has a higher percentage of communities of color and low-income communities.

Utility Interruption

Utility interruption is any loss of a public service including electrical service, telecommunications, wastewater and potable water, and natural gas.

Berkeley residents, visitors, businesses, institutions, and other partners rely on utilities for day-to-day life. Loss of utilities for prolonged period is particularly devastating for people with disabilities, people with access and functional needs, and people with low incomes that may not be able to purchase supplies and or relocate.

Utility interruption can be planned and include a warning, such as with PG&E Public Safety Power Shutoffs that proactively turn off electricity to mitigate wildfire risk, or come a secondary impact of the other natural hazards included in this plan. Utility interruption can also occur without a preceding natural hazard, for example maintenance and repair or accidental damage. The extent and severity of utility interruption depends on many factors, including cause, location, duration, and time of year. The probability of utility interruption is high, given the number of systems, aging infrastructure, and the variety of possible natural hazards.

Hazardous Materials Release

The City has identified fifteen facilities in Berkeley with sufficiently large quantities of toxic chemicals to pose a high risk to the community. Hazardous materials also travel through Berkeley by truck and rail. Natural hazards identified in the plan could trigger the release of hazardous materials. Over the last 25 years, Berkeley has seen a more than 90 percent reduction in the number of facilities with extremely hazardous materials. The City carefully tracks hazardous materials within its borders, and works closely with companies using large amounts of potentially dangerous materials.

Infectious Disease

Infectious diseases are illnesses caused by germs, such as bacteria, viruses, and fungi. They enter the body, multiply and cause an infection. Some infectious diseases are contagious, meaning they can spread from one person to another. The State of California has a list of over 95 communicable diseases that must be reported by healthcare providers or laboratories to local public health officials. All people in Berkeley are susceptible to infectious diseases. The populations at the highest risk for infectious diseases are the very young, the elderly, or individuals who are immunocompromised. Additionally, higher-poverty neighborhoods of color are at greater risk due to the effects of health and social inequalities.

Infectious diseases vary in their impact and severity. Recent outbreaks since 2019 include the COVID-19 pandemic and clusters of monkeypox virus. In most infectious disease outbreaks, the impact is limited, with the majority of illnesses treatable and the likelihood of fatalities low. Large-scale outbreaks like COVID-19 kill millions of people, completely alter daily life and social activities, threaten businesses and the global economy, and strain existing health care facilities.

Access and Functional Needs

This plan recognizes that many individuals that are still disproportionately vulnerable during disasters. People with access and functional needs are defined as community members who may have additional needs before, during and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care. Individuals in need of additional response assistance may include those who have disabilities, live in institutionalized settings, are elderly, are children, are from diverse cultures, have limited English proficiency, or are non-English speaking, or are transportation disadvantaged. An individual with a disability is defined by the ADA as a person who had a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment. The ADA does not specifically name all of the impairments that are covered.

Underserved Communities and Marginalized Populations

Disasters also disproportionately impact underserved communities and marginalized populations. For example, people of color and people with low incomes have been historically denied access to housing and resources, increasing their vulnerability to these shocks. The Mitigation Strategy in the 2024 LHMP identifies if or how each Action benefits underserved communities and socially vulnerable populations. The strategy prioritizes those actions that provide benefits to underserved communities and marginalized populations. Further, the 2024 LHMP includes a list of mitigation actions for individuals and households that are designed to be approachable and accessible to people in varying circumstances and with varying resources to draw from.

Summary of Changes to the Risk Assessment

The 2024 LHMP contains numerous updates to facts, figures, and descriptions. The City has incorporated the newest-available hazard data and incorporated new hazards into the Plan. The City and its partners have provided additional descriptions, details, and definitions to explain the science of these hazards and their potential impacts.

Within the previous events section for each hazard, the City has added information about any instances of the hazard affecting Berkeley since 2019. Throughout the plan, the City has updated financial loss estimates for inflation.

In some hazard sections, Risk and Loss Estimates include analysis from the Government Finance Officers Association (GFOA). GFOA is a nonprofit association of more than 23,000 state and local government finance professionals and elected officials from across North America. The City of Berkeley has been assessing the potential impacts of extreme events, like natural disasters, on the City government's financial condition, particularly its reserve levels for the General Fund. The City engaged the GFOA to produce a recommendation to help it decide the appropriate reserve level for the general fund, given the risks from extreme events. A key part of GFOA's mission is to promote best practices in public finance, including reserve policies. The analysis by GFOA also shed light on the potential broader economic losses to the community from the risks posed by extreme events.

Hazards Described in the 2024 Plan

For the first time, the plan identifies poor air quality, high wind, sea level rise, utility interruption, and infectious disease as hazards of concern. Significant changes and updates to the analysis of each hazard are described below:

Earthquake (Section B.2)

- The Earthquake section has been pared down to improve readability.
- The descriptions of vulnerable building types have been updated and now include photos.
- The map of potentially vulnerable buildings in Berkeley has been updated.

Wildland-Urban Interface Fire (Section B.3)

- This section has been updated to include the following:
 - Information about the Berkeley Overnight Camps and their fire risk.
 - Information about the 2017 Grizzly Fire.
 - A detailed description of fire weather, outlining Red Flag and Extreme Fire Weather days.
 - New data and narrative about wildfire risk in Berkeley from the National Institutes of Standards and Technology and East Bay Regional Parks.
- This section has been updated to include the following new maps that better contextualize the wildfire risk in Berkeley:
 - Fire Hazard Severity Zones in State Responsibility Area from Cal Fire
 - City of Berkeley Fire Zones 1, 2, and 3
 - Wildfire Hazard Map for Fire Prevention Planning which classifies the hazard from lowest to highest
 - Density of Structures in Berkeley Fire Zones 2 and 3
 - Wildfire Risk to Structures Map which combines the hazard classification with structure density to show the areas of higher wildfire risk to structures
 - Distance Between Structures in Berkeley Fire Zones 2 and 3
 - An updated map of the 1923 fire boundary

Extreme Heat Events (Section B.4)

- This section has been updated to include the following:
 - Information and a map showing thermal belting, the phenomenon where the Berkeley hills has higher temperatures than the rest of the city.
 - Graphics about forecasting heat risk.
 - Extreme heat events since 2019 in Berkeley.
 - Data and a map of excess emergency rooms visits on extreme heat days by zip code have been included demonstrating higher rates for people in central, south, and west Berkeley.
 - A map of cooling center locations in Berkeley.
 - New data for potential impacts and losses from a study of the 2006 heat wave in California showing the excess statewide healthcare costs and premature deaths.

Poor Air Quality (Section B.5)

- Poor air quality events are a newly-introduced hazard of concern for the 2024 LHMP.
- The poor air quality section describes the factors that contribute to poor air quality, how it is measured, and how it can concentrate in the Berkeley hills due to marine layer inversion. It also describes the chronic poor air quality issues from industry and transportation infrastructure in west and south Berkeley.

High Wind (Section B.6)

- High wind events are a newly introduced hazards of concern for the 2024 LHMP.
- The high wind section describes what constitutes high wind and the seasonality of wind events in Berkeley. High wind events are very closely connected to fire weather. However, high wind in any season can damage trees, infrastructure, and utilities.

Rainfall-Triggered Landslide (Section B.7)

- This section has been updated to include the following:
 - Landslide occurrences in Berkeley since 2019.
 - New maps of Berkeley using data from the California Landslide Inventory and Landslide Susceptibility Classes from the California Department of Conservation.

Tsunami (Section B.8)

- This section has been updated to include the following:
 - A new map of the Tsunami Inundation Zone, which was updated to reflect new science and feedback from local jurisdictions.
 - Updated maps of the Berkeley Tsunami Evacuation Phases from the Tsunami Evacuation Playbooks. These Playbooks, developed by the California Geological Survey, California Governor's Office of Emergency Services, and the National Ocean and Atmospheric Administration (NOAA), reflect more refined and detailed planning, in which forecasted tsunami amplitudes, storm surge, and tidal information can help guide which areas might be inundated in different scenarios, depending on the extent of the event. This analysis uses helps NOAA to better predict inundation areas during actual tsunami events. Local emergency managers can use this information to better target evacuation areas during actual tsunami events.
 - Information about the 2023 tsunami advisory for Berkeley as a result of the underwater volcano eruption near Tonga.
 - New data and maps that show the probability of a tsunami occurring in Berkeley, expressed in 100-year, 200-year, 475-year, and 975-year return periods.
 - New data about the people and structures that might be impacted by a tsunami in Berkeley.

Sea Level Rise (Section B.9)

- Sea level rise is a newly introduced hazard of concern for the 2024 LHMP. It was listed in the 2019 LHMP as a related impact of climate change in that section, but did not have its own section.
- The section provides analysis of amounts of sea level rise anticipated under different projected carbon emissions scenarios, as well as maps of expected levels of inundation

from 2-ft, 4-ft, and 5.5-ft sea level rise scenarios using the Adapting to Rising Tides Bay Shoreline Flood Explorer.

- New studies about shallow groundwater rising and related maps are included.

Floods (Section B.10)

- This section has been updated to include the following:
 - Newly-revised flood exposure map for Berkeley using data from the FEMA National Flood Insurance Program.
 - A map of Community Calls for Service to report storm drain back up during the January 2023 winter storms.
 - Information about the most recent flooding in December 2022 and January 2023, which resulted in a Federal Major Disaster Declaration for Alameda County.

Utility Interruption (Section B.11)

- Utility interruption is a newly introduced hazard of concern for the 2024 LHMP. It was listed as secondary impact of several of the other hazards of concern in the 2019 LHMP. However, utility interruption can occur without a preceding hazard and can cause severe impacts, resulting in it receiving its own section in the 2024 update.
- This section describes the utility systems, who manages them, and what the impacts of interruptions (planned or not) can have on people and infrastructure.

Hazardous Materials Release (Section B.12)

- The Hazardous Materials Release section contains updated figures on the number of sites with hazardous materials in Berkeley.

Infectious Disease (Section B.13)

- Infectious disease is a newly introduced hazard of concern for the 2024 LHMP.
- This section describes infectious diseases, recent occurrences of outbreaks like the COVID-19 pandemic, and the potential impacts on people, daily life, and healthcare infrastructure.

Element C: Mitigation Strategy

Through many years of diligent effort by City government and the community, Berkeley has developed many innovative initiatives to increase our disaster resilience. The authorities, policies, programs and resources that Berkeley will use to support execution of the 2024 LHMP Mitigation strategy include:

- The City has strengthened its ability to serve the community during and after disasters by seismically upgrading or replacing buildings that house critical City functions. In 2022, work was completed on the North Berkeley Senior Center. In 2021, work was completed on the Live Oak Community Center.
- The City has worked diligently to enhance public safety and reduce physical threats from earthquakes by requiring owners of soft story and unreinforced masonry buildings to retrofit their structures.
 - Berkeley was the first city in the nation to inventory the community’s soft-story buildings. As of July 2023, 277 buildings have completed their retrofit, 26 still need to be retrofitted, and 61 buildings were removed from the list.
- The City offers a comprehensive suite of programs to encourage the community to strengthen buildings to be more hazard-resistant.
 - In early 2017, the Building and Safety Division developed a new Retrofit Grants program with funding from a Hazard Mitigation Grant from the Federal Emergency Management Agency (FEMA) and the California Governor’s Office of Emergency Services (Cal OES). As of August 2023, 63 design grants and 75 construction grants have been disbursed.
 - Since July 2002, the City has distributed over \$12 million to homeowners through the Transfer Tax Rebate Program, which reduces the real estate transfer tax to building owners who perform seismic safety work.
 - The City participates in the Earthquake Brace + Bolt (EBB) program, a grant program administered by the California Earthquake Authority, providing grants of up to \$3,000 for seismic retrofits of owner-occupied residential buildings with 1-4 dwelling units.
- The City, working together with key partners, is using a comprehensive strategy to aggressively mitigate Berkeley’s wildland-urban interface (WUI) fire hazard. These approaches include:
 - Prevention through development regulations with strict building and fire code provisions, as well as more restrictive local amendments for new and renovated construction;
 - Enforcement programs including annual inspections with support from the YouthWorks internship program;
 - Providing home hardening and defensible space materials and instructions to low income residents in targeted high risk areas;
 - Natural resource protection through vegetation management programs;
 - Improvement of access and egress routes;
 - Coordinating regional wildfire mitigation strategies with key partners and stakeholders;

- Infrastructure maintenance and improvements to support first responders' efforts to reduce facilitate emergency evacuation and fire spread.
- The City is embarking on an update to the General Plan, including a new Environmental Justice and Safety Element. These processes and documents will build off the 2024 LHMP and Planning Process.
- The City's Office of Emergency Services encourages community readiness and participation in hazard mitigation strategies. Through the 2024 LHMP Planning Process, the City created new videos, guides, and outreach materials intended to support community members in understanding their risks and what actions they can take to reduce risks.

These programs, and many others, place Berkeley as a leader in disaster management. Long-term maintenance and improvements to these programs will support execution of the 2024 LHMP Mitigation strategy, and will help to protect the Berkeley community in our next disaster.

Disaster Mitigation Goals

Berkeley will focus on five goals to reduce and avoid long-term vulnerabilities to the hazards identified in *Element B: Risk Assessment*:

- A. Reduce the potential for loss of life, injury, and economic damage to Berkeley residents and businesses from earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, poor air quality, infectious disease, sea level rise, wind, utility disruption and their secondary impacts.
- B. Increase City government's ability to serve the community during and after hazardous events by mitigating risk to key City functions.
- C. Protect and enhance quality of life in Berkeley.
- D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.
- E. Co-create mitigation plans, policies, and programs with Berkeley's underserved communities, elevating the voices of these community members and prioritizing their needs to prepare for and adapt to climate change and natural hazards.

Overview of Actions

This plan identifies and analyzes 33 mitigation actions to reduce the impacts from hazards described in *Element B: Risk Assessment*. This suite of actions addresses every natural hazard posing a threat to Berkeley, with an emphasis on new and existing buildings and infrastructure.

Tables 2, 3, and 4 below summarize all of the actions. The tables group actions by their priority level (see *Element C.5* for details on prioritization of actions), and identify the hazard(s) and each action addresses.

Table 2. High-Priority Actions in mitigation strategy

Action	Hazards
Continue appropriate seismic and fire safety analysis based on current and future use for all City-owned facilities and structures.	Multi-hazard
Strengthen or replace City buildings in the identified prioritized order as funding is available.	Multi-hazard
Reduce hazard vulnerabilities for non-City-owned buildings throughout Berkeley.	Multi-hazard
Implementation of the Retrofit Grants Program which helps Berkeley building owners increase safety and mitigate the risk of damage caused by earthquakes	Earthquake
Continued Implementation of the Soft Story Retrofit Program, which mandates seismic retrofit of soft story buildings with 5+ residential units.	Earthquake
Complete the ongoing program to retrofit all remaining non-complying Unreinforced Masonry (URM) buildings.	Earthquake
Monitor passage and implementation of mandatory seismic retrofit ordinances for concrete buildings in other jurisdictions to assess best practices.	Earthquake
Reduce fire risk in existing development through fire code updates and enforcement.	Wildland-Urban Interface Fire
Reduce fire risk in existing development through vegetation management.	Wildland-Urban Interface Fire
Manage and promote pedestrian evacuation routes in Fire Zones 2 and 3.	Earthquake Wildland-Urban Interface Fire
Improve responder access and community evacuation in Fire Zones 2 and 3 through roadway maintenance and appropriate parking restrictions.	Earthquake Wildland-Urban Interface Fire
Research, identify, and implement infrastructure improvements to facilitate emergency evacuation.	Wildland-Urban Interface Fire Tsunami
Reduce fire risk through utility undergrounding.	Earthquake Wildland-Urban Interface Fire High Winds

Action	Hazards
Work with EBMUD to ensure an adequate water supply during emergencies and disaster recovery.	Earthquake Wildland-Urban Interface Fire
Reduce Berkeley’s vulnerability to extreme heat events and associated hazards.	Extreme Heat Poor Air Quality
Mitigate hazards associated with natural gas usage, including disaster damage and energy service disruption, by minimizing need for energy use and moving toward use of electricity in lieu of natural gas.	Multi-hazard
Mitigate hazardous materials release in Berkeley through inspection and enforcement programs.	Multi-hazard
Maintain City participation in the National Flood Insurance Program.	Floods
Maintain City programs and projects to mitigate the impacts of infectious diseases in Berkeley.	Infectious Disease
Collect, analyze and share information with the Berkeley community about Berkeley hazards and associated risk reduction techniques.	Multi-hazard
Coordinate with and encourage mitigation actions of key City partners.	Multi-hazard
Coordinate regional wildfire mitigation strategies with key partners and stakeholders	Wildland-Urban Interface Fire
Advance equitable community resilience, with a focus on disadvantaged communities.	Multi-hazard

Table 3. Medium-Priority Actions in mitigation strategy

Action	Hazards
Mitigate wildfire risk to Berkeley’s overnight camps.	Wildland-Urban Interface Fire
Reduce Berkeley’s vulnerability to severe storms and associated hazards through proactive research and planning, zoning regulations, and improvements to stormwater drainage facilities.	Landslide Floods
Reduce Berkeley’s vulnerability to extreme heat events and associated hazards.	Extreme Heat Poor Air Quality
Implement energy assurance strategies at critical City facilities.	Multi-hazard
Implement existing City programs, plans, and projects designed to reduce emissions that contribute to poor air quality.	Poor Air Quality Extreme Heat
Mitigate the impacts of sea level rise in Berkeley.	Sea Level Rise Flood

Table 4. Low-Priority Actions in mitigation strategy

Action	Hazards
Mitigate climate change impacts by integrating climate change research and adaptation planning into City operations and services.	Multi-hazard
Collaborate with partners to increase the security of Berkeley’s water supply from climate change impacts.	Multi-hazard
Mitigate Berkeley’s tsunami hazard.	Tsunami
Give priority to project applications that would rebuild to current standards following disasters.	Multi-hazard

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- 1 Detweiler, Shane and Wein, A., 2018, The HayWired Earthquake Scenario – Earthquake Hazards: U.S. Geological Survey Scientific Investigations Report 2017-5013-A-H, p.4
 - 2 Maranghides, A., et al. (2022) WUI Structure/Parcel/Community Fire Hazard Mitigation Methodology. NIST Technical Note 2205. National Institute of Standards and Technology. Gaithersburg, MD. <https://doi.org/10.6028/NIST.TN.2205>
 - 3 <https://cal-adapt.org/about/>
 - 4 California Adaptation Planning Guide, July 2012.
 - 5 Seo, H. (2022, August 19). How heat waves take a toll on Mental Health. The New York Times. <https://www.nytimes.com/2022/08/19/well/mind/heat-mental-health.html>
 - 6 Southerland, et al., 2021. “Assessing the Distribution of Air Pollution Risks within Cities: A Neighborhood-Scale Analysis Leveraging High-Resolution Data Sets in the Bay Area, California.” Environmental Health Perspectives, Volume 129, Issue 3. doi: 10.1289/EHP7679
 - 7 May, C. L.; Mohan, A.; Plane, E.; Ramirez-Lopez, D.; Mak, M.; Luchinsky, L.; Hale, T.; Hill, K. 2022. Shallow Groundwater Response to Sea-Level Rise: Alameda, Marin, San Francisco, and San Mateo Counties. Pathways Climate Institute and San Francisco Estuary Institute. <https://www.sfei.org/documents/shallow-groundwater-response-sea-level-rise-alameda-marin-san-francisco-and-san-mateo>