Lake Merced Bikeway Feasibility Study

Final Report
January 29, 2021

FEHR & PEERS

SFMTA

San Francisco County Transportation Authority

Contents

San Francisco
County Transportation
Authority

Preparation of this report was made possible with Proposition K local transportation sales tax funds from the San Francisco County Transportation Authority's Neighborhood Transportation Improvement Program (NTIP).

Introduction

Lake Merced Park, located in the southwest area of San Francisco, is surrounded by various activity centers such as San Francisco State University (SFSU), Parkmerced, Fort Funston, and the San Francisco Zoo. The existing multi-use path around Lake Merced is popular with bicyclists and pedestrians alike and can at times become crowded, leading to conditions of potential conflict between these users. Additionally, roadway segments on the northern end of Lake Merced are located on San Francisco's High Injury Network and within a Metropolitan Transportation Commission Community of Concern. To address the need for safe, accessible, improved transportation in and around Lake Merced, District 7's Supervisor Norman Yee commissioned this study to evaluate opportunities for installing bicycle facilities around Lake Merced Park.

This study considers, at a conceptual level, the feasibility of improving roadway infrastructure around Lake Merced Park to better accommodate bicyclists and pedestrians. The study documents existing conditions, investigates alternatives and the trade-offs of each, and recommends a preferred bikeway improvement around the lake that improves conditions for both bicyclists and pedestrians. This process was conducted in coordination with SFMTA, San Francisco Recreation and Parks Department (RPD), and San Francisco Public Utilities Commissions (SFPUC).

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Existing Conditions

We reviewed adopted plans, policies, and readily available data to establish an existing context for the Lake Merced area. The following summarizes the most relevant findings from our data gathering process that have been used to inform this study.

See Appendix B for details.

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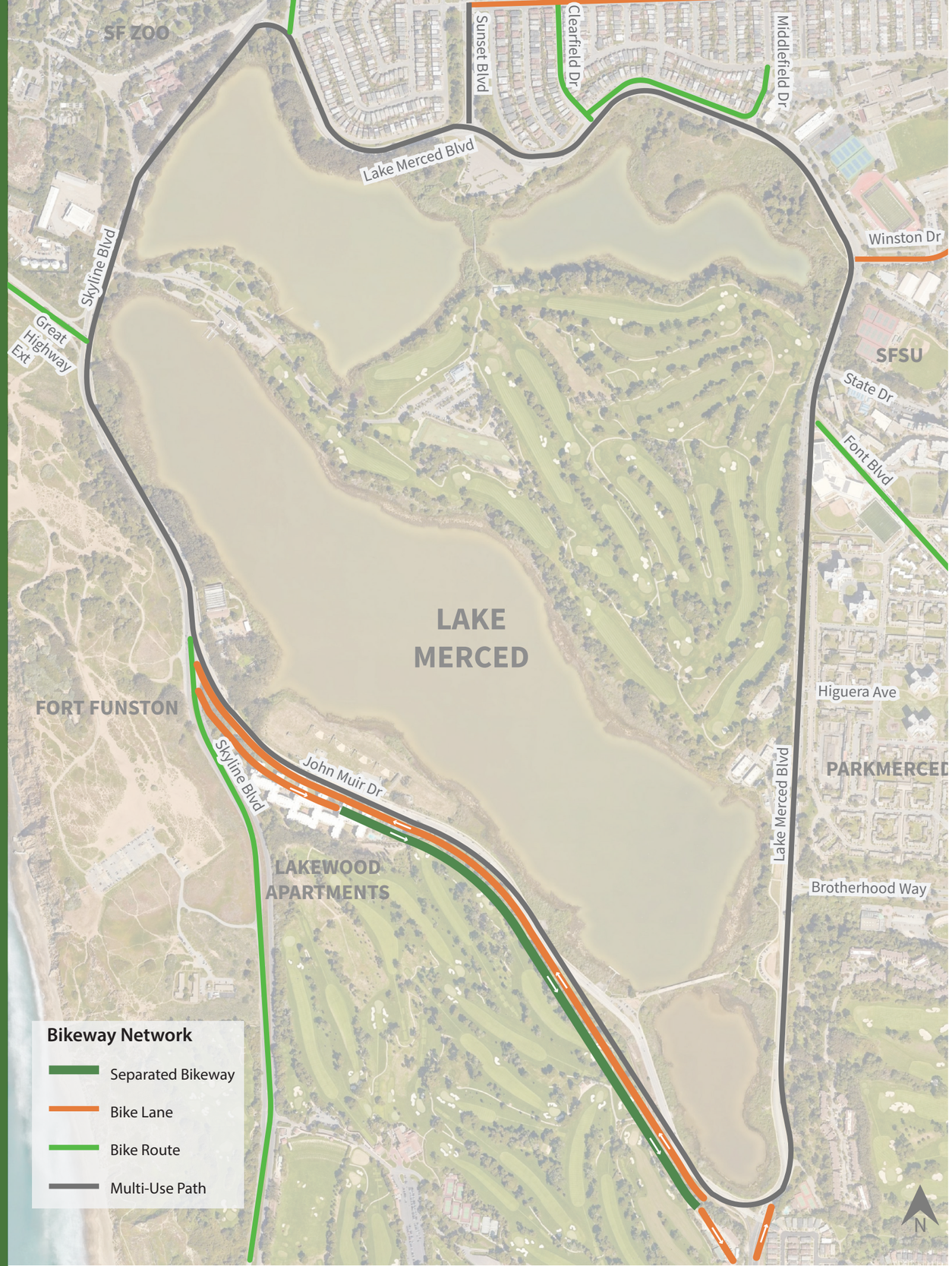


The existing bike facilities around Lake Merced are as follows:

- A multi-use path (pedestrians and bicyclists share the same space) around the entire lake on the lake side of Lake Merced Boulevard, John Muir Drive, and Skyline Boulevard
- Bike lanes along John Muir Drive, between Skyline Boulevard and Lake Merced Boulevard; the southbound bike lane is separated by soft-hit posts south of the Lakewood Apartments

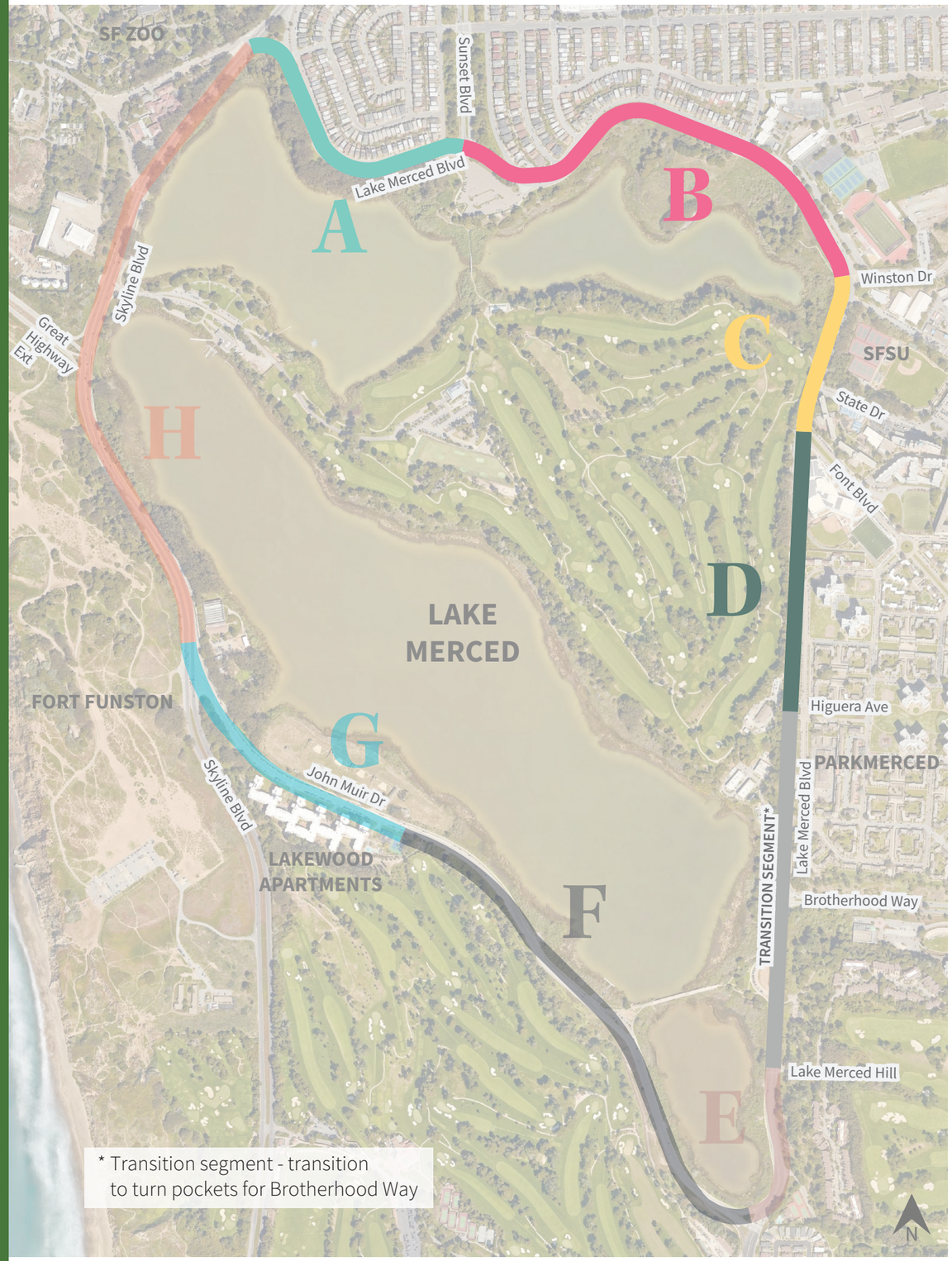
Numerous bike facilities currently connect to Lake Merced:

- A multi-use path on Sunset Boulevard
- Bike lanes on Winston Drive (both directions)
- Bike lanes along Lake Merced Boulevard (both directions), south of the John Muir Drive intersection
- Bike routes on Skyline Boulevard south of John Muir Drive and north of Lake Merced Boulevard, on the Great Highway Extension, on Font Boulevard, and on Clearfield Drive and Middlefield Drive

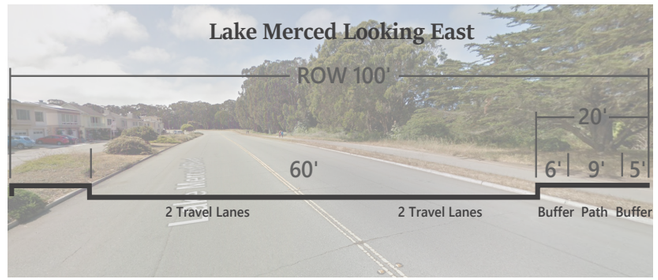
The highest activity on the multi-use path in the vicinity of the lake is observed around the Winston Drive intersection, near the SFSU campus, and along John Muir Drive near the Lakewood Apartments. Additionally, Lake Merced Boulevard between Sunset Boulevard and Font Boulevard is part of San Francisco's High Injury Network. Therefore, this section should be prioritized for both increasing capacity and enhancing safety for bicyclists and pedestrians.

Existing Conditions

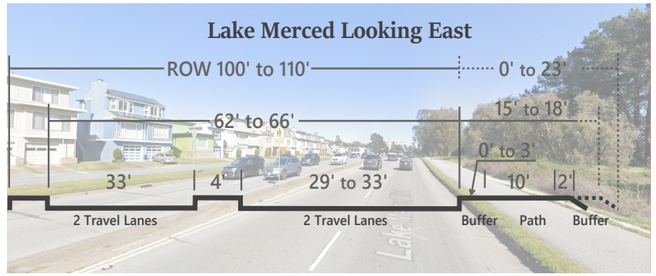
Bike Facilities



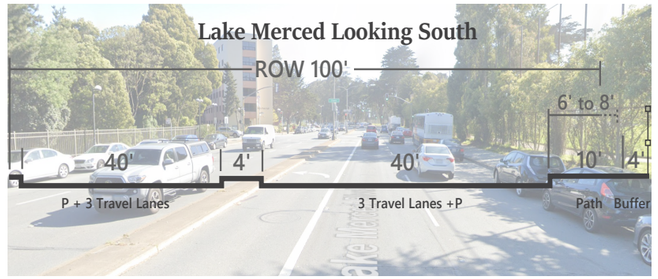
A
Skyline Blvd
Sunset Blvd



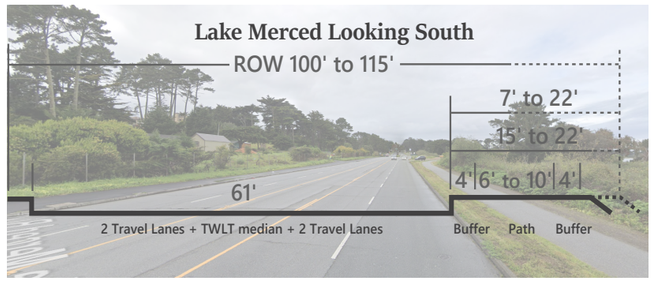
B
Sunset Blvd
Winston Dr



C
Winston Dr
Font Blvd



D
Font Blvd
Higuera Ave

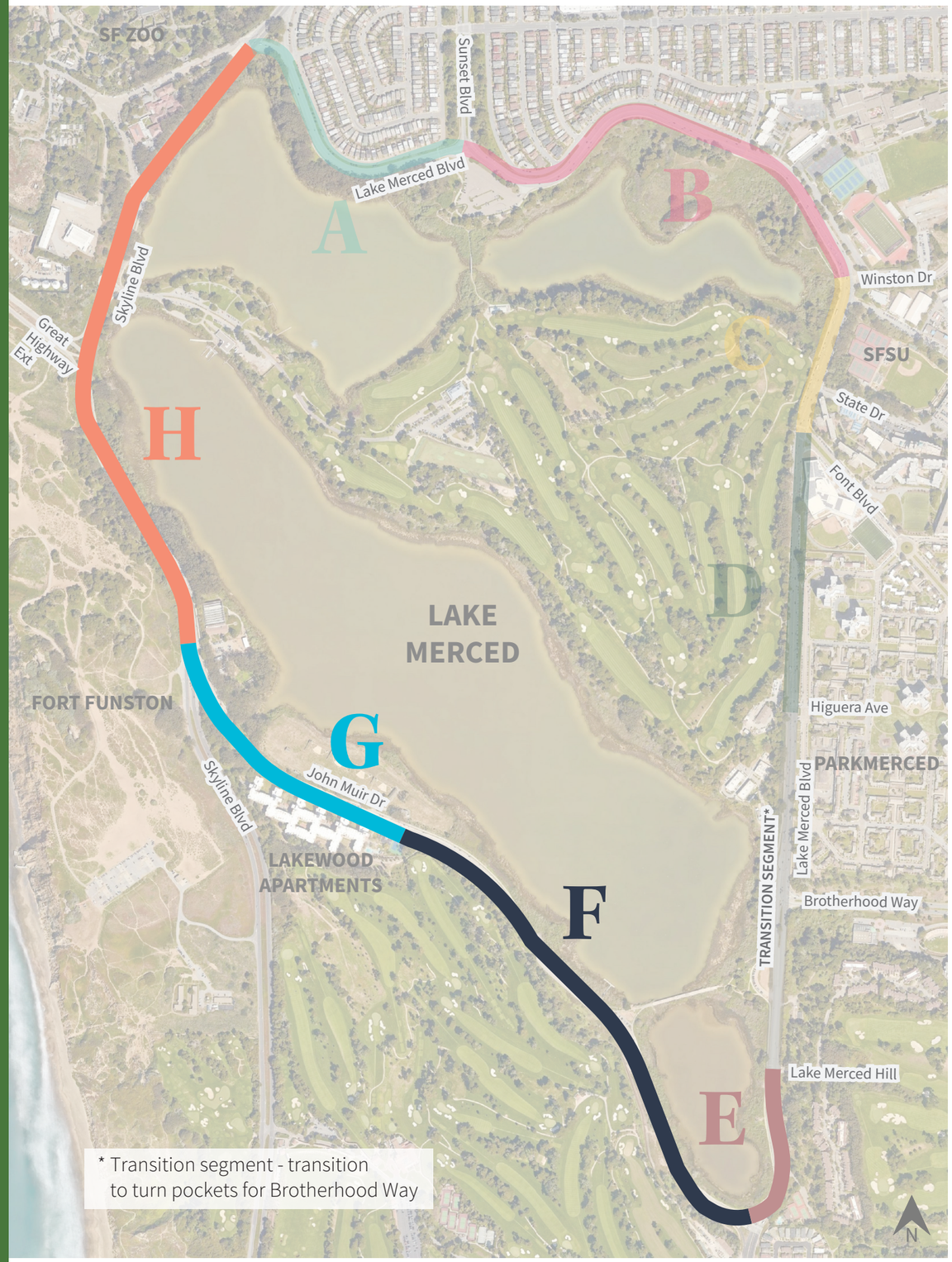


The study area was broken into nine segments based on roadway characteristics such as roadway width, lane assignments, path configuration, and travel characteristics.

Streetview imagery from Google, 2019

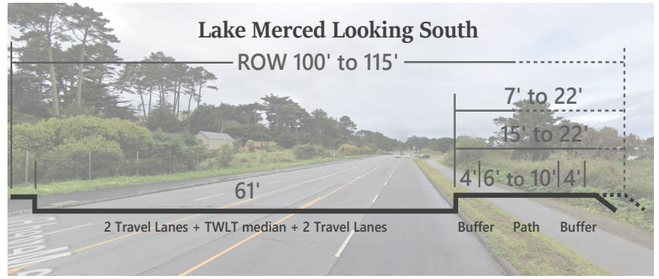
Existing Conditions

Cross Sections



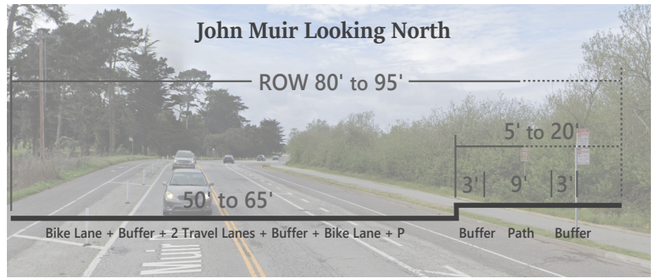
E

Lake Merced Hill / John Muir Dr



F

John Muir Dr / Skyline Blvd



G

Lakewood Apts / Skyline Blvd

H

Skyline Blvd / Lake Merced Blvd

The study area was broken into nine segments based on roadway characteristics such as roadway width, lane assignments, path configuration, and travel characteristics.

Streetview imagery from Google, 2019

Existing Conditions

Cross Sections

Outreach Summary

The Lake Merced Bikeway Feasibility Study outreached key stakeholders at several stages in the development of conceptual designs for a bikeway around the entirety of Lake Merced Park. At this time, the SFMTA focused only on select stakeholder outreach with the understanding that a robust community outreach process would need to be undertaken in subsequent planning phases if the project moves forward. Outreach completed for this study focused on getting initial feedback on the tradeoffs involved in widening the pathway and/or constructing a continuous bikeway on the roadway around Lake Merced.

The following outreach tasks were completed as part of the Lake Merced Bikeway Feasibility Study:

- A project webpage was created at project initiation. The website will host the final Lake Merced Bikeway Feasibility Study document (www.sfmta.com/projects/lake-merced-pedestrian-bicycle-safety-projects)

- In Spring 2020, SFMTA staff corresponded with key stakeholders from SF Public Utilities Commission (SFPUC) who owns the property at Lake Merced Park and SF Recreation and Parks (SFRPD), who manages the park. The SFMTA received preliminary feedback on opportunities and constraints for the proposed bikeway options and gained additional existing conditions information. To understand coordination opportunities with projects in the area the SFMTA also had discussions with Caltrans regarding the Signalization of Skyline Boulevard at Great Highway, bike lane plans for Skyline Boulevard) and spoke with Mayor's Office of Economic and Workforce Development (OEWD) to find out more information regarding the Brotherhood Way bike path project. Preliminary information from SFPUC, SFRPD, Caltrans, and OEWD helped inform the existing conditions research and first draft of the report.

-In June 2020, the SFMTA coordinated and hosted an online workshop with staff from SFPUC, SFRPD and SFMTA to review the first draft of the report. Prior to the workshop, these preliminary design concepts, including two appendices detailing pinch points and cross-section spreadsheets, were circulated internally with SFMTA staff (Traffic Operations, Sustainable Streets Engineers and Transit Planning) to ensure no fatal flaws with the design proposals. Comments from the workshop informed changes to the study and the draft final report.

-The SFMTA met with staff from the San Francisco Bicycle Coalition (SFBC) in early phases of the project to gather initial input. The SFMTA also shared the draft final report SFBC in November 2020. The SFBC are supportive of the concept designs within the study and prefer the two-way bike facility.

-The SFMTA met with Board of Supervisors President Norman Yee and District 7 staff several times prior to project initiation to finalize the project scope and provided regular updates to District 7 staff throughout the course of the study. SFMTA staff presented the draft final report to President Yee and his office on December 18, 2020.

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Bikeway Alternatives Development

We explored opportunities to provide enhanced bike and pedestrian facilities around the Lake using industry best practices and SFMTA design standards. Our alternatives included traditional bikeway configurations to maintain existing curbs where possible while also promoting the recreational uses of bike and pedestrian activity around Lake Merced.

See Appendix C for details.

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We explored opportunities to provide enhanced bike and pedestrian facilities around the Lake using industry best practices and SFMTA design standards. Our alternatives included traditional bikeway configurations to maintain existing curbs where possible while also promoting the recreational uses of bike and pedestrian activity around Lake Merced.

Below is a summary of the alternatives considered followed by a description of the Preferred Alternative.
See Appendix C for details.

	Option 1 Off-Street Bike Facility (All Segments)	Option 2 On-Street Bike Facilities (Lake Merced Blvd, Segments A-E Only)	
	Multi-Use Path	**2.1 One-Way Bikeways**	**2.2 Two-Way Bikeway (Lake Side)**
			
Design Objective	Provide off-street bike facilities for two-way bike travel while maintaining the existing curbs. This is achieved by improving the existing multi-use path.	Provide on-street bike facilities for two-way bike travel while maintaining the existing curbs.	Provide bike facilities for two-way bike travel on the lake side of the street while maintaining the existing curbs.
Trade-Offs & Opportunities	Widening the path towards the lake would require grading and extensive environmental studies. Bikes and pedestrians would continue to share the space which is not preferred.	Would require parking lane removal on Segments C & D. Provides continuity at southern end of Segment E with existing bike lanes on John Muir Drive and Lake Merced Blvd	Would require parking and travel lane removal, and would not fit within existing curb-to-curb width on Segment B. Travel lane removal on Segment C may cause traffic operation issues.
Feasibility	Meets design objective and geometrically feasible, but very costly and unknown (and potentially significant) environmental impacts.	While geometrically feasible, inconsistent with the context of recreational use around the lake.	Geometrically feasible & cost-effective, but requires substantial trade-offs at some locations

Recommendations: The Preferred Alternative is a combination of the options explored: option 1 for segments F-H; option 2.1 for Segment E to maintain the continuity from the existing bike lanes south of Segment E; and option 2.2 for Segments A-E to provide two-way bike travel where the activity is, on the lake side. Given the potential high cost of the full build-out, the Preferred Alternative is presented as a phased approach with a Near Term and a Long Term bikeway facility.
See Appendix C for details.

Bikeway Alternatives Development

Preferred Bikeway Alternative

Our initial direction was to study one option that addressed bike facilities in the street and another that integrated a separated off-street bike and pedestrian facility. Through our collaborative effort with SFMTA and project stakeholder agencies, we shifted to a phased approach, which better aligns with the City's policies for quick-build solutions. This phased approach identifies a Near Term solution that can be implemented without considerable investment and a more visionary Long Term solution. Both the Near and Long Term solutions would meet the study objectives of providing improved bike and pedestrian facilities around the lake with minimal impacts to traffic and other modes of travel.

See Appendix A for details.

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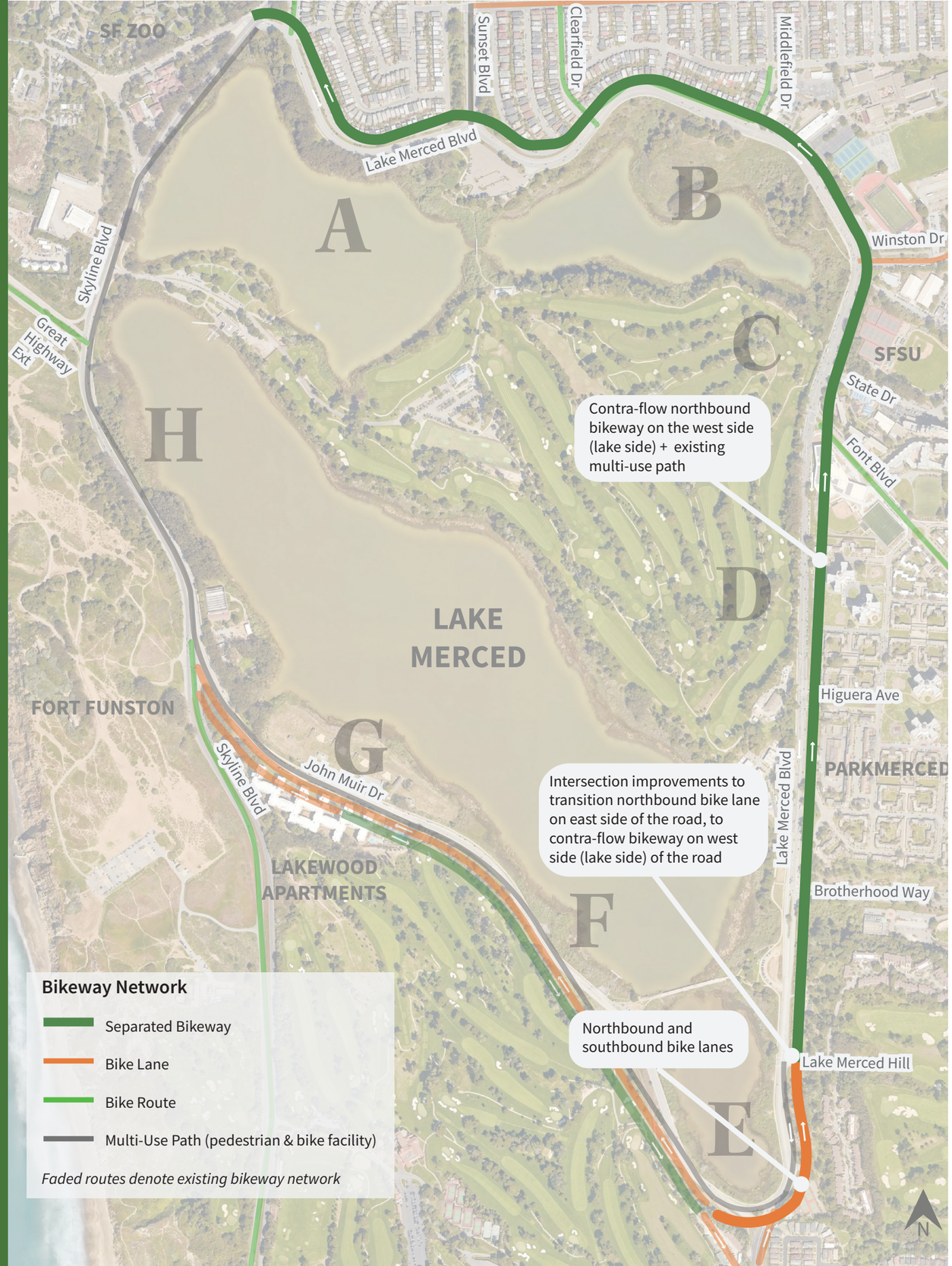


In the Near Term, proposed bikeway improvements along Lake Merced Boulevard include:

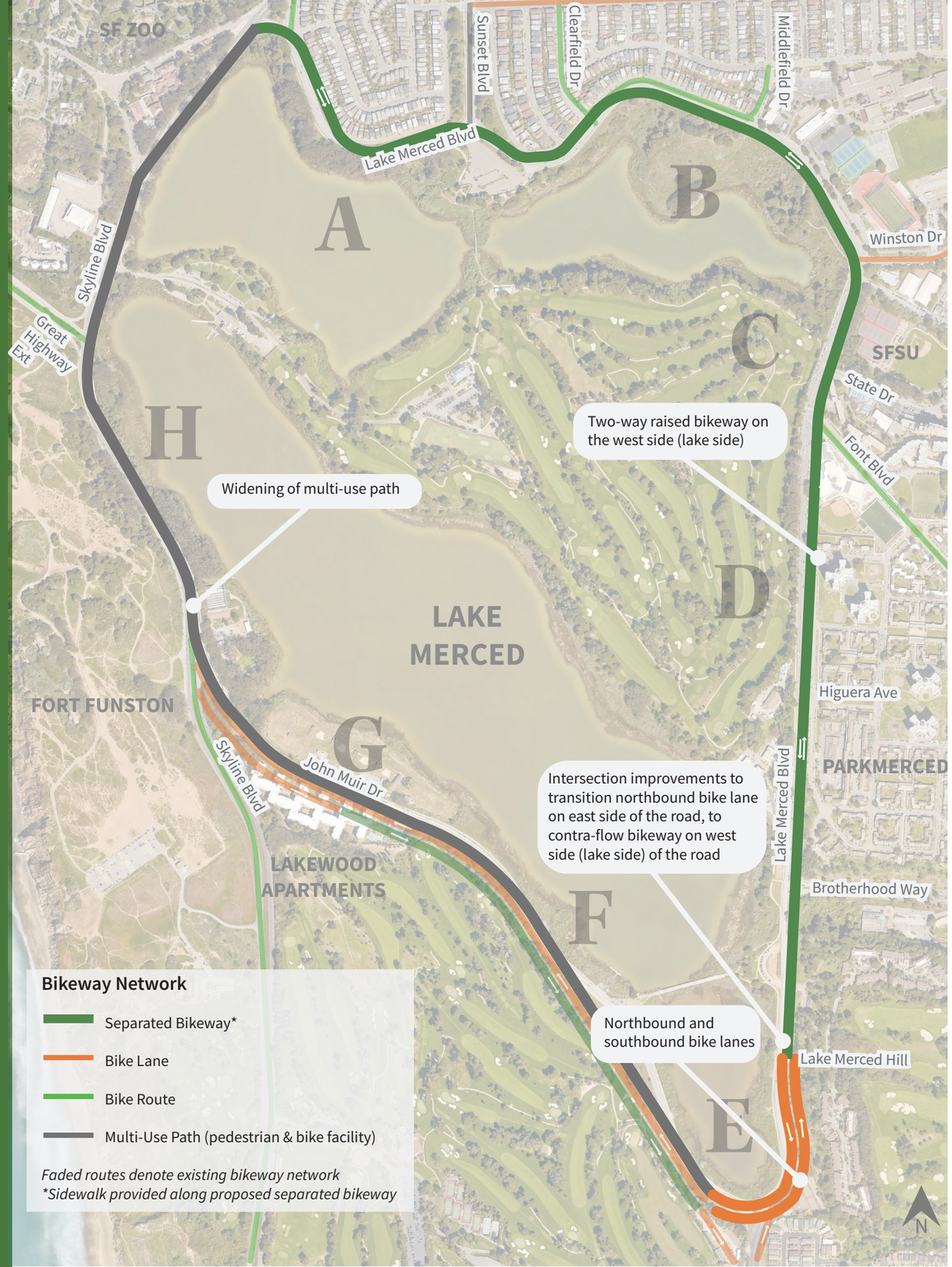
- A contra-flow northbound bikeway on the lake side from Skyline Boulevard to Lake Merced Hill (Segments A-D and the transition segment).
- Bike lanes in both directions between Lake Merced Hill and John Muir Drive (Segment E) to facilitate connection to the existing bike lanes on John Muir Drive (Segments F & G) and Lake Merced Boulevard south of the study area.
- Intersection improvements at Lake Merced Hill to connect northbound bicyclists from the proposed bike lanes on the east side of the road in Segment E to the proposed contra-flow bike lane on the west side of the road north of the intersection.

The existing multi-use path on the lake side would be maintained.

No changes are proposed for the bike facilities along John Muir Drive or Skyline Boulevard (Segments F-H) in the Near Term.

Proposed Improvements

Near Term



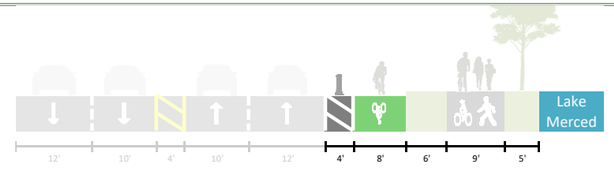
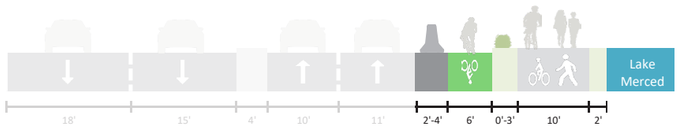
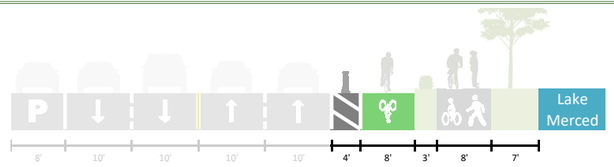
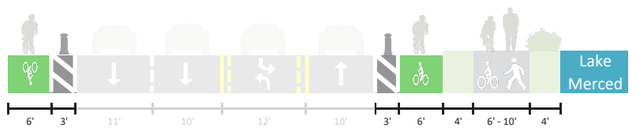
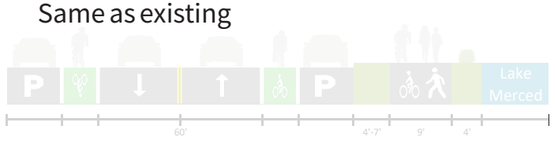
In the Long Term, proposed bikeway improvements around Lake Merced include:

- A raised two-way bikeway on the lake side from Skyline Boulevard to Lake Merced Hill (Segments A-D and the transition segment), replacing the existing multi-use path.
- Bike lanes in both directions between Lake Merced Hill and John Muir Drive (Segment E) to facilitate connection to the existing bike lanes on John Muir Drive (Segments F & G) and Lake Merced Boulevard south of the study area (same as proposed Near Term improvements).
- Intersection improvements at Lake Merced Hill to connect northbound bicyclists from the proposed bike lanes on the east side of the road in Segment E to the proposed contra-flow bike lane on the west side of the road north of the intersection.
- Widening of the existing multi-use path along John Muir Drive or Skyline Boulevard (Segments F-H).

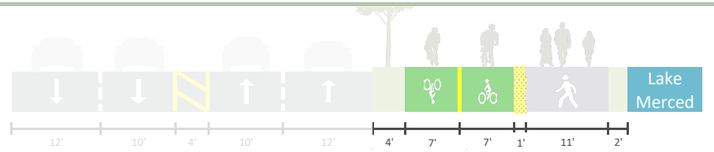
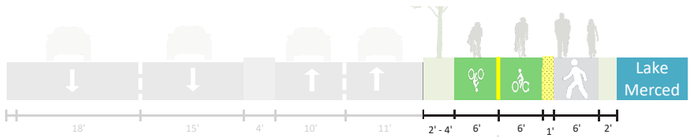
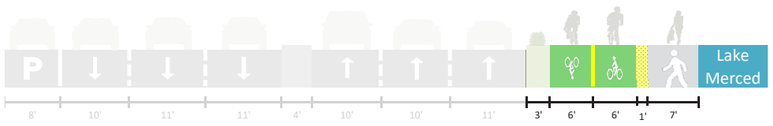
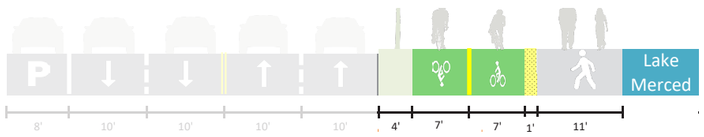
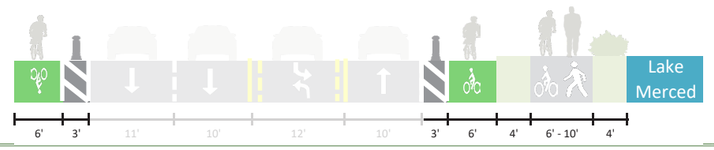
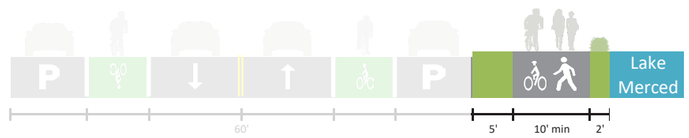
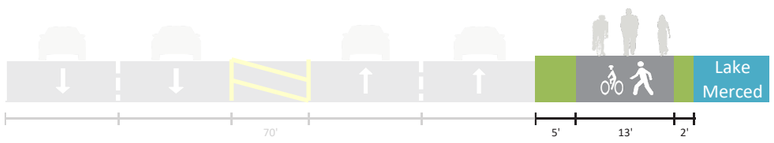
A sidewalk would also be provided along the raised two-way bikeway, on the lake side from Skyline Boulevard to Lake Merced Hill (Segments A-D and the transition segment).

Proposed Improvements

Long Term

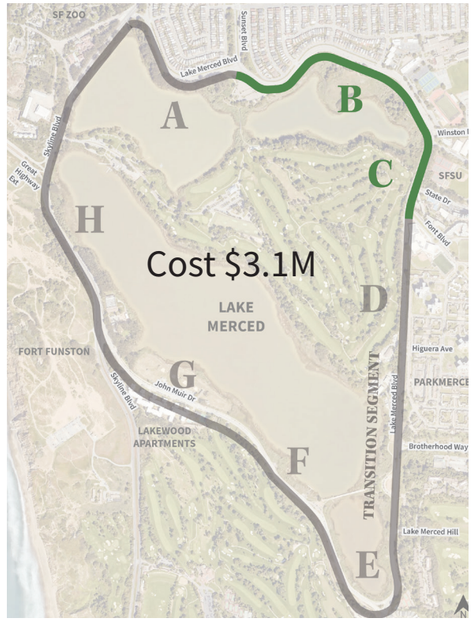
Near Term		Parking or Lane Removal?	Cost	
On-Street Two-Way Bikeway; No Path Improvements			Per 100 LF	**Full Segment**
A 2,200ft		No	$18K	**$390K**
B 3.600ft		No	$58K	**$2.1M**
C 1,100ft		Parking lane removal southbound (lake side)	$86K	**$950K**
D 2,100ft		Parking lane removal southbound (lake side)	$81K	**$1.7M**
Transition	Cross Section Varies	No	$56K	**$1.5M**
E 1,200ft		Travel lane removal southbound (lake side)	$75K	**$900K**
F 4,100ft	Same as existing 	No	No Cost	**No Cost**
G 2,000ft	Same as existing 	No	No Cost	**No Cost**
H 5,000ft	Same as existing 	No	No Cost	**No Cost**
Total Cost			$374K	**$7.5M**

See Appendix A for detailed cost estimate tables and larger cross section graphics. *Cost estimates for Near Term improvements include construction costs (signal modifications for contra-flow bikeway),soft costs (program & project management, planning and environmental, PS&E, and construction administration), and contingency.*

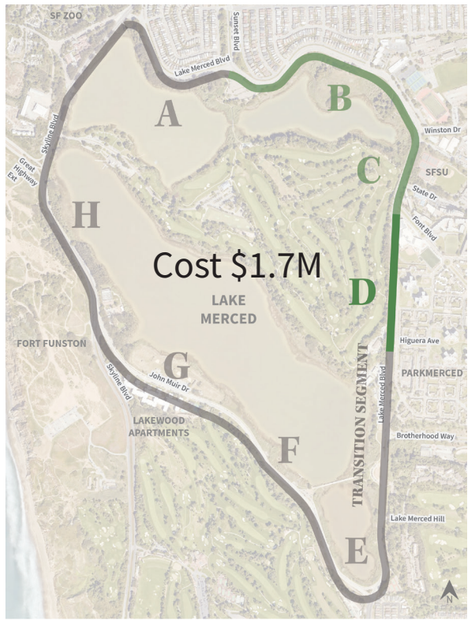
Long Term	Raised Two-Way Bikeway & Enhanced Path	Parking or Lane Removal?	Cost	
			Per 100 LF	**Full Segment**
A 2,200ft		No	$345K	**$7.6M**
B 3,600ft		No	$317K	**$11.4M**
C 1,100ft		Parking lane removal on both sides	$400K	**$4.4M**
D 2,100ft		Parking lane removal on both sides	$362K	**$7.6M**
Transition	Cross Section Varies	No	$408K	**$10.6M**
E 1,200ft		Travel lane removal southbound (lake side)	$283K	**$3.4M**
F 4,100ft		No	$98K	**$4M**
G 2,000ft		No	$105K	**$2.1M**
H 5,000ft		No	$106K	**$5.3M**
Total Cost			$2.4M	**$56.4M**

See Appendix A for detailed cost estimate tables and larger cross section graphics. *Cost estimates for Near Term improvements include construction costs (signal modifications for contra-flow bikeway),soft costs (program & project management, planning and environmental, PS&E, and construction administration), and contingency.*

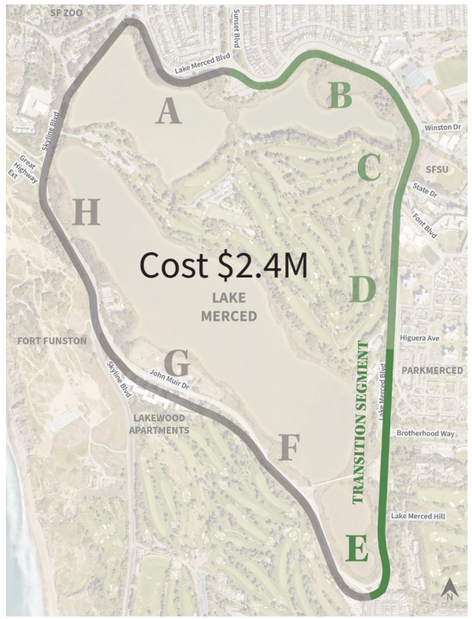
Phase 1 - Segments B & C



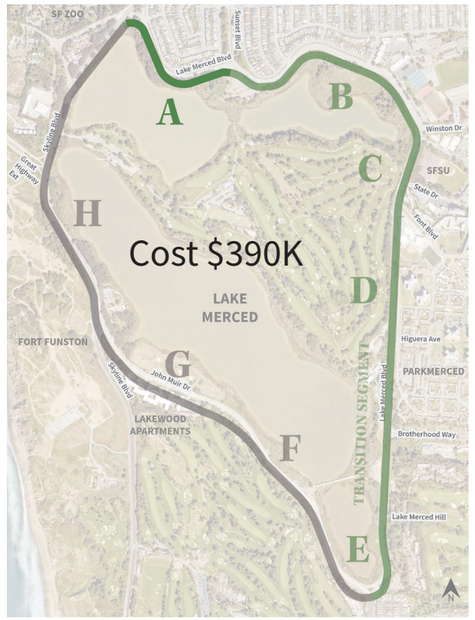
Phase 2 - Segments D



Phase 3 - Segments E & Transition



Phase 4 - Segment A



Implementing improvements requires thoughtful planning, informed by cost/ benefit analysis and capitalizing on funding opportunities. Public input will also be required for subsequent design phases to determine implementation strategies.

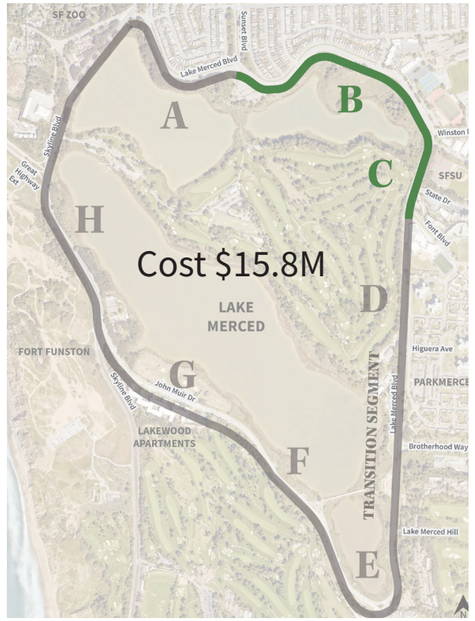
Segments B & C are heavily traveled segments and fall along the City's High Injury Network, making them the highest priority locations. If funding can be secured, SFMTA may choose to implement the Long Term improvements here rather than the Near Term first.

For continuity, the implementation of improvements should continue clockwise around the lake based on lack of existing infrastructure for separated bike and pedestrian facilities.

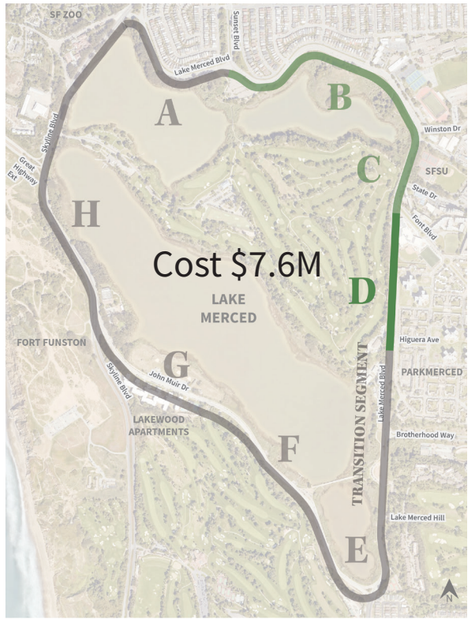
Implementation Plan

Near Term

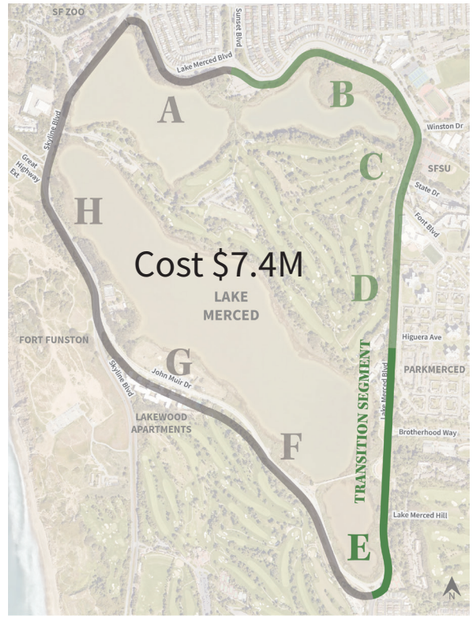
Phase 1 - Segments B & C



Phase 2 - Segments D



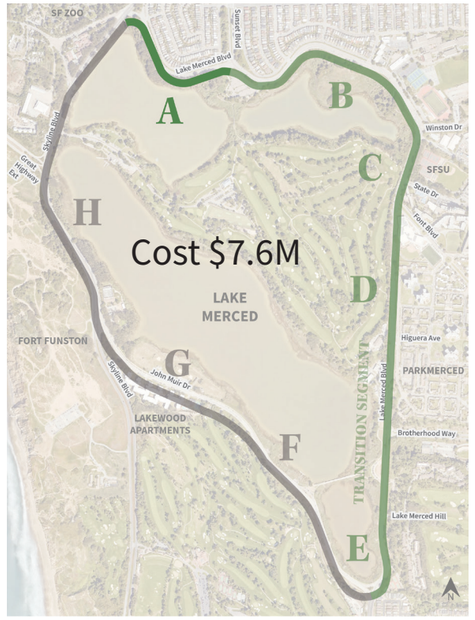
Phase 3 - Segments E & Transition



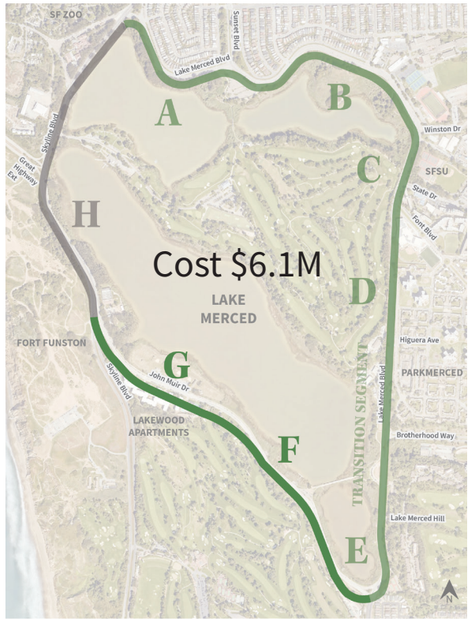
Similarly to the implementation plan for the Near Term, SFMTA should focus on the High Injury Network first (B & C), and leverage grant opportunities to secure funding for the improvements, seeking to preserve continuity along the route. The east side should be prioritized based on lack of separated bike and pedestrian facilities unless there are funding opportunities to implement the west side improvements (Segments F-H) as part of parallel efforts.

Public input will be required to determine implementation of the long-term design.

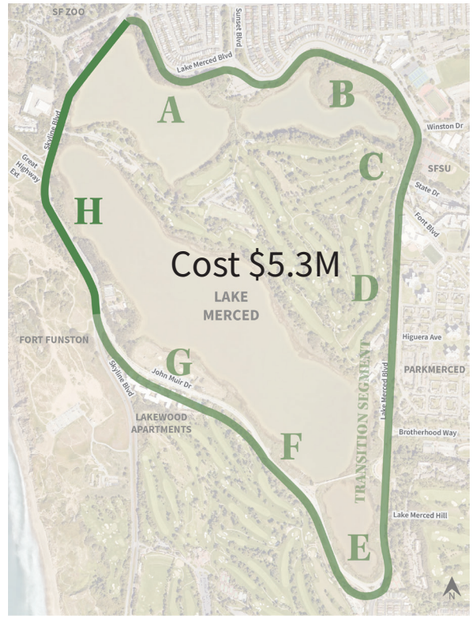
Phase 4 - Segment A



Phase 5 - Segments F & G



Phase 6 - Segments H



Note: Long Term costs do no account for any savings to build off of Near Term improvement

Implementation Plan

Long Term

Funding, Next Steps & Other Considerations

Funding and Next Steps

The SFMTA does not currently have funding proposed to implement this bike feasibility effort in full for either the near-term and long-term options. However, the SFMTA can consider the highest priority improvements from this report as part of the agency's quick-build program. Next steps beyond strategic, quick-build improvements will require additional scope development, funding, and further discussions between the SFCTA and SFMTA.

Robust public input will be required for subsequent design phases for both near and long term options. Please see Appendix A for details on both near- and long-term preferred alternatives.

Other Considerations

The designs shown are the result of input from stakeholders and the desire to offer low impact, continuous bike facilities. However, the SFMTA recognizes that there are other possible configurations for the bike facility that may provide separated bicycle facilities at a lower cost. A near-term two-way bike facility at the roadway level may require removing parking or capacity, but could potentially be delivered more quickly and meet the high quality separation desired as part of the long term options. If the SFMTA moves forward with implementation, we will evaluate street level separated bikeway alternatives, considering issues such as continuity of bike facilities from Segment to Segment, high vehicle speeds, the need to maintain vehicle turning lanes, and connections to other bikeways.

FEHR PEERS

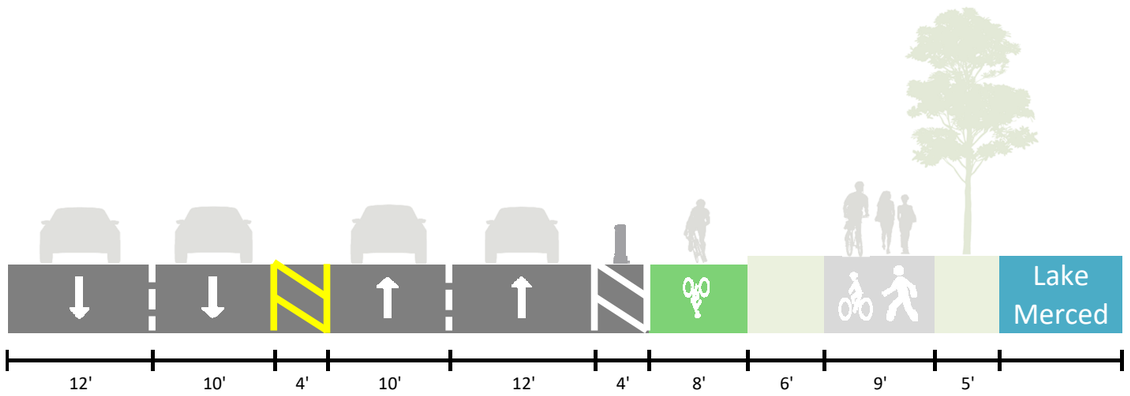
Appendices

FEHR & PEERS

Appendix A
Preferred Alternative - Details

Existing Conditions

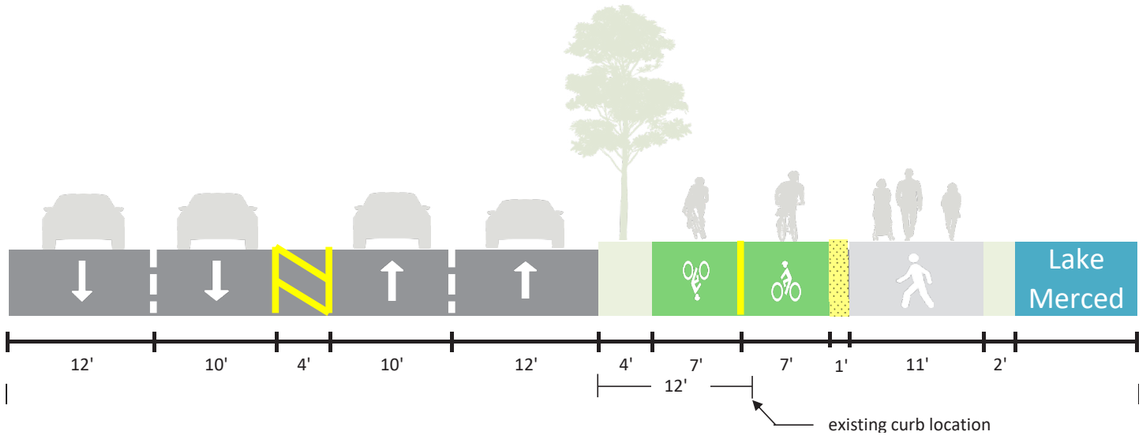
Bus route(s): 18



Near Term Proposal - On-Street Bikeway

Proposed Changes

- Number of travel lanes maintained
- Lane width reduction
- Though lane removal feasible in both directions given traffic volumes, not considered at this time to minimize impacts of proposal and to maintain continuity of bike facilities around the lake
- Design can be further vetted in subsequent design phases with community input



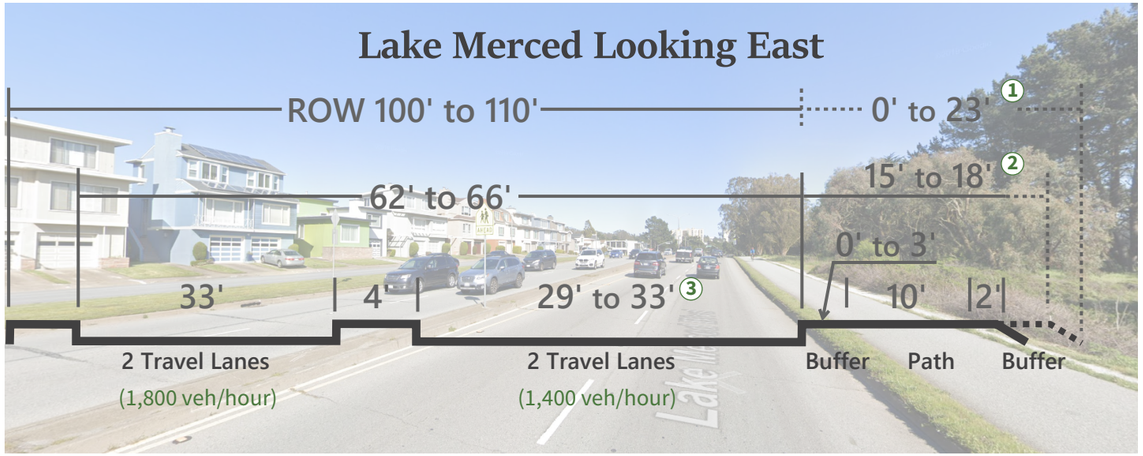
Long Term Proposal - Raised Bikeway

Proposed Changes

- Number of travel lanes maintained; lane removal feasible in both directions given traffic volumes
- Lane width reduction
- Roadway narrowed by 12 feet to accommodate a wider, separated two-way bikeway and pedestrian path

Preferred Alternative

Near & Long Term



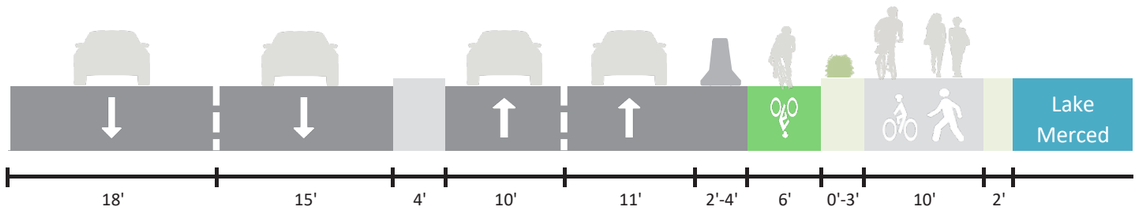
Existing Conditions

Bus route(s): 18, 29

① ROW alignment varies between 0 and 23 feet from edge of curb on west side of the road

② Top of embankment slope distance from curb on west side of the road varies from 15 to 18 feet

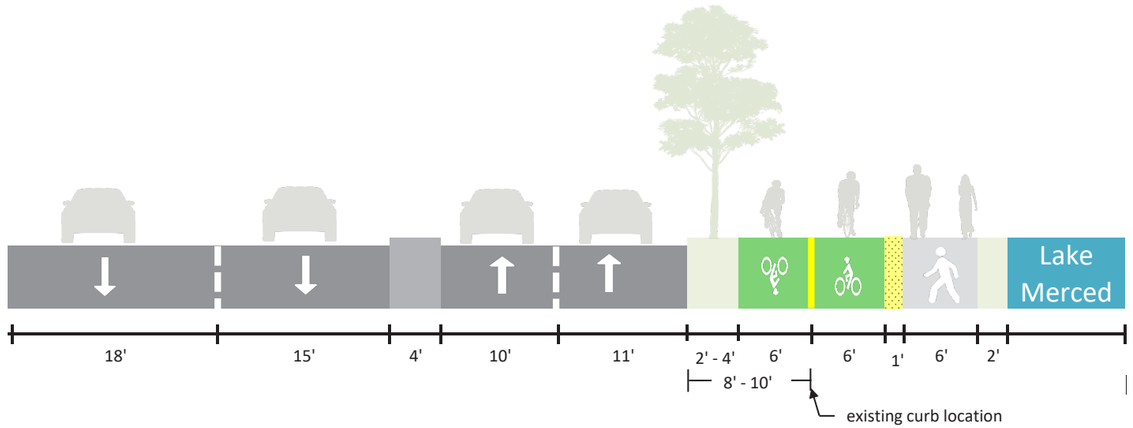
③ Curb-to-curb distance on west side varies from 29 to 33 feet with two travel lanes; width is larger (up to 43 feet) to include right-turn pockets at intersections



Near Term Proposal - On-Street Bikeway

Proposed Changes

- Number of travel lanes maintained; travel lane removal not feasible given traffic volumes
- Lane width reduction on lake side
- K rail used instead of soft-hit posts due to high traffic volumes and narrow travel lanes, particularly near Winston Dr intersection
- Protected parking design considered here, however high speeds and curved roads make parking undesirable here and turn pockets are removed (making turns unsafe)
- Design can be further vetted in subsequent design phases with community input



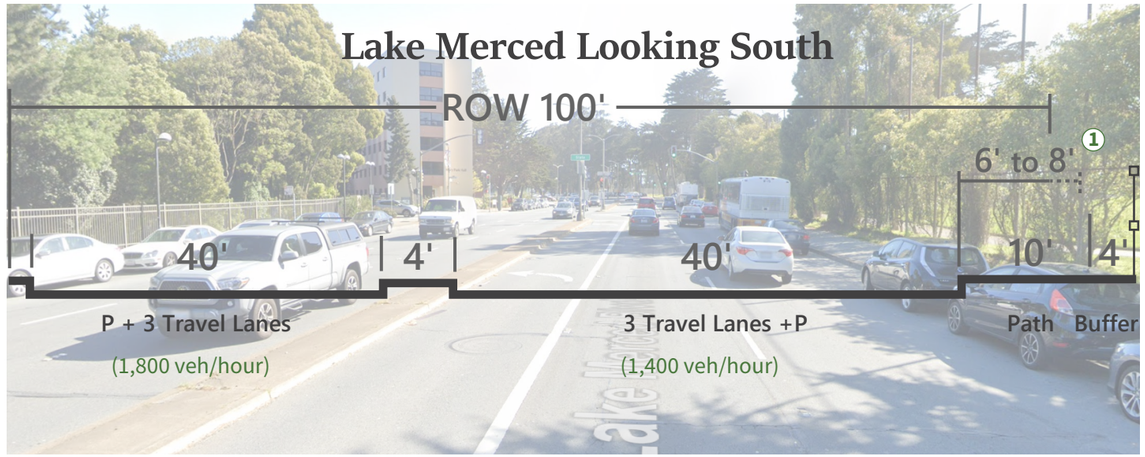
Long Term Proposal - Raised Bikeway

Proposed Changes

- Number of travel lanes maintained; travel lane removal not feasible given traffic volumes
- Lane width reduction on lake side
- Roadway narrowed by 8 to 10 feet to accommodate a separated two-way bikeway and pedestrian path

Preferred Alternative B

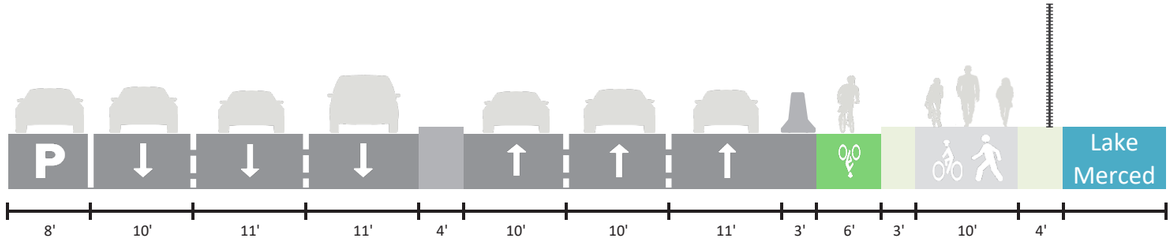
Near & Long Term



Existing Conditions

Bus route(s): 57

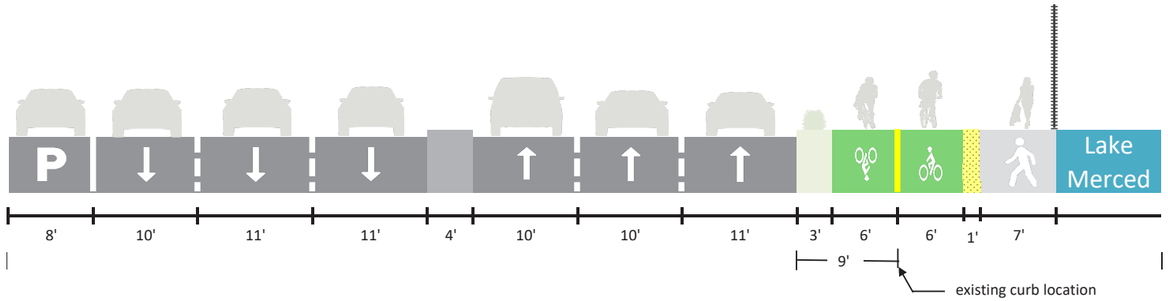
① ROW alignment varies between 6 and 8 feet from edge of curb on west side of the road



Near Term Proposal - On-Street Bikeway

Proposed Changes

- Parking removal on lake side (southbound)
- Number of travel lanes maintained; travel lane removal feasible southbound given traffic volumes
- Consider use of K-rail instead of soft-hit posts for additional protection



Long Term Proposal - Raised Bikeway

Proposed Changes

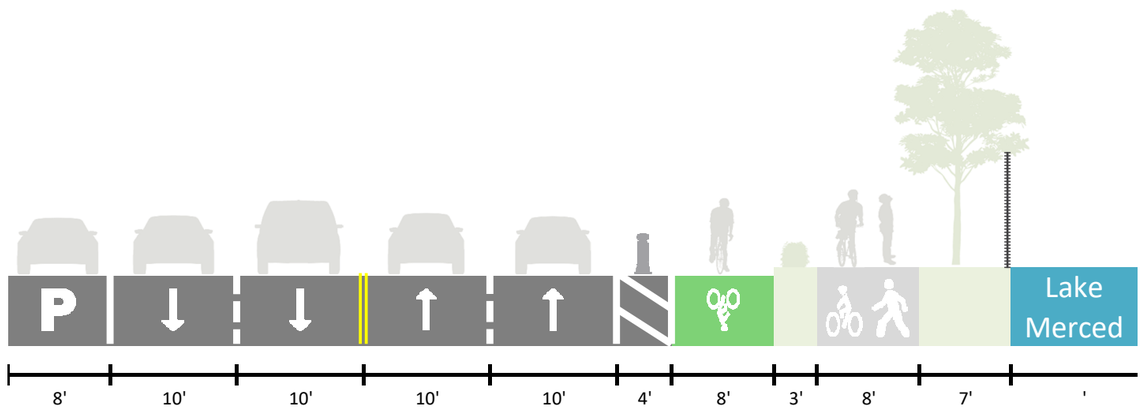
- Parking removal on lake side (southbound)
- Number of travel lanes maintained
- Roadway narrowed by 9 feet to accommodate a separated two-way bikeway and pedestrian path
- Alternative: remove travel lane southbound instead of parking

Preferred Alternative

Near & Long Term

Existing Conditions

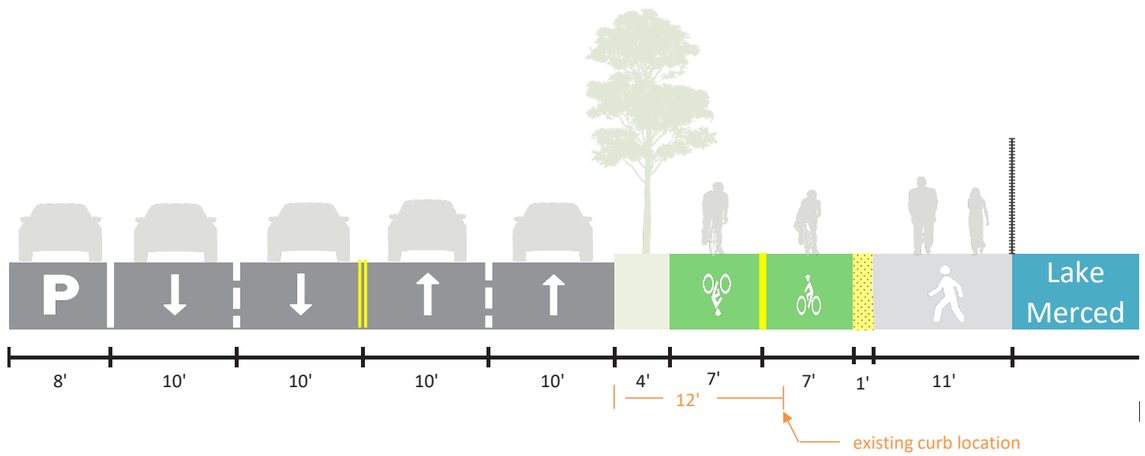
① ROW alignment varies between 3 feet and 18 feet from edge of curb on west side of the road



Near Term Proposal - On-Street Bikeway

Proposed Changes

- Parking removal on lake side (southbound)
- Number of travel lanes maintained; travel lane removal not feasible given traffic volumes
- Lane width reduction
- Consider use of K-rail instead of soft-hit posts for additional protection
- Removal of parking northbound is not desired due to adjacent land uses and continuity of the bike facility east of the lake
- Design can be further vetted in subsequent design phases with community input



Long Term Proposal - Raised Bikeway

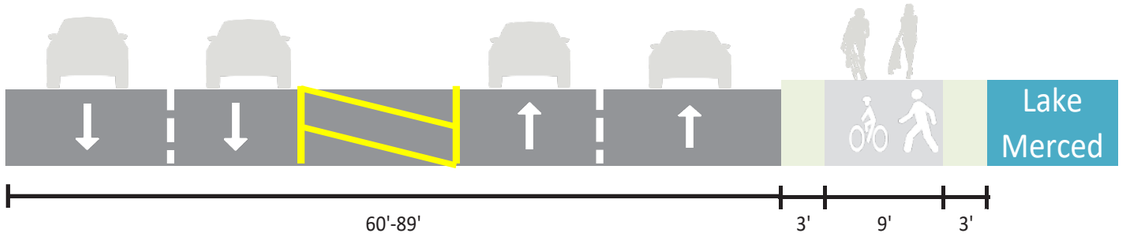
Proposed Changes

- Parking removal on lake side (southbound)
- Number of travel lanes maintained; travel lane removal not feasible given traffic volumes
- Lane width reduction
- Roadway narrowed by 12 feet to accommodate a separated two-way bikeway and pedestrian path

Preferred Alternative

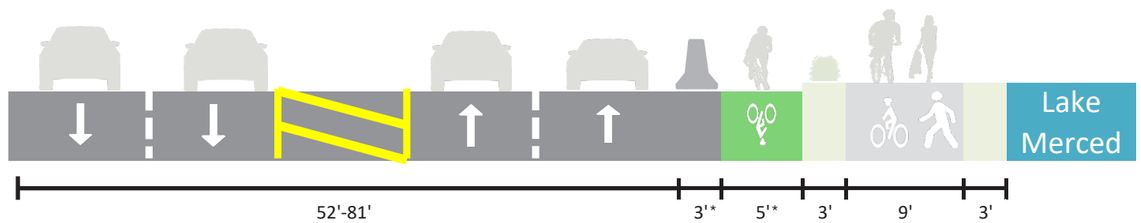
Near & Long Term

Lake Merced Looking South

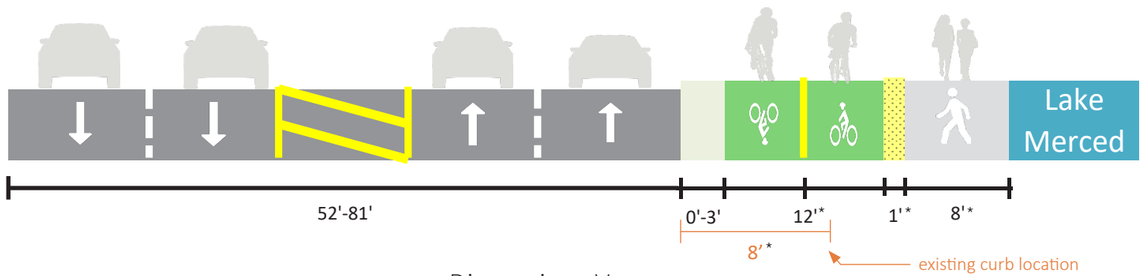


Dimensions Vary

Lane Configuration at Brotherhood Way
Southbound - 2 left turn lanes and 1 through lane
Northbound - 2 through lanes and 1 right turn lane



Dimensions Vary



Dimensions Vary

* Minimum dimensions

Existing Conditions

Bus route(s): 57

This segment of Lake Merced Boulevard has a consistent two lanes in each direction, but the lane and overall roadway width vary throughout. It's a segment with transitions between parking lanes and turn pockets on Segment D to the turn lanes at the Brotherhood Way intersection, and the two-way left-turn median on Segment E.

The roadway width varies, but is wide enough to accommodate two lanes in each direction and bikeways as indicated below.

Near Term Proposal - On-Street Bikeway

Proposed Changes

- Number of travel lanes maintained; travel lane removal not feasible given traffic volumes
- Lane width and buffer areas reduction required to accommodate on-street contra-flow bikeway
- K-rail recommended instead of soft-hit posts due to high-speed traffic on this segment
- Two way bike facility was considered but not proposed to maintain continuity of bike facilities around the lake in the near-term
- Design can be further vetted in subsequent design phases with community input

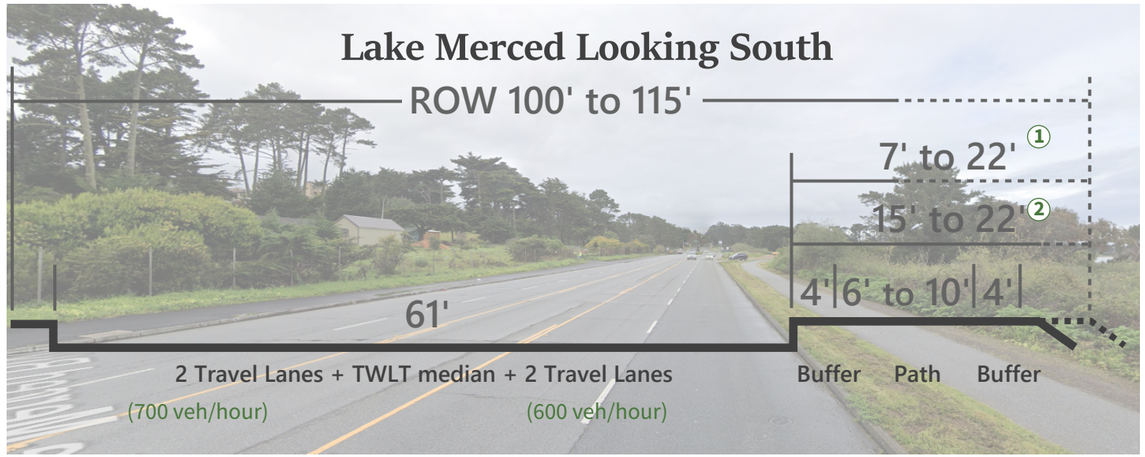
Long Term Proposal - Raised Bikeway

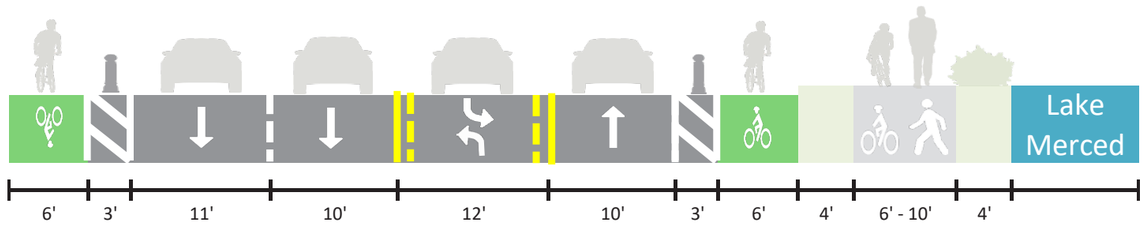
Proposed Changes

- Number of travel lanes maintained; travel lane removal not feasible given traffic volumes
- Lane width and buffer areas reduction required
- Roadway narrowed to accommodate a separated two-way bikeway and pedestrian path

Preferred Alternative

Near & Long Term





Existing Conditions

Bus route(s): 57

① ROW alignment varies between 7 and 22 feet from edge of curb on west side of the road

② Top of embankment slope distance from curb on west side of the road varies from 15 to 22 feet

Near Term & Long Term Proposal - On-Street Bikeway

Proposed Changes

- Travel lane removal southbound to accommodate on-street buffered bike lanes
- Lane width reduction
- To ease connectivity to existing on-street bike lanes on Lake Merced Boulevard and John Muir Drive south and west of the Lake Merced Blvd/John Muir Dr intersection, on-street bikeways are proposed for both the near and long term on Segment E
- Two way bike facility was considered but not proposed to maintain continuity of bike facilities around the lake in the near-term, and to support connectivity for cyclists riding between the one-way bike facilities on John Muir Drive and Lake Merced Boulevard south of John Muir Drive
- Design can be further vetted in subsequent design phases with community input

Preferred Alternative

Near & Long Term

Existing Conditions

① ROW alignment varies between 5 and 20 feet from edge of curb on east side of the road

Long Term Proposal - Path Improvements

Proposed Changes

- For continuity, bike facilities are proposed as shown, however parking protected bike facilities or two way bike facility could be considered with further study
- Design can be further vetted in subsequent design phases with community input
- Minor grading and bush removal required to widen existing path (2 feet)
- Paved path to be widened from existing 9 feet to 10 feet

No Improvements are proposed in the Near Term for Segments F-H

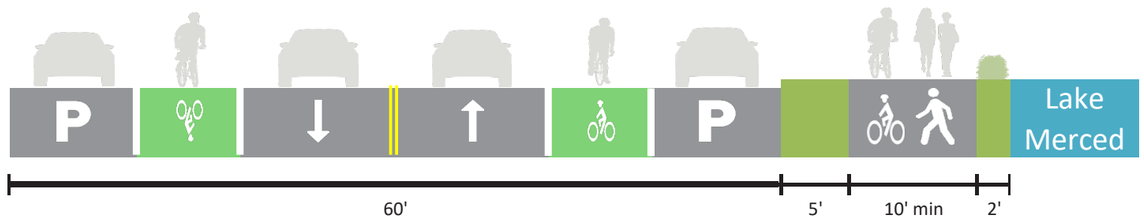
See Appendix C-1 for detailed pinch points for this segment (F1-F4)

Preferred Alternative

Long Term

Existing Conditions

① Curb to fence distance on east side of the road varies between 17 and 28 feet



Long Term Proposal - Path Improvements

Proposed Changes

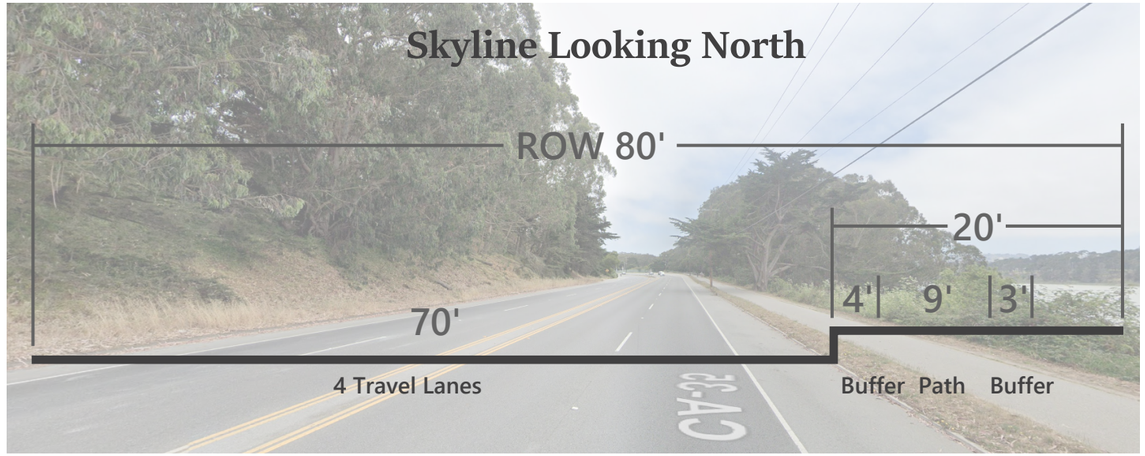
- For continuity, bike facilities are proposed as shown, however parking protected bike facilities or two way bike facilities could be considered with further study
- Design can be further vetted in subsequent design phases with community input Path fits within existing curb to fence area
- Paved path to be widened from existing 9 feet to 10 feet (minimum)

No Improvements are proposed in the Near Term for Segments F-H

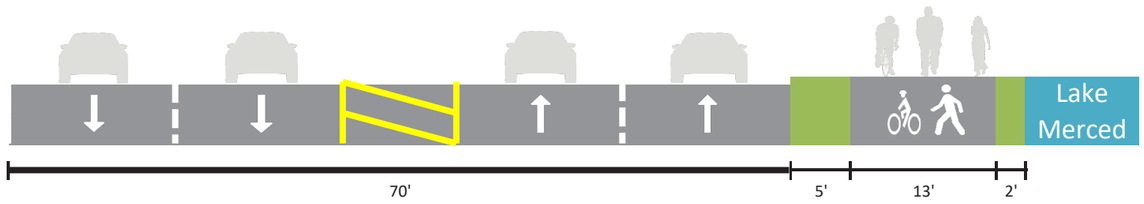
See Appendix C-1 for detailed pinch points for this segment (G1-G6)

Preferred Alternative

Long Term



Existing Conditions



Long Term Proposal - Path Improvements

Proposed Changes

- Path fits within existing ROW and level section, no grading required
- Paved path to be widened from 9 feet (existing) to 13 feet
- Note: Roadway shoulders shown in existing conditions image are required per Caltrans standards
- Cross section shown is typical, but some portions of this segment are more constrained.

No Improvements are proposed in the Near Term for Segments F-H

See Appendix C-1 for detailed pinch points for this segment (H1-H12)

Preferred Alternative

Long Term

SFMTA Lake Merced Bikeway Feasibility Study

11/16/2020

Cost Estimate by Fehr & Peers & MSA

Near Term Improvements

#	Item	A 2200 ft	B 3600 ft	C 1100 ft	D 2100 ft	T 2600 ft	E 1200 ft	F 4100 ft	G 2000 ft	H 5000 ft	Total
3	Roadway Items	$ 132,000	$ 238,000	$ 92,000	$ 126,000	$ 231,000	$ 73,000	$ -	$ -	$ -	$ 892,000
5	Traffic	$ 107,000	$ 273,000	$ 98,000	$ 135,000	$ 271,000	$ 89,000	$ -	$ -	$ -	$ 973,000
6	Signal & Electrical	$ -	$ 799,000	$ 400,000	$ 800,000	$ 400,000	$ 400,000	$ -	$ -	$ -	$ 2,799,000
	Construction Subtotal	*$ 239,000*	*$ 1,310,000*	*$ 590,000*	*$ 1,061,000*	*$ 902,000*	*$ 562,000*	*$ -*	*$ -*	*$ -*	$ 4,664,000
	Soft Costs & Contingency (see Note) 60%	*$ 143,000*	*$ 786,000*	*$ 354,000*	*$ 637,000*	*$ 541,000*	*$ 337,000*	*$ -*	*$ -*	*$ -*	*$ 2,798,000*
	Total Project Cost	***$ 390,000***	***$ 2,100,000***	***$ 950,000***	***$ 1,700,000***	***$ 1,450,000***	***$ 900,000***	***$ -***	***$ -***	***$ -***	***$ 7,490,000***

Notes:

1. Soft Costs include program management, project management, planning, engineering, survey, environmental clearance, environmental studies, construction management, outreach, and inspection
2. While the Long Term proposed cross-section for Segment E is the same as Near Term, the Long Term cost estimates assume full resurfacing while the Near Term assumed just re-striping and a slurry seal
3. Long Term costs do no account for any savings to build off of Near-Term improvement
4. Totals may not add up due to rounding
5. The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgement as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will no vary from its opinions of probable costs.
6. This Estimate was prepared without City review and approval, and as such, may be subject to change during the City permitting process.
7. Underground non-pavement utilities such as, but not limited to, water, sanitary sewer, and gas are assumed to be at an adequate depth.

Cost Estimates

Near Term

SFMTA Lake Merced Bikeway Feasibility Study

11/16/2020

Cost Estimate by Fehr & Peers & MSA

Long Term Improvements

#	Item	A 2200 ft	B 3600 ft	C 1100 ft	D 2100 ft	Transition 2600 ft	E 1200 ft	F 4100 ft	G 2000 ft	H 5000 ft	Total
1	Demolition	$ 1,117,000	$ 1,409,000	$ 466,000	$ 1,038,000	$ 1,288,000	$ -	$ 294,000	$ 144,000	$ 442,000	$ 6,198,000
2	Drainage & Utilities	$ 145,000	$ 190,000	$ 81,000	$ 123,000	$ 152,000	$ -	$ 5,000	$ 1,000	$ -	$ 697,000
3	Roadway Items	$ 2,802,000	$ 3,179,000	$ 1,196,000	$ 3,007,000	$ 3,844,000	$ 490,000	$ 1,167,000	$ 633,000	$ 1,585,000	$ 17,903,000
4	Landscaping	$ 295,000	$ 365,000	$ 61,000	$ 173,000	$ 234,000	$ -	$ 644,000	$ 314,000	$ 785,000	$ 2,871,000
5	Traffic	$ 51,000	$ 56,000	$ 20,000	$ 50,000	$ 67,000	$ 54,000	$ 33,000	$ 16,000	$ 40,000	$ 387,000
6	Signal & Electrical	$ 253,000	$ 1,814,000	$ 826,000	$ 242,000	$ 998,000	$ 1,539,000	$ 308,000	$ 150,000	$ 375,000	$ 6,505,000
	Construction Subtotal	*$ 4,700,000*	*$ 7,100,000*	*$ 2,700,000*	*$ 4,700,000*	*$ 6,600,000*	*$ 2,100,000*	*$ 2,500,000*	*$ 1,300,000*	*$ 3,300,000*	$ 35,000,000
	Soft Costs & Contingency (see Note) 60%	*$ 2,820,000*	*$ 4,260,000*	*$ 1,620,000*	*$ 2,820,000*	*$ 3,960,000*	*$ 1,260,000*	*$ 1,500,000*	*$ 780,000*	*$ 1,980,000*	*$ 21,000,000*
	Total Project Cost	***$ 7,600,000***	***$ 11,400,000***	***$ 4,400,000***	***$ 7,600,000***	***$ 10,600,000***	***$ 3,400,000***	***$ 4,000,000***	***$ 2,100,000***	***$ 5,300,000***	***$ 56,400,000***

Notes:

1. Soft Costs include program management, project management, planning, engineering, survey, environmental clearance, environmental studies, construction management, outreach, and inspection
2. Totals may not add up due to rounding
3. The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgement as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will no vary from its opinions of probable costs.
4. This Estimate was prepared without City review and approval, and as such, may be subject to change during the City permitting process.
5. Underground non-pavement utilities such as, but not limited to, water, sanitary sewer, and gas are assumed to be at an adequate depth.

Cost Estimates

Long Term

Appendix B
Existing Transportation Data Memo

FEHR PEERS

Memorandum

Date: May 7, 2020

To: Jeffrey Banks, SFMTA

From: Ingrid Ballús Armet, Fehr & Peers

Subject: Lake Merced Bikeway Feasibility Study – Transportation Data Summary

SF16-0894.23

The Lake Merced Bikeway Feasibility Study (herein referred to as "Project") proposes a high-level feasibility evaluation of bicycle and pedestrian improvements around Lake Merced. This memo summarizes transportation data collected for this project. Transportation data includes counts, collisions, and speed surveys. The existing conditions map shows information relevant to the multi-use path around the lake (Lake Merced, John Muir, and Skyline) and the roadway configuration on Lake Merced.

Counts Summary

As part of this Project, Fehr & Peers proposed conducting peak hour multimodal (vehicle, bicycle, pedestrian) intersection turning-movement counts and vehicle classification counts on Lake Merced as well as pedestrian and bicycle counts on the off-street multi-use path around Lake Merced. However, due to travel behavior changes as a result of the COVID-19, counts and field visits for these will be delayed. We will coordinate with SFMTA as the project unfolds to understand when/if these can be collected and incorporate them to this summary.

Previous counts collected include intersection turning movement counts (collected by Fehr & Peers) and segment counts (collected by SFMTA) listed below:

Peak Hour Intersection Turning Movement Counts (collected by Fehr & Peers)

1. Lake Merced Blvd/Winston Dr
2. Lake Merced Blvd/Font Blvd
3. Lake Merced Blvd/Brotherhood Way
4. Lake Merced Blvd/State Dr

Segment Counts (collected by SFMTA)

1. Lake Merced Blvd between Higuera Ave and Font Blvd

2. Lake Merced Blvd between Brotherhood Way and John Muir Drive (at entrance to Camp Ida Smith)
3. John Muir Dr west of Lake Merced Blvd
4. John Muir Dr at entrance to Pacific Rod and Rifle Club (520 John Muir Dr)

Intersection turning movement counts include vehicle, pedestrian, and bicycle counts. Segment counts consist of 10-minute counts that were extrapolated to daily volumes and include vehicle counts only (see Appendix B for the calculation equation).

Table 1 shows the date and time each set of counts were collected. **Figure 1** summarizes vehicle counts and locations. **Figure 2** summarizes pedestrian and bicycle counts and locations. See **Appendix A** for Intersection Turning Movement Counts and **Appendix B** for Segment Count Data.

Table 1: Counts Summary

	Location	Date Collected	Time Periods Collected
Peak Hour Intersection Turning-Movement Counts (collected by Fehr & Peers)	1. Lake Merced Blvd / Winston Dr	March 29, 2018 (Thursday)	7-9 AM & 4-6 PM
	2. Lake Merced Blvd / Font Blvd		
	3. Lake Merced Blvd / Brotherhood Way		
	4. Lake Merced Blvd / State Dr		
Segment Counts (collected by SFMTA)	a) Lake Merced Blvd between Higuera Ave & Font Blvd	March 14, 2019 (Thursday)	9:58-10:08 AM & 1:15-1:25 PM
	b) Lake Merced Blvd between Brotherhood Way and John Muir Drive (at entrance to Camp Ida Smith)		
	c) John Muir Dr west of Lake Merced Blvd	February 12, 2020 (Wednesday)	24-hour counts
	d) John Muir Dr at entrance to Pacific Rod and Rifle Club (520 John Muir Dr)		

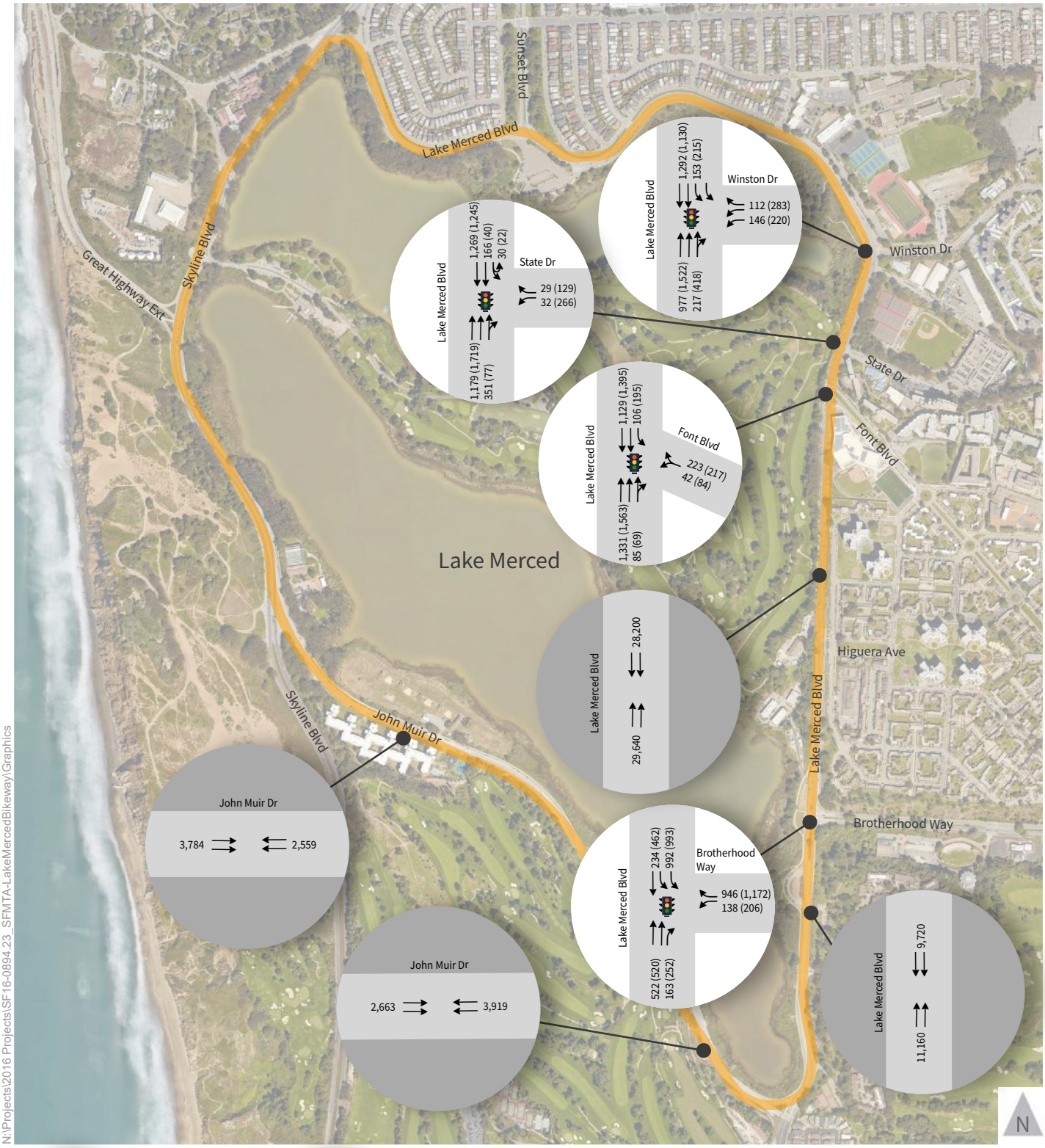


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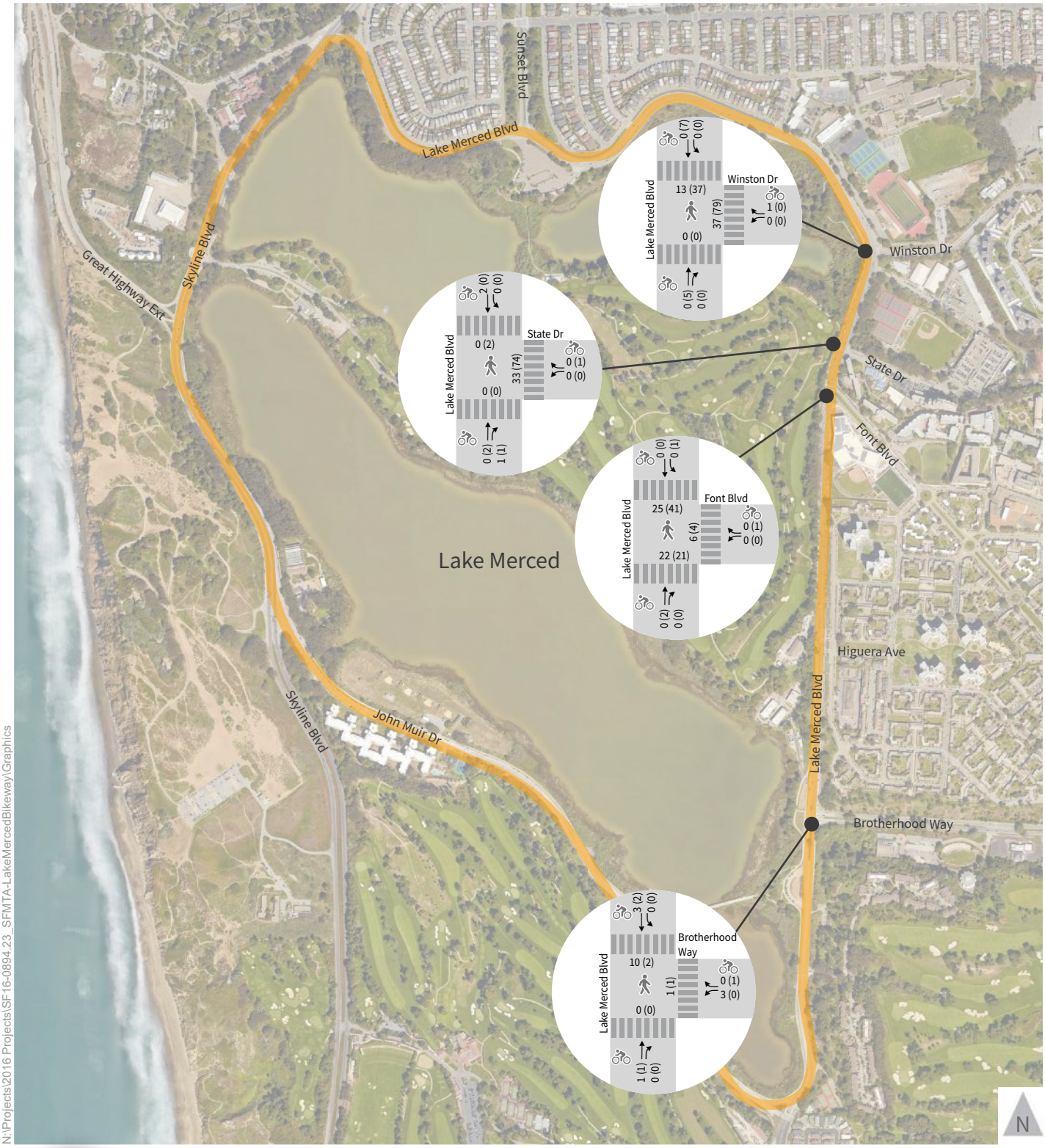
Figure 1

Lake Merced Vehicle Volumes

Note: Segment Counts are based on 10-minute counts



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AM (PM)
pedestrians or bicycles/hour

Study Area

Peak Hour Pedestrian and Bicycle Intersection Turning- Movement Counts

Figure 2

Lake Merced Pedestrian and Bicycle Volumes

Collisions

Collision data collected by SFMTA over a 5-year period between 2015-2019 indicate a total of 154 crashes occurred around Lake Merced. Of those 154 crashes, 10 involved a bicyclist and a vehicle and 10 involved pedestrians and vehicles. The intersections that saw the most collisions were:

- John Muir Dr/Skyline Blvd – 27 crashes
- Brotherhood Way/Lake Merced Blvd – 20 crashes
- John Muir Dr/Lake Merced Blvd – 16 crashes
- Lake Merced Blvd/Skyline/Zoo Rd – 14 crashes
- Great Hwy/Skyline Blvd – 12 crashes

Bicycle collisions occurred at the following locations and the main causes of bicycle-related collisions include left turn conflicts and vehicles encroaching on the bicycle right-of-way:

- Skyline Blvd/Harding Rd Intersection – 1 crash
- Skyline midblock north of Harding – 1 crash
- Skyline Blvd/Great Hwy Intersection – 3 crashes
- Lake Merced Blvd/John Muir Dr Intersection – 2 crashes
- Lake Merced Blvd Midblock north of Brotherhood Way – 1 crash
- Lake Merced Blvd Midblock south of Middlefield Dr – 1 crash
- Lake Merced Blvd/Winston Dr Intersection – 1 crash

Speed Surveys

Speed surveys from 2011 and 2019 were provided by SFMTA for John Muir and Winston Drive and for John Muir Drive between Skyline and Lake Merced Boulevard. 2011 speed data was collected from 12:05 PM to 2:30 PM on Wednesday, June 22, 2011 and 2019 speed data was collected from 10:08 AM to 2:02 PM on Thursday, March 14, 2019. Table 2 summarizes the speed surveys.

Generally, 85th percentile speeds are slightly above speed limits around the lake. 85th percentile speeds on Lake Merced are 10-13% higher than the posted speed limit and 5-20% higher on John Muir Dr.

Table 2: Speed Survey Summary

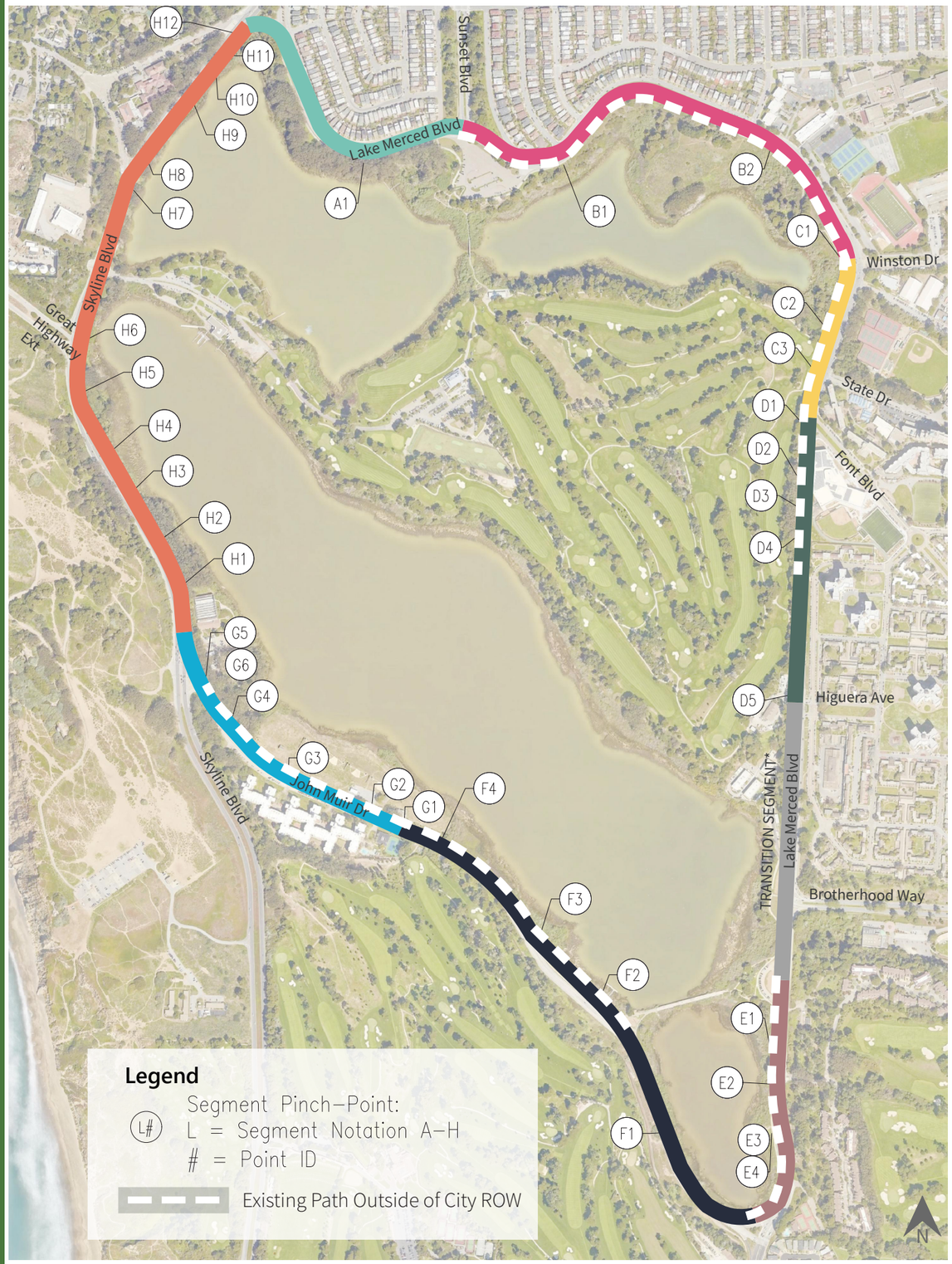
Location	Year	Existing Speed Limit (mph)	85th Percentile Speeds (mph)		Percent Above the Speed Limit
			Northbound	Southbound	
Lake Merced Blvd between Higuera Ave and Font Blvd	2019	40	44	45	10-13%
Lake Merced Blvd between Brotherhood Way and John Muir Drive (at entrance of Camp Ida Smith)			44	45	10-13%
			Eastbound	Westbound	
John Muir Dr between Lake Merced Blvd and Bridge Parking Lot	2011	40	43	42	5-8%
John Muir Drive between Bridge Parking Lot and Skyline Blvd		30	36	36	20%

Appendix C
Bikeway Alternatives Development

	Option 1 Off-Street Bike Facility	Option 2 On-Street Bike Facilites	
	Multi-Use Path	One-Way Bikeways	Two-Way Bikeway (Lake Side)
			
A 2,200ft	✓ Fits within existing cross section	✓ Fits within existing cross section	✓ Fits within existing cross section
B 3.600ft	! 2 feet needed Grading or curb changes (parts of the segment)	✓ Fits within existing cross section	✗ Curb on lake side must be moved (4-8 feet)
C 1,100ft	! 3 feet needed Moving existing fence or parking/travel lane removal	! Parking removal on both sides	! Parking and travel lane removal southbound (lake side)
D 2,100ft	✓ Fits within existing cross section	! Parking removal on both sides	! Parking removal on both sides
E 1,200ft	! 2 feet needed Grading or curb changes (parts of the segment)	! Travel lane removal southbound (lake side)	! Travel lane removal southbound (lake side)
F 4,100ft	! 2 feet needed Minor grading and bush removal	not studied	not studied
G 2,000ft	✓ Fits within existing cross section	not studied	not studied
H 5,000ft	✓ Fits within existing cross section	not studied	not studied

Bikeway Options

Feasibility Summary

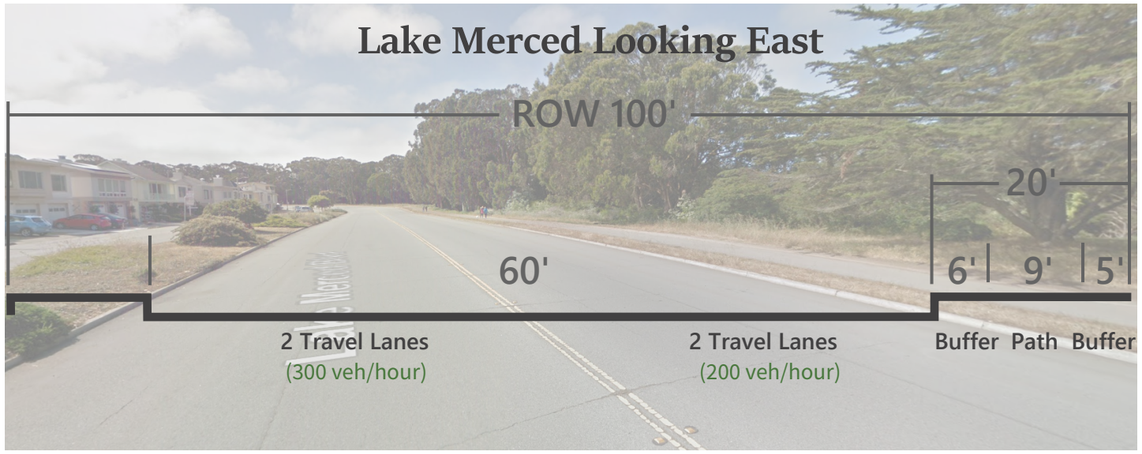


Option 1 objective: provide off-street bicycle facilities for two-way bicycle travel. The options presented in this packet look at improving the existing multi-use path to provide the minimum widths for the path and shoulders/ buffers shown below while maintaining the existing curbs.

- Existing path is outside of City ROW in some sections
- Grading or curb changes required in some sections
- Pinch point details are shown in Appendix B-1

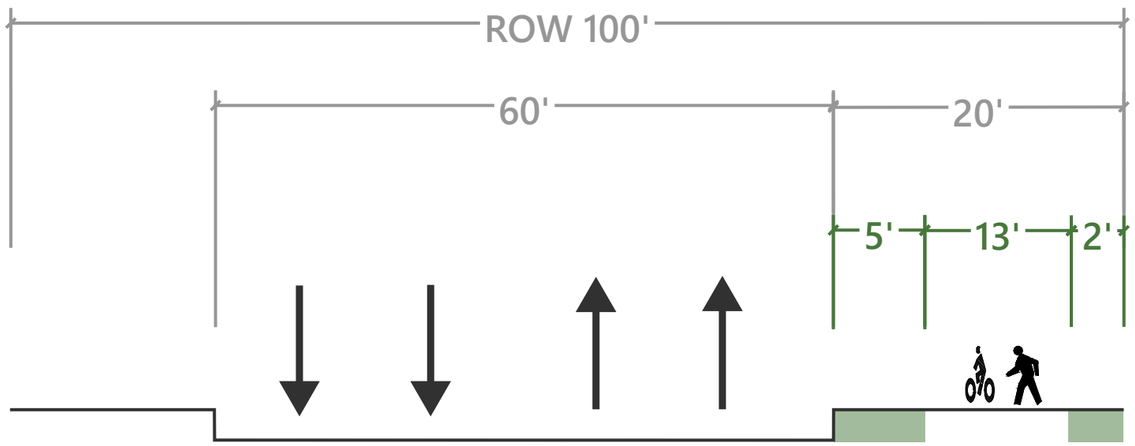
Option 1

Multi-Use Path



Existing Conditions

Bus route(s): 18



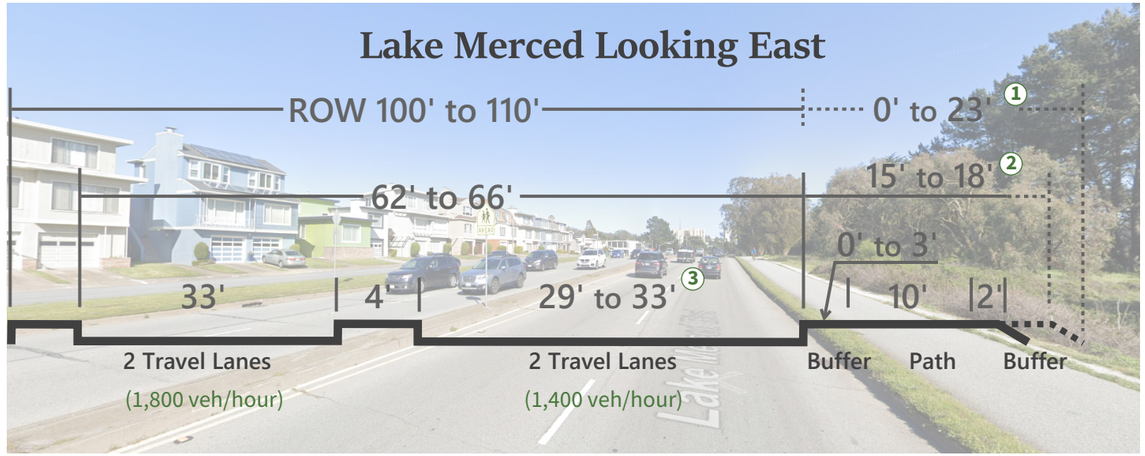
Preliminary Concept

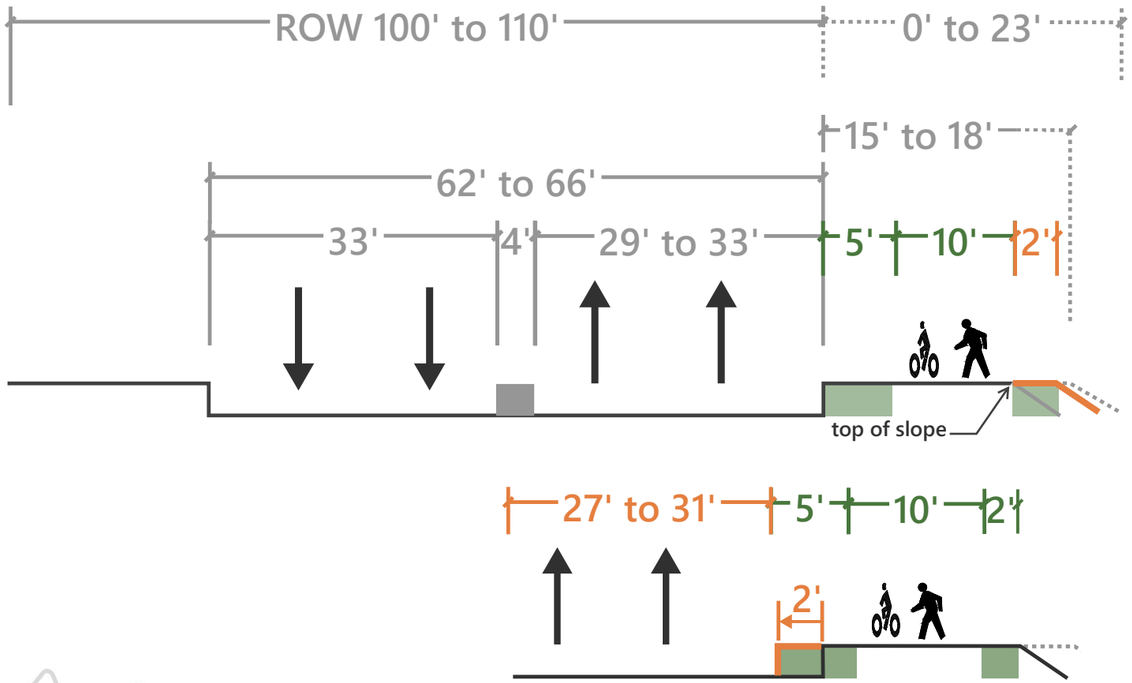
- Path fits within existing ROW and level section, no grading required
- Paved path to be widened from 9 feet (existing) to 13 feet

Option 1

Multi-Use Path

See Appendix C-1 for detailed pinch points for this segment (A1)





B

Option 1

Multi-Use Path

Existing Conditions

Bus route(s): 18, 29

① ROW alignment varies between 0 and 23 feet from edge of curb on west side of the road

② Top of embankment slope distance from curb on west side of the road varies from 15 to 18 feet

③ Curb-to-curb distance on west side varies from 29 to 33 feet with two travel lanes; width is larger (up to 43 feet) to include right-turn pockets at intersections

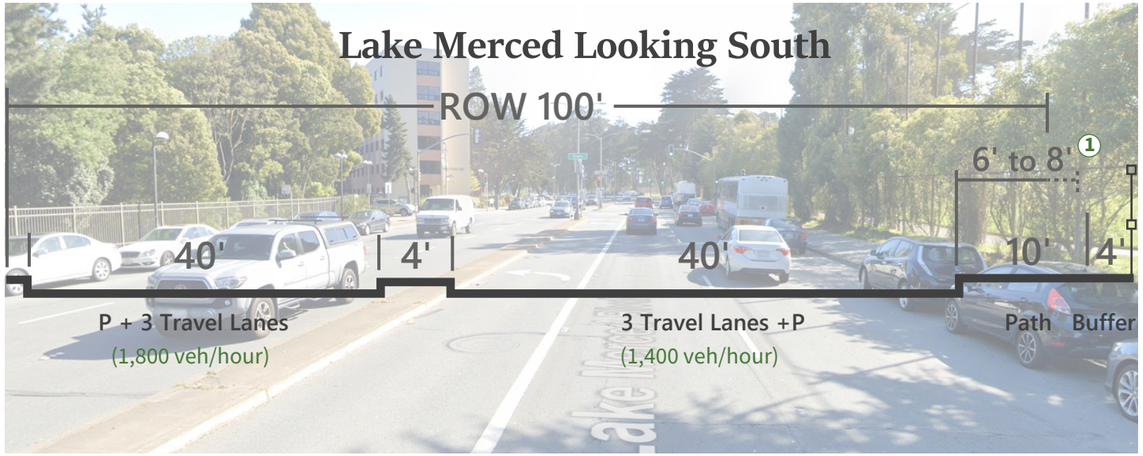
Preliminary Concept

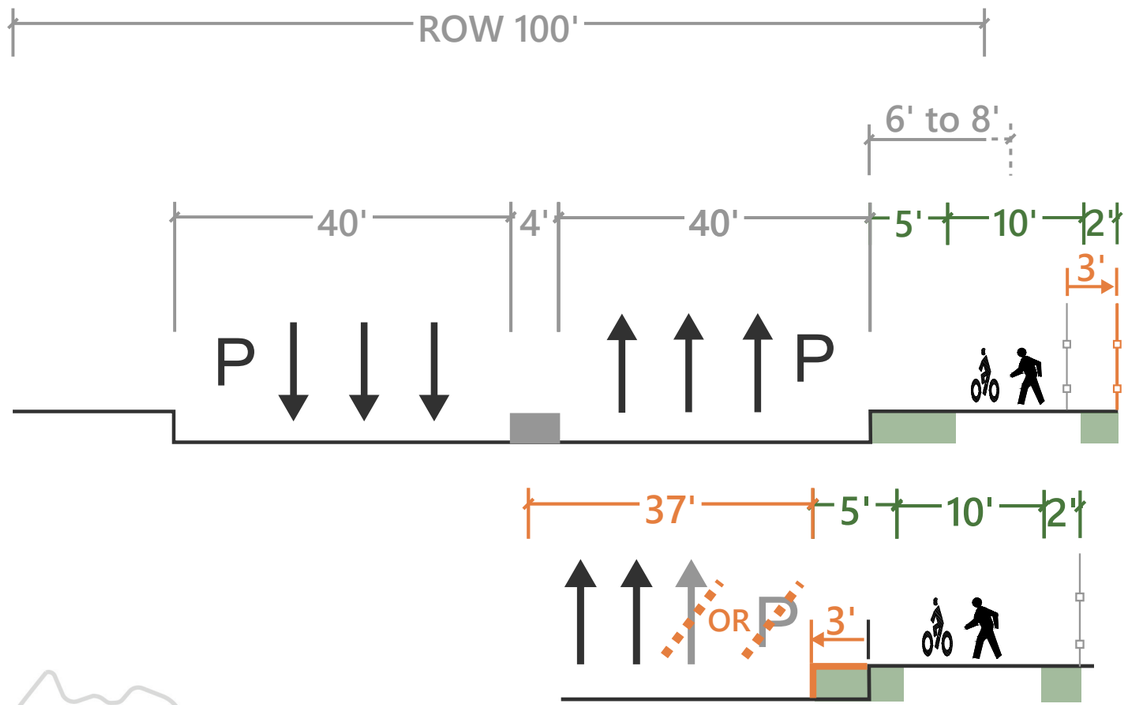
- Grading needed (2 feet) in parts of the segment where top of slope is only at 15 feet from the edge of curb

Alternative Concept

- Path could be widened 2 feet into the roadway; number of travel lanes maintained but lane width reduced

See Appendix C-1 for detailed pinch points for this segment (B1-B2)





Existing Conditions

Bus route(s): 57

① ROW alignment varies between 6 and 8 feet from edge of curb on west side of the road

Preliminary Concept

- Requires moving existing fence line by 3 feet

Alternative Concept

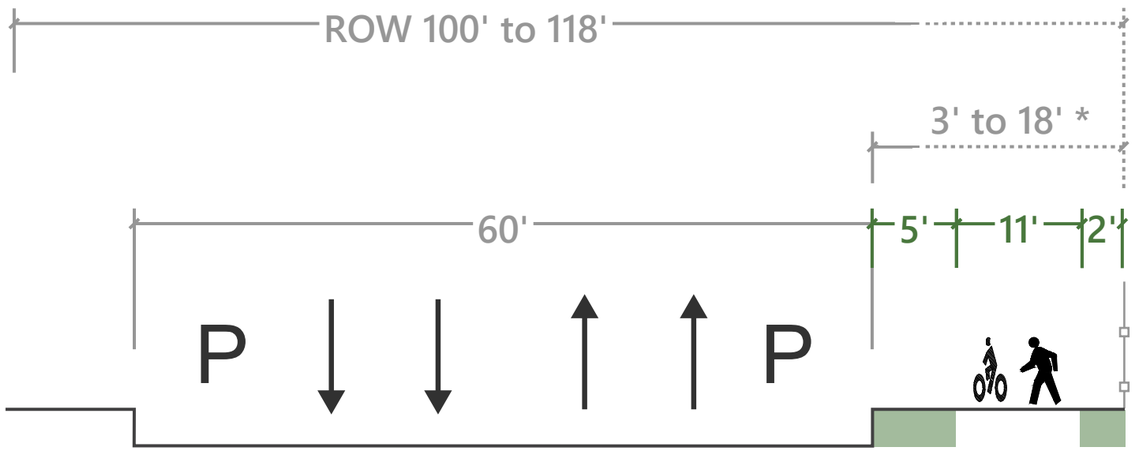
- Path could be widened 3 feet into the roadway; requires travel or parking lane removal

C1

Option 1

Multi-Use Path

See Appendix C-1 for detailed pinch points for this segment (C1-C3)



Existing Conditions

① ROW alignment varies between 3 feet and 18 feet from edge of curb on west side of the road

Preliminary Concept

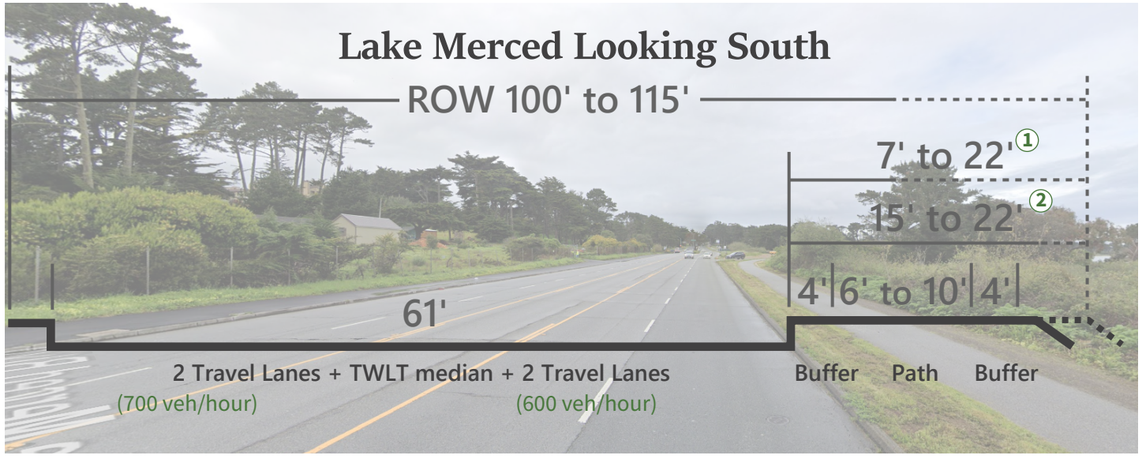
- Path fits within existing curb to fence area
- Paved path to be widened from existing 8 feet to 11 feet

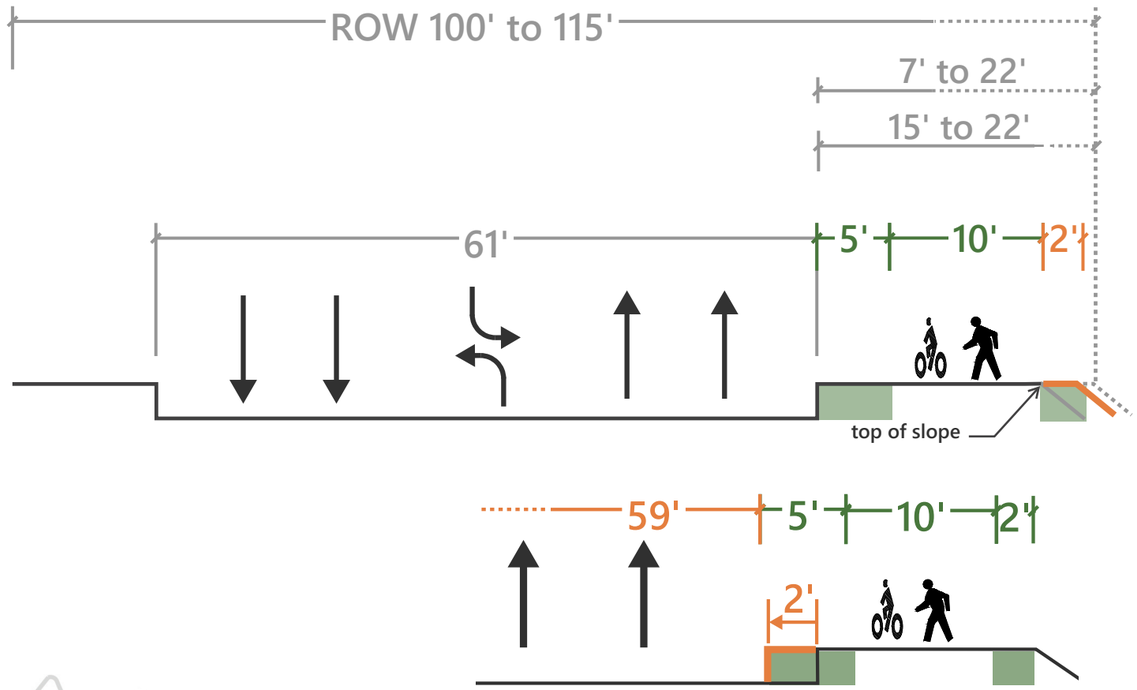
D1

Option 1

Multi-Use Path

See Appendix C-1 for detailed pinch points for this segment (D1-D5)





E

Option 1

Multi-Use Path

Existing Conditions

Bus route(s): 57

① ROW alignment varies between 7 and 22 feet from edge of curb on west side of the road

② Top of embankment slope distance from curb on west side of the road varies from 15 to 22 feet

Preliminary Concept

- Grading needed (2 feet) in parts of the segment where top of slope is only at 15 feet from the edge of curb

Alternative Concept

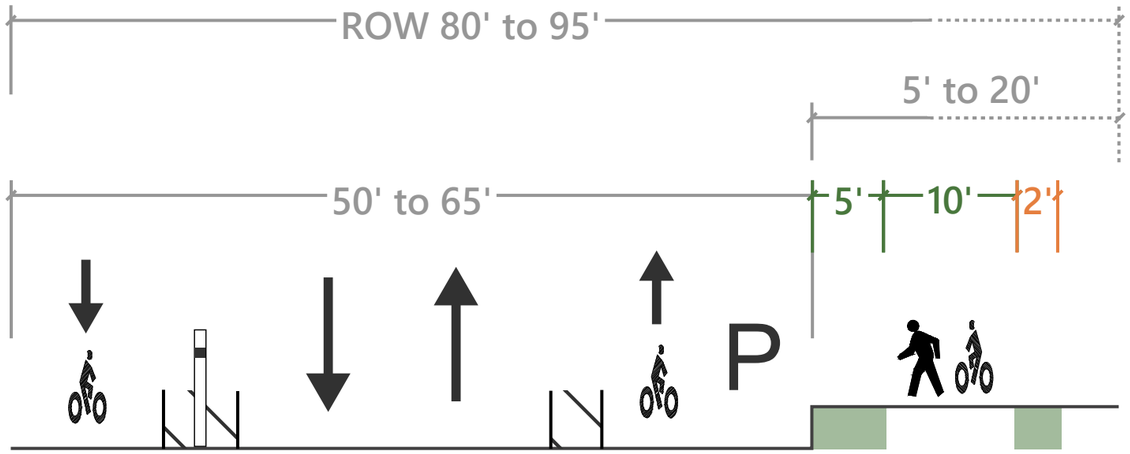
- Path could be widened 2 feet into the roadway; number of travel lanes maintained but lane width reduced

See Appendix C-1 for detailed pinch points for this segment (E1-E4)

Existing Conditions

Bus route(s): 57

① ROW alignment varies between 5 and 20 feet from edge of curb on east side of the road



Preliminary Concept

- Minor grading and bush removal required to widen existing path (2 feet)
- Paved path to be widened from existing 9 feet to 10 feet

Option 1

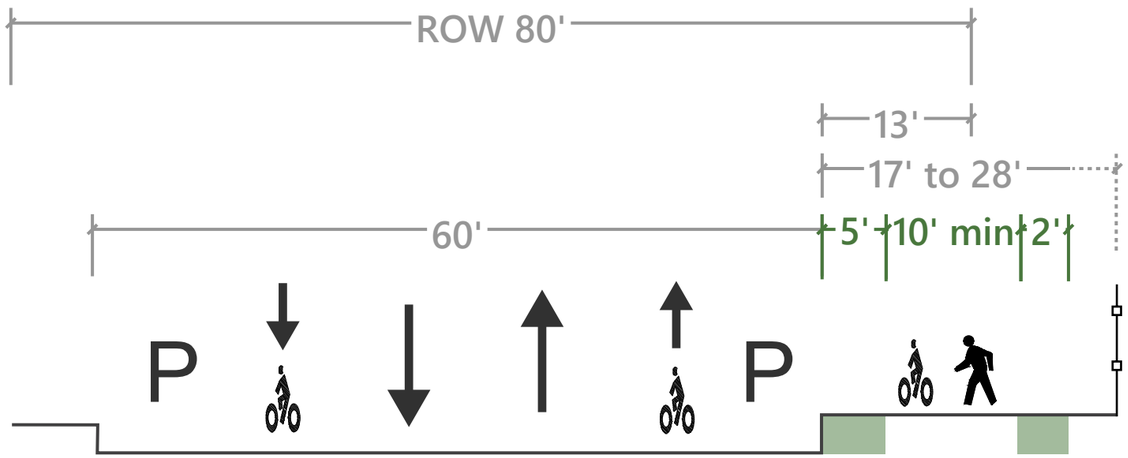
Multi-Use Path

See Appendix C-1 for detailed pinch points for this segment (F1-F4)

Existing Conditions

Bus route(s): 57

① Curb to fence distance on east side of the road varies between 17 and 28 feet



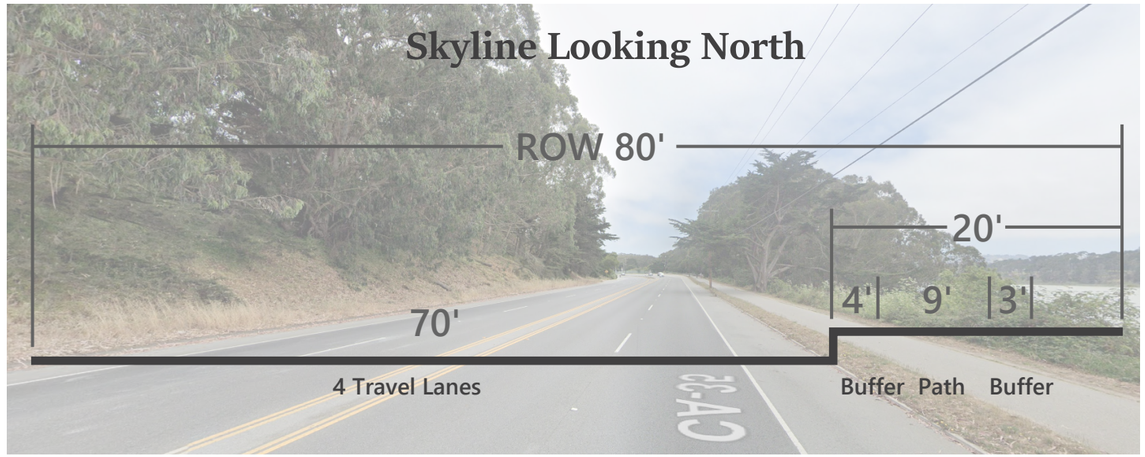
Preliminary Concept

- Path fits within existing curb to fence area
- Paved path to be widened from existing 9 feet to 10 feet (minimum)

Option 1

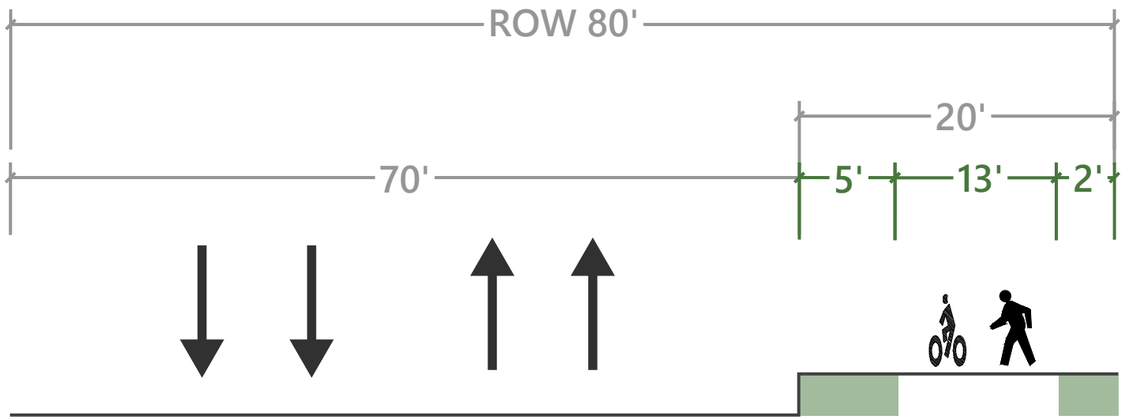
Multi-Use Path

See Appendix C-1 for detailed pinch points for this segment (G1-G6)



Existing Conditions

Bus route(s): 57



Preliminary Concept

- Path fits within existing ROW and level section, no grading required
- Paved path to be widened from 9 feet (existing) to 13 feet

H

Option 1

Multi-Use Path

See Appendix C-1 for detailed pinch points for this segment (H1-H12)

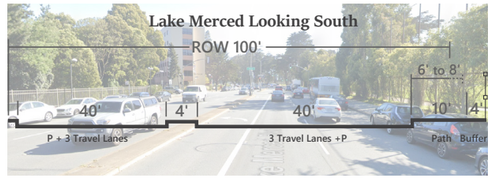
Feasibility Summary

Bus	PM Peak Hour SB/EB NB/WB	Lane removal possible?	Option 2.1 One-Way Bikeways	Option 2.2 Two-Way Bikeway (Lake Side)
18	200 300	Yes in either direction	Fits as is	Fits as is
18, 29	1,400 1,800	No	Fits as is	Fits where curb to median is 40'; does not fit where curb to median is less than 40'
57	1,400 1,800	Yes in SB direction	Would require parking removal or travel lane removal	Would require removal of parking lane and 1 SB through lane
	1,400 1,800	No	Would require parking removal or travel lane removal	Would require parking removal or travel lane removal
57	600 700	Yes in either direction	Would require removal of 1SB through lane	Would require removal of 1SB through lane

A

B

C



D

E

Option 2 objective: provide on-street bicycle facilities on for two-way bicycle travel on Lake Merced Boulevard. This packet presents two options that satisfy minimum widths requirements for the bikeway(s) and buffer(s), as well as the parking and travel lanes, while maintaining the existing curbs.

Option 2.1 One-Way Bikeways

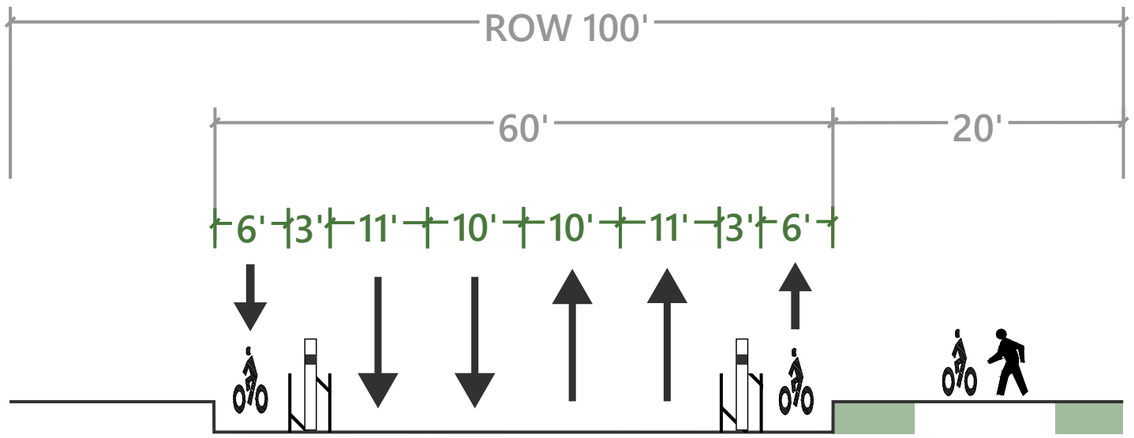
Option 2.2 Two-Way Bikeway (Lake Side)

Option 2

On-Street Bikeway

Existing Conditions

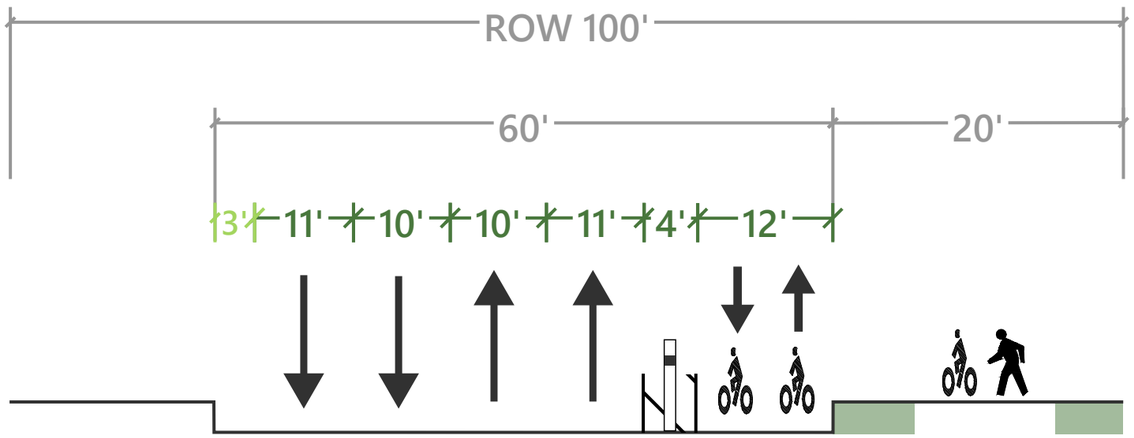
Bus route(s): 18



Preliminary Concept 2.1

One-Way Bikeways

- Number of travel lanes maintained
- Lane width reduction



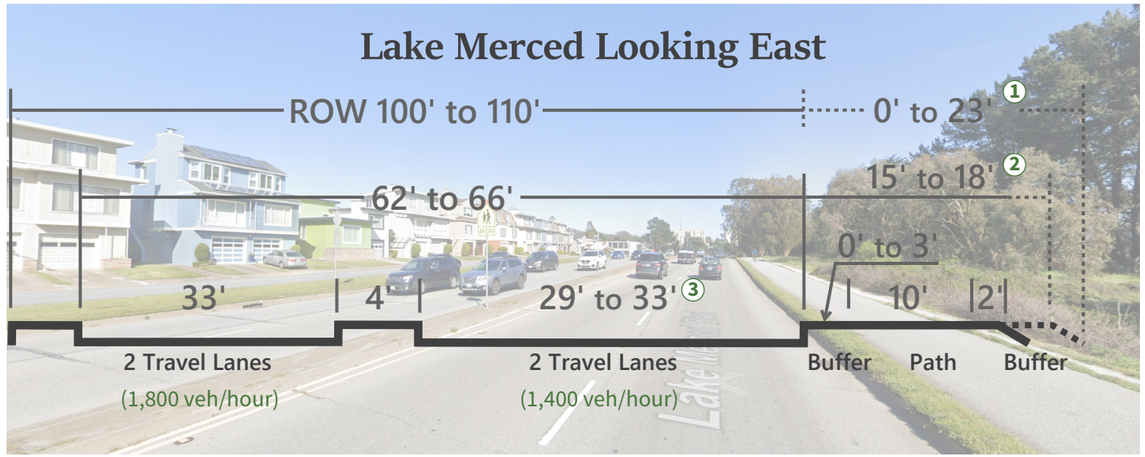
Preliminary Concept 2.2

Two-Way Bikeway (Lake Side)

- Number of travel lanes maintained
- Lane width reduction
- 3 feet “extra” to be allocated

Option 2

On-Street Bikeway



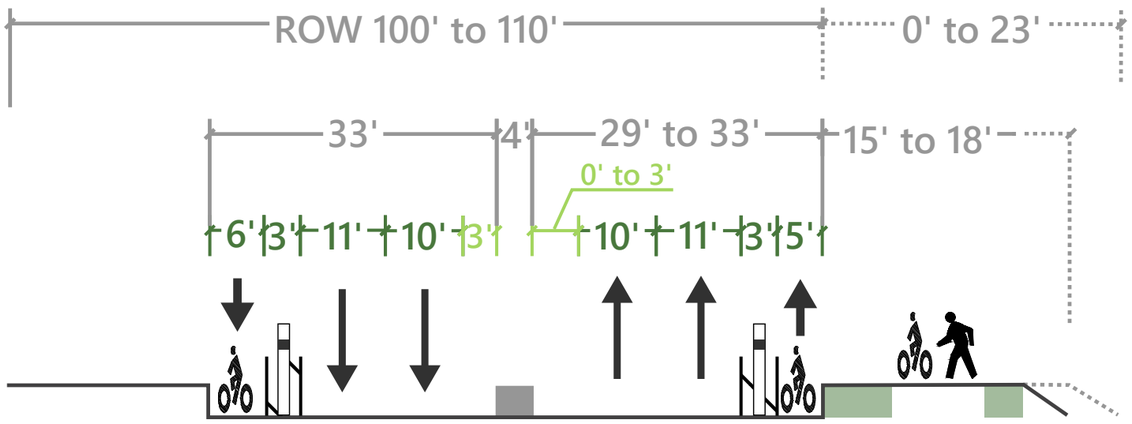
Existing Conditions

Bus route(s): 18, 29

① ROW alignment varies between 0 and 23 feet from edge of curb on west side of the road

② Top of embankment slope distance from curb on west side of the road varies from 15 to 18 feet

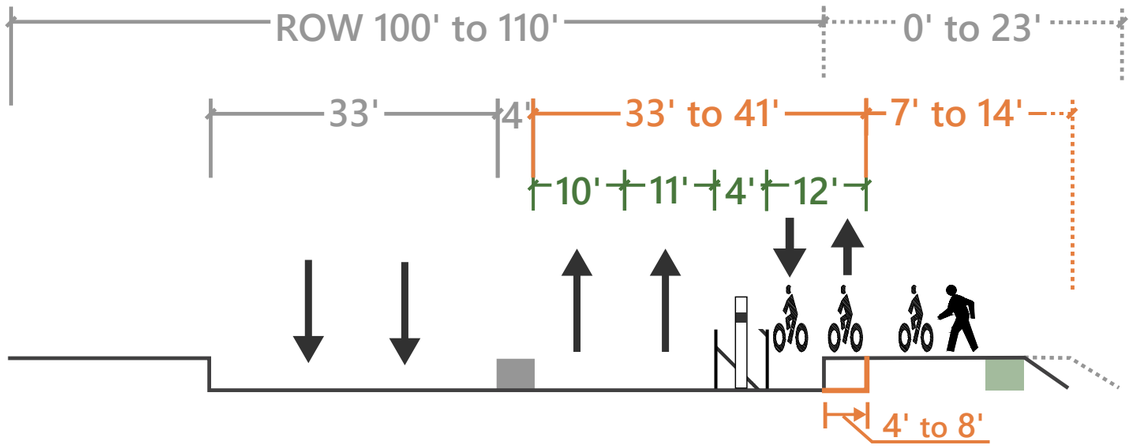
③ Curb-to-curb distance on west side varies from 29 to 33 feet with two travel lanes; width is larger (up to 43 feet) to include right-turn pockets at intersections



Preliminary Concept 2.1

One-Way Bikeways

- Number of travel lanes maintained
- Lane width reduction
- 3 feet "extra" to be allocated on each side of the road



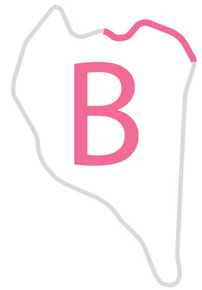
Preliminary Concept 2.2

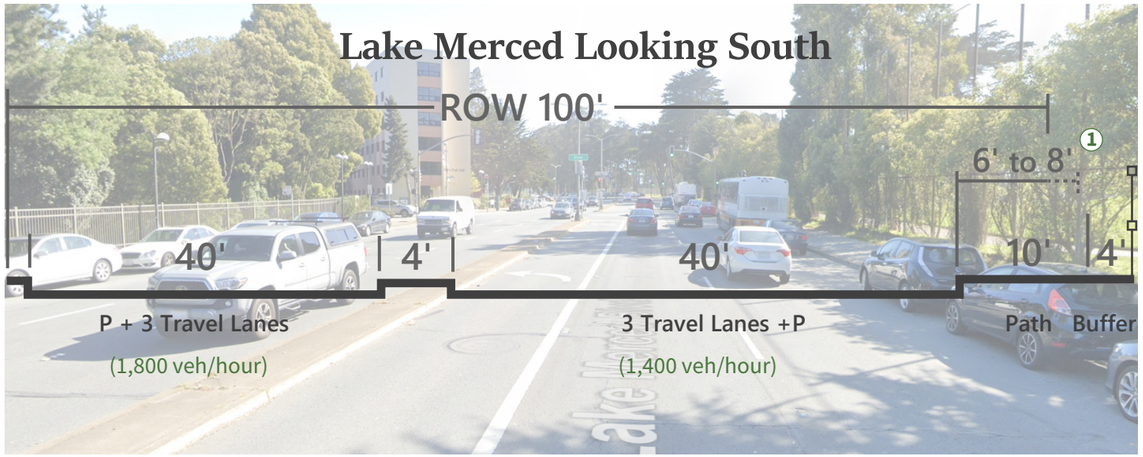
Two-Way Bikeway (Lake Side)

- Lane removal not feasible given traffic volumes
- **Curb on lake side must be moved by 4 to 8 feet**
- Alternatively, could remove median to minimize impact to multi-use path

Option 2

On-Street Bikeway

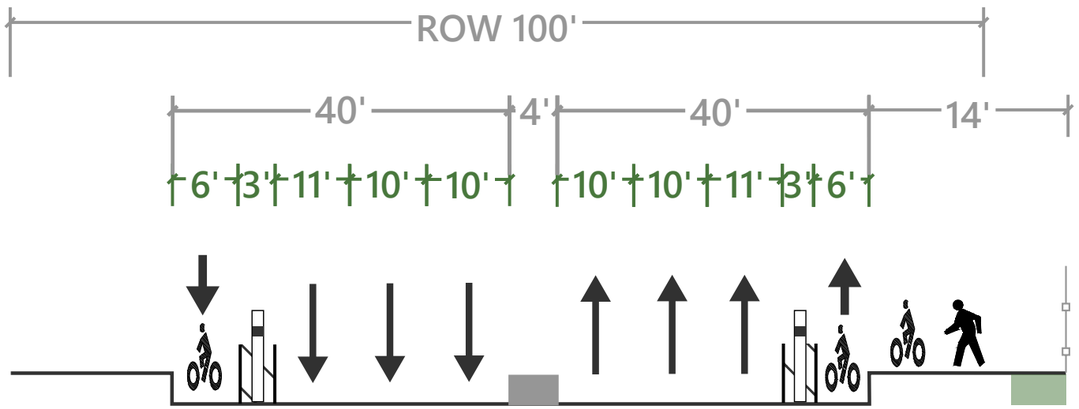




Existing Conditions

Bus route(s): 57

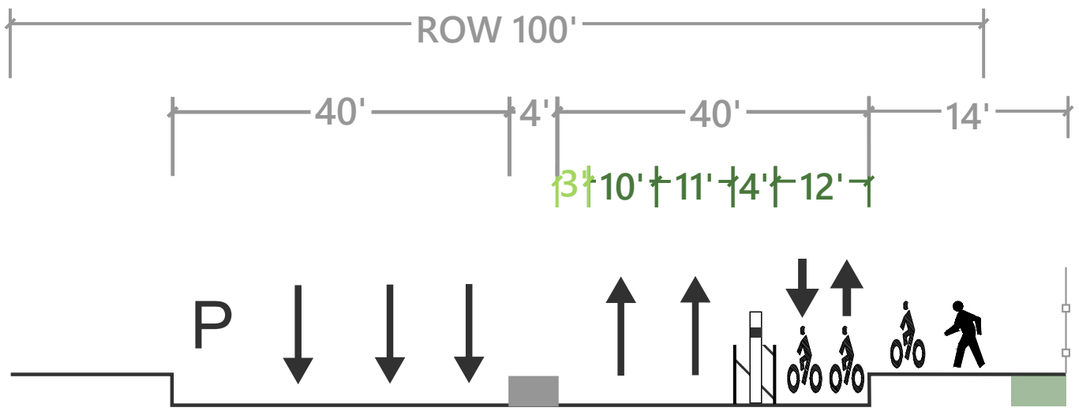
① ROW alignment varies between 6 and 8 feet from edge of curb on west side of the road



Preliminary Concept 2.1

One-Way Bikeways

- Number of travel lanes maintained; lane removal only feasible southbound given traffic volumes
- **Parking removal on both sides**
- Alternatively, could remove 1 travel lane southbound instead, but parking removal is preferred for pedestrian safety



Preliminary Concept 2.2

Two-Way Bikeway (Lake Side)

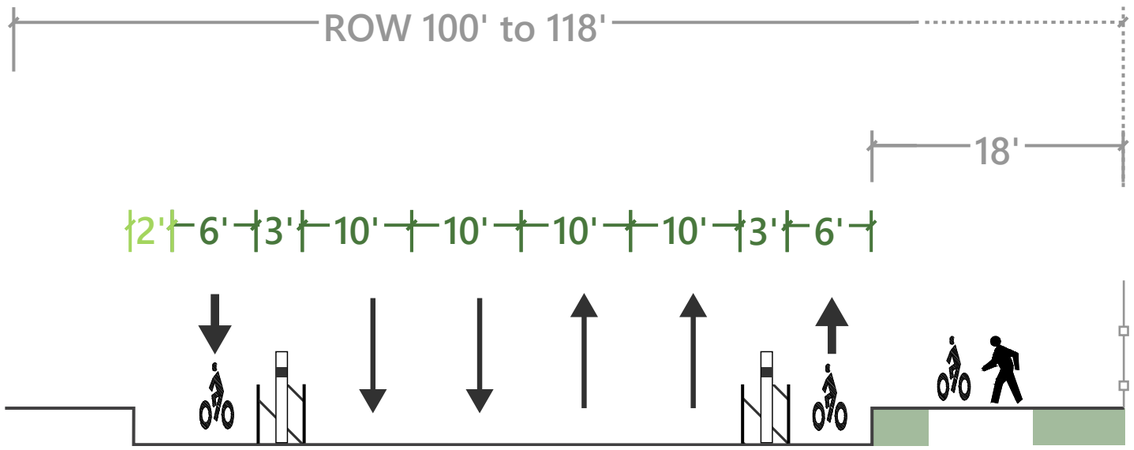
- Parking and travel lane removal southbound
- 3 feet “extra” to be allocated

Option 2

On-Street Bikeway

Existing Conditions

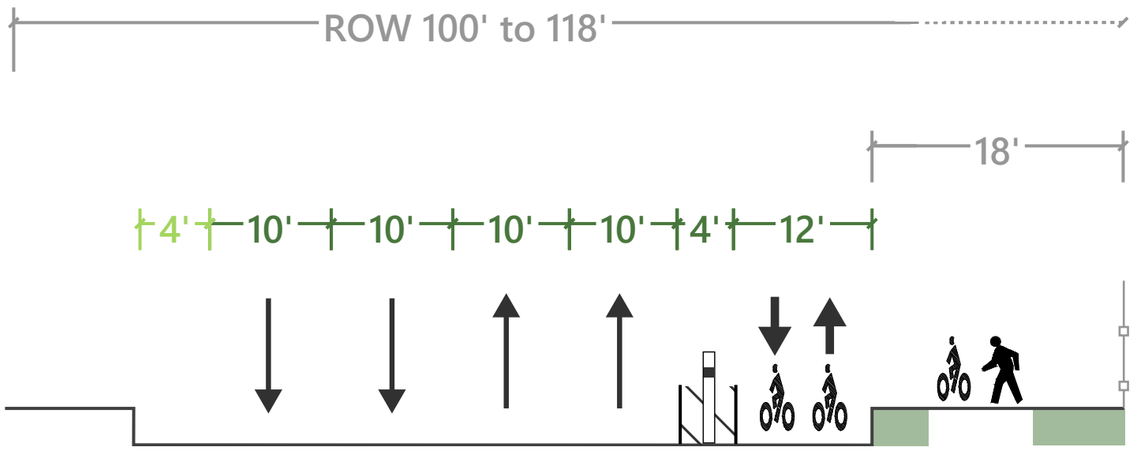
① ROW alignment varies between 3 feet and 18 feet from edge of curb on west side of the road



Preliminary Concept 2.1

One-Way Bikeways

- Number of travel lanes maintained; lane removal not feasible given traffic volumes
- **Parking removal on both sides**
- 2 feet "extra" to be allocated



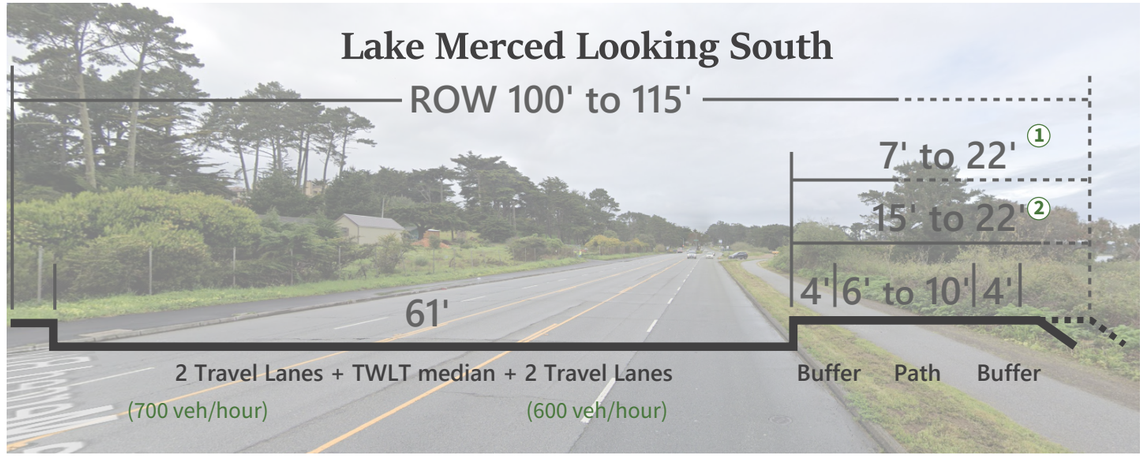
Preliminary Concept 2.2

Two-Way Bikeway (Lake Side)

- Number of travel lanes maintained; lane removal not feasible given traffic volumes
- **Parking removal on both sides**
- 4 feet "extra" to be allocated

Option 2

On-Street Bikeway

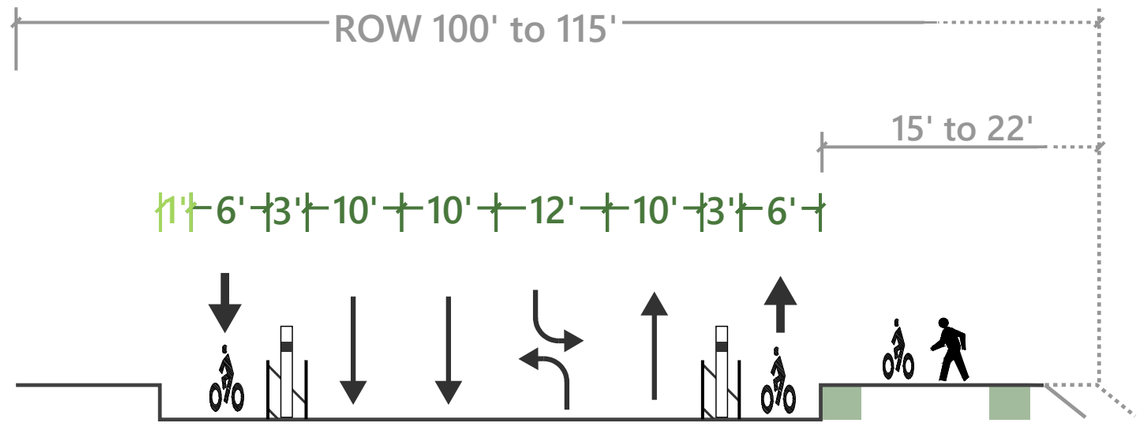


Existing Conditions

Bus route(s): 57

① ROW alignment varies between 7 and 22 feet from edge of curb on west side of the road

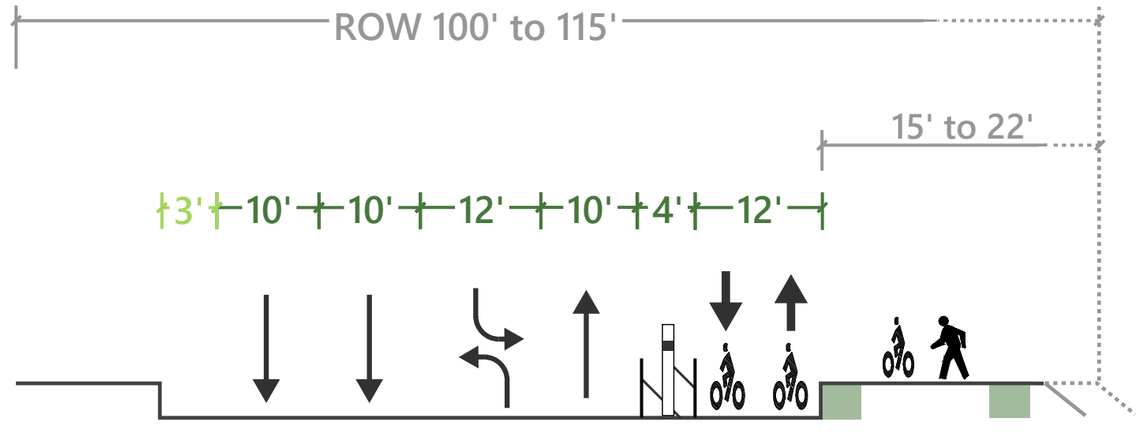
② Top of embankment slope distance from curb on west side of the road varies from 15 to 22 feet



Preliminary Concept 2.1

One-Way Bikeways

- **Travel lane removal southbound**
- 1 foot “extra” to be allocated



Preliminary Concept 2.2

Two-Way Bikeway (Lake Side)

- **Travel lane removal southbound**
- 3 feet “extra” to be allocated

Option 2

On-Street Bikeway

Appendix C-1
Detailed Pinch Points

Purpose

The Constraints Map was compiled from a range of data sources generated over a time line of approximately 90 years (see Reference List). As a result, some of this information was found to be conflicting or incomplete.

To aid the designer this supplement was created to identify the 'pinch points', or locations where the ability to widen the path, say for example 15-ft to 17-ft from the curb line to the lakeside, may be impacted by:

- a 'hard' constraint such as a tree, fence, structure, or the need to extend out over an embankment slope
- a 'soft' constrain such as the jurisdictional boundaries along the operating right-of-way of the roadway

Caveat

Note that the bulk of the route around Lake Merced has not been surveyed. Where survey has been undertaken it was noted that discrepancies were observed between the survey and the City of San Francisco's digital mapping (base map and topographic map). As a result, additional spot checking in the field was recommended and was completed the weekend of May 23/24. Note this supplement excludes Park infrastructure outside the operating right-of-way of the roadway.

Format

Map – Annotated base map in *.pdf format identifying Segments A-H and an alpha numeric ID for pinch points for each segment. The map indicates the approximate limits of top of embankment slope and the approximate narrowest offset from the curb.

Supplement – The supplement is organized as shown below:

Cross Section: Segment (A-H)
Pinch Point: Route (Lake Merced Blvd, John Muir Drive, Skyline)

Minimum existing paved path width = X-ft
Gross width from curb to right of way line = X-ft

Figure *Segment ID – Description*

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by ……
2. Widening to street side of paved path is limited by …….

Cross Section: A
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width = 9-ft
Gross width from curb to right of way line = 20 ft

Figure A1 – Lake Merced Blvd west of Sunset

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by embankment slope which is approximately 21 ft from the curb at the pinch point
2. Widening to street side of paved path is limited by locally poles and signage in the buffer zone
3. Widening of paved path to street side to consider curvature of the street and drainage inlets

Cross Section: B
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width = 7-ft
Gross width from curb to right of way line = 10-ft
Distance from curb to top of embankment slope = 18-ft +/- min

Figure B1 – Lake Merced Blvd looking from Clearfield to Sunset

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by top of embankment slope, trees and shrubs and outcrops
2. Widening to street side of paved path is limited by drainage inlets and manholes
3. Widening of paved path to street side curb would also need to consider turn pockets and curvature

Cross Section: B
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width = 7-ft to 11-ft
Gross width from curb to right of way line = varies from -1 ft (entire path outside of right-of-way) to 27 ft
Distance from curb to top of embankment slope = 15-ft +/- min

Figure B2 – Lake Merced Blvd looking from Middlefield to Winston

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by top of embankment slopes, trees and shrubs and rope fence
2. Widening to street side of paved path is limited by drainage inlets and manholes and poles at Middlefield & Winston
3. Widening of paved path to street side curb would also need to consider bus stop, turn pockets and curvature

Cross Section: C
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width = 9-ft
Gross width from curb to right of way line = varies 6-ft (inside path) to 11-ft
Distance from curb to top of embankment slope = 18-ft +/- min

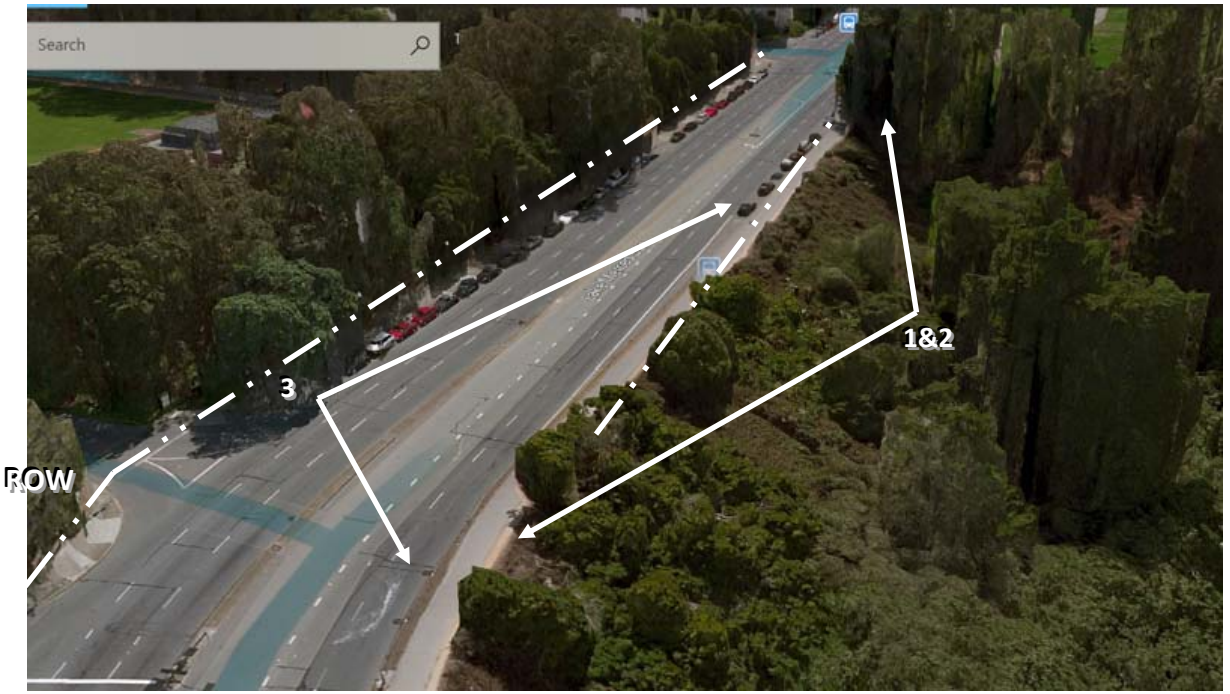


Figure C1 – Lake Merced Blvd at Winston Looking South to State

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence at south end near State St and embankment slope
2. Widening to street side of paved path is limited by Parking at south end near State St , drainage inlets and light and signal poles at intersections (No Cross Walk at State)
3. Widening of paved path to street side curb would need to consider curved alignments, turn pockets and parking impacts

Cross Section: C
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width =10-ft (offset from edge of path to corner of fence 3'-10" +/- per DPW Survey)
Gross width from curb to right of way line = varies 6-ft (inside path)
Distance from curb to top of embankment slope = 18-ft +/- min

Figure C2 – Lake Merced Blvd at NE Corner of Golf Course Fence

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence (3-ft 10-in from edge of path) and embankment slope (18-ft min from curb)
2. Widening to street side of paved path is limited by parking and drainage inlets and light and signage
3. Widening of paved path to street side curb would need to consider parking impacts
4. Assumed that tree stumps and roots can be removed

Cross Section: C
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width =10-ft
Gross width from curb to right of way line = 6-ft (inside path)

Figure C3 – Lake Merced Blvd at State looking South to Font

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence at trees and shrubs (13-ft from curb)
2. Widening to street side of paved path is limited by Parking, drainage inlets and light and signal poles at intersections (Note there is no crosswalk at State St.)
3. Widening of paved path to street side curb would need to consider turn pockets

Cross Section: D
Pinch Point: Lake Merced Boulevard – Font Crosswalk and Park Rest Area

Minimum existing paved path width = 12-ft +/- per spot field measure
Gross width from curb to right of way line = ROW line varies 3-ft min at approach walk and 14-ft 8in at bulb out

Figure D1 – Lake Merced Blvd at Font

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by trees (20-ft +/- from curb)and park rest area bench (15-ft +/- curb)
2. West side of paved path is outside the operational right-of-way of Lake Merced Blvd. Bulb out is within operating right-of-way
3. Widening to street side of paved path is limited by signal and would need to consider crosswalk and curb ramps

Cross Section: D
Pinch Point: Lake Merced Boulevard – Raised Sidewalk Profile (up to 3-ft max above gutter flow line per spot field measure)

Minimum existing paved path width =7-ft 6-in +/- per spot field measure with 6-ft buffer
Gross width from curb to right of way line = 8-ft (inside path)

Figure D2 – Lake Merced Blvd at north end of raised sidewalk profile (At Font Blvd)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence (18-ft +/- from curb)
2. Widening to street side of paved path is limited by traffic signals and signs
3. Widening of paved path to street side curb would need to consider driveway, crosswalk, drain inlet and manhole access
4. Estimated length of the raised profile = 250 ft (Need survey)

Cross Section: D
Pinch Point: Lake Merced Boulevard – Raised Sidewalk Profile (up to 3-ft max above gutter flow line per spot field measure)

Minimum existing paved path width = 8-ft
Gross width from curb to right of way line = 13-ft

Figure D3 – Lake Merced Blvd at center of raised sidewalk profile (south of Font Blvd)

IMPROVEMENT CONSIDERATIONS

1. Fence line (varies 18-ft +/- min from curb)
2. Trees/roots would be adversely impacted by improvements with lower profile grade
3. Estimated length of the raised profile = 250 ft (Need survey)

Cross Section: D
Pinch Point: Lake Merced Boulevard – Raised Sidewalk Profile (up to 3-ft max above gutter flow line per spot field measure)

Minimum existing paved path width = 8-ft
Gross width from curb to right of way line = 3-ft to 20-ft

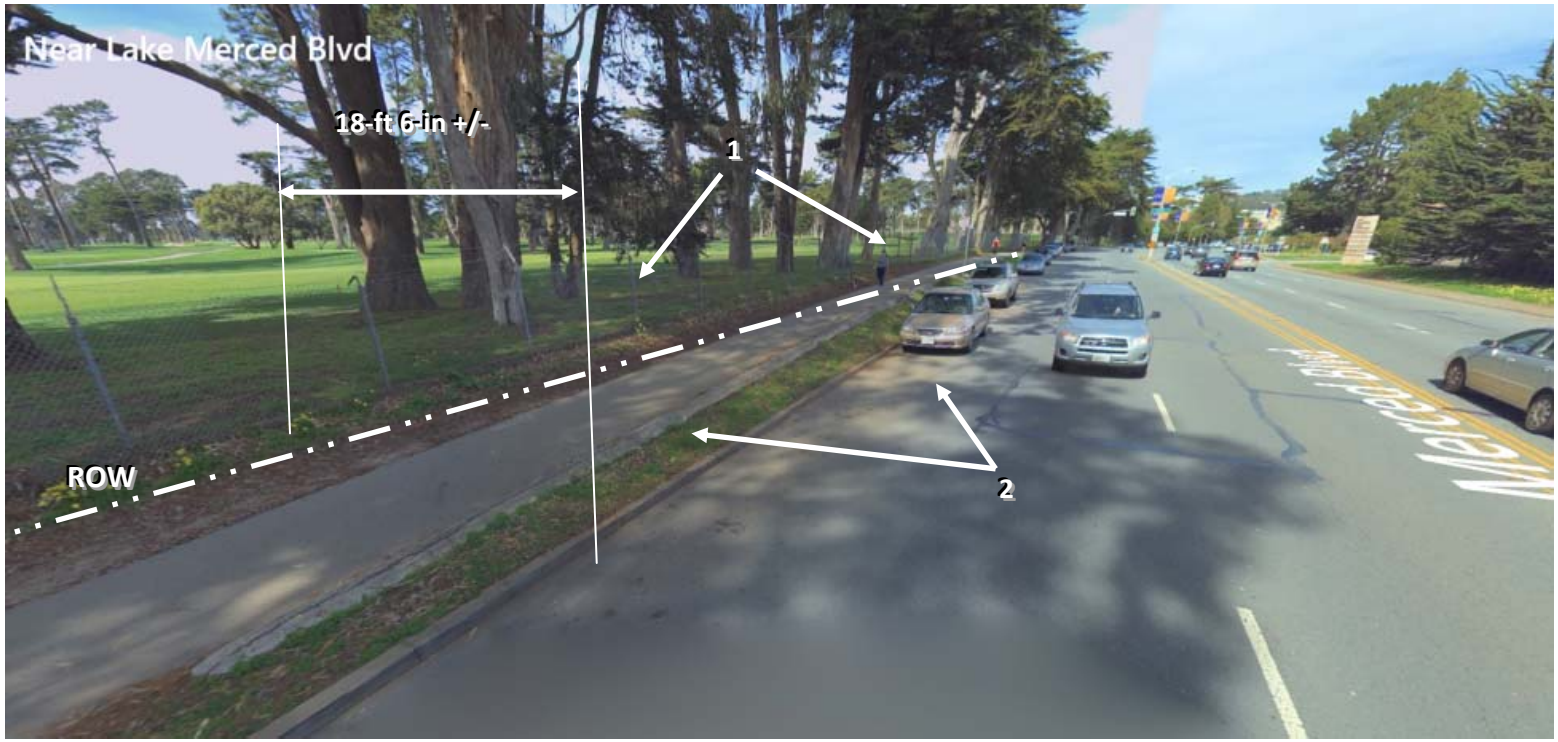


Figure D4 – Lake Merced Blvd at south end of raised sidewalk profile (Near Vidal Dr)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence and must consider Golf Course trees & roots in proximity
2. Widening to street side of paved path with raised profile grade is limited space needed to access parked cars
3. Estimated length of the raised profile = 250 ft (Need survey)
4. Sidewalk cuts through ROW approaching the Font intersection

Cross Section: D
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width = 8-ft 6-in +/-
Gross width from curb to right of way line = 20-ft (8.5-ft grass, 8.5 ft paved path, 3-ft buffer)

Figure D5 – Lake Merced Blvd at Higuera (Harding Park Maintenance Access)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence (18-ft 3-in +/- per field spot measure from curb)
2. Widening to street side of paved path is limited by traffic signals at the Higuera intersection
3. Widening of paved path to street side curb would need to consider driveway, crosswalk and manhole access and drainage

Cross Section: E
Pinch Point: Lake Merced Boulevard

Minimum existing path width = 14.5 ft +/- (4-ft dirt, 6-ft 6-in paved path, 4-ft buffer)
Gross width from curb to right of way line = 8-ft (inside path)

Figure E1 – Lake Merced Blvd at North Lake Merced Hills Drive Intersection (Looking South)

IMPROVEMENT CONSIDERATIONS

1. Widening to street side of paved path is limited by a cluster of street light and signal standards and electrical cabinet
2. Widening to lakeside is limited by embankment slope (16-ft +/- per City topo map that needs survey verification)
3. Widening of paved path to street side curb to consider two drainage inlets approx. 30-in inside typical curb line and connections to main

Cross Section: E
Pinch Point: Lake Merced Boulevard

Minimum existing path width = 14.5 ft +/- (4-ft dirt, 6-ft 6-in paved path, 4-ft buffer)
Gross width from curb to right of way line = 8-ft (inside path)

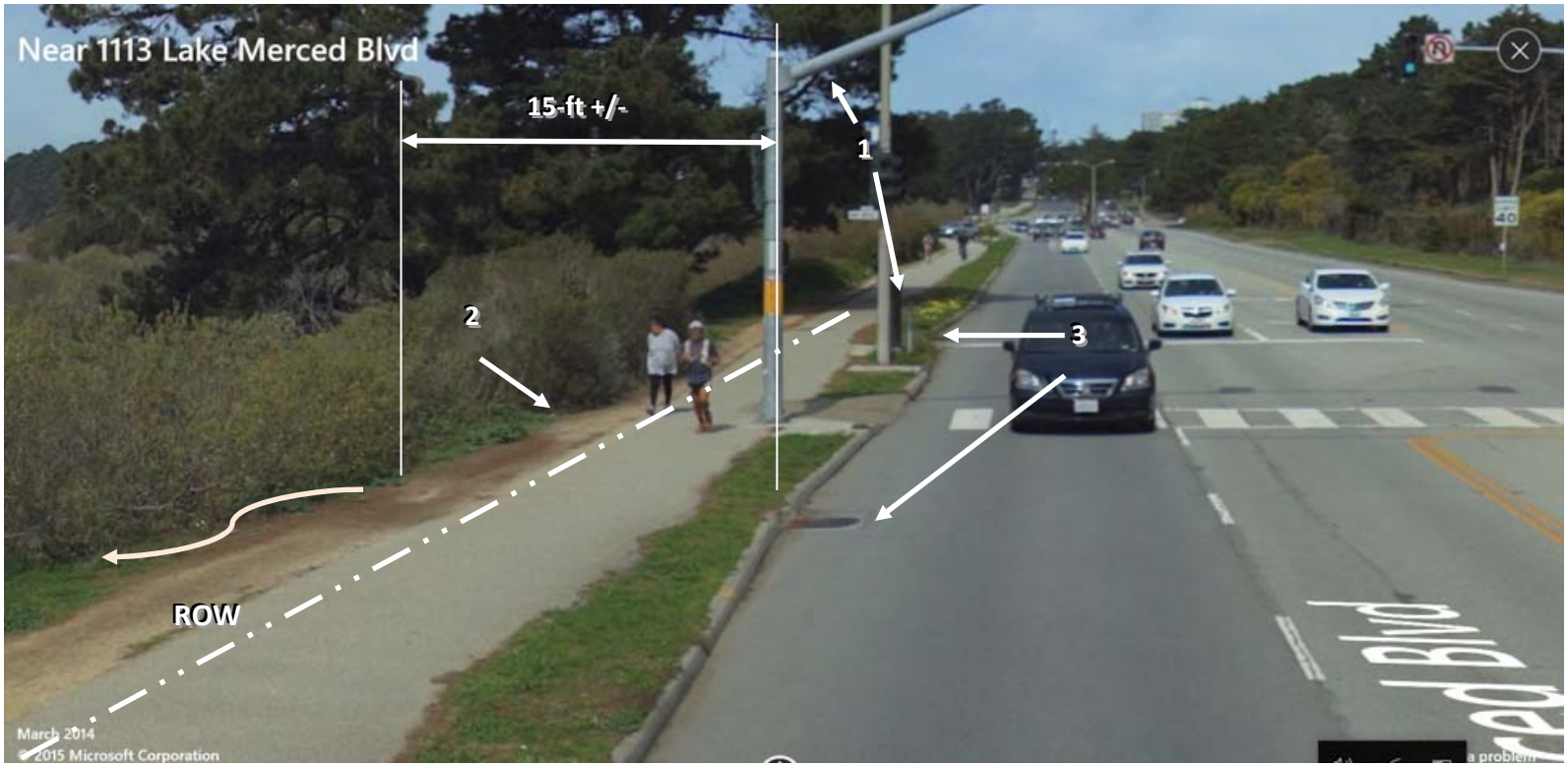


Figure E2 – Lake Merced Blvd at North Lake Merced Hills Drive Intersection (Looking North)

IMPROVEMENT CONSIDERATIONS

1. Widening to street side of paved path is limited by a cluster of street light and signal standards and electrical cabinet
2. Widening to lakeside is limited by embankment slope (15-ft +/- per City Topo map that needs survey verification)
3. Widening of paved path to street side curb to consider two drainage inlets approx. 24-in inside typical curb line and connections to main

Cross Section: E
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width = 7-ft
Gross width from curb to right of way line = 16-ft (1-ft sloped terrain, 4.5-ft dirt to fence post, 7-ft paved path, 3.5-ft buffer)

Figure E3 – Lake Merced Blvd south between John Muir Drive and North Lake Merced Hills Drive

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence (See Figure E4 for detail)
2. Widening to lakeside is also limited by embankment slope (15-ft +/- min from curb line per City Topo map that needs survey verification)
3. Widening of paved path to street side curb would need to consider curved alignment and connections to John Muir Drive

Cross Section: E
Pinch Point: Lake Merced Boulevard

Minimum existing paved path width 7-ft
Gross width from curb to right of way line = varies 16-ft (1-ft sloped terrain, 4.5-ft dirt to fence post, 7-ft paved path, 3.5-ft buffer) to 22-ft max

Figure E4 – Lake Merced Blvd south between John Muir Drive and North Lake Merced Hills Drive

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside is also limited by embankment slope (15-ft +/- min from curb line per City Topo map that needs survey verification)
2. Widening of paved path to street side curb would need to consider poles in the buffer, curved alignment and connections to John Muir Drive

Cross Section: F
Pinch Point: John Muir Drive Erosion Control Structures – Location 1 of 3

Minimum existing paved path width = 9-ft 6-in +/-
Gross width from curb to right of way line = 20-ft +/-

Figure F1 - John Muir Drive Erosion Control Structure No. 1 (Vista Grande Canal is visible to the right)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside triggers modification to erosion control structure
2. Widening to lakeside would encroach into Park ROW
3. Widening to street side must maintain hydraulic grades (run off drains to lake over 5% cross slope) and drainage inlets

Cross Section: F
Pinch Point: John Muir Drive Erosion Control Structures – Location 2 of 3

Minimum existing paved path width = 8-ft +/-
Gross width from curb to right of way line = 10-ft +/-

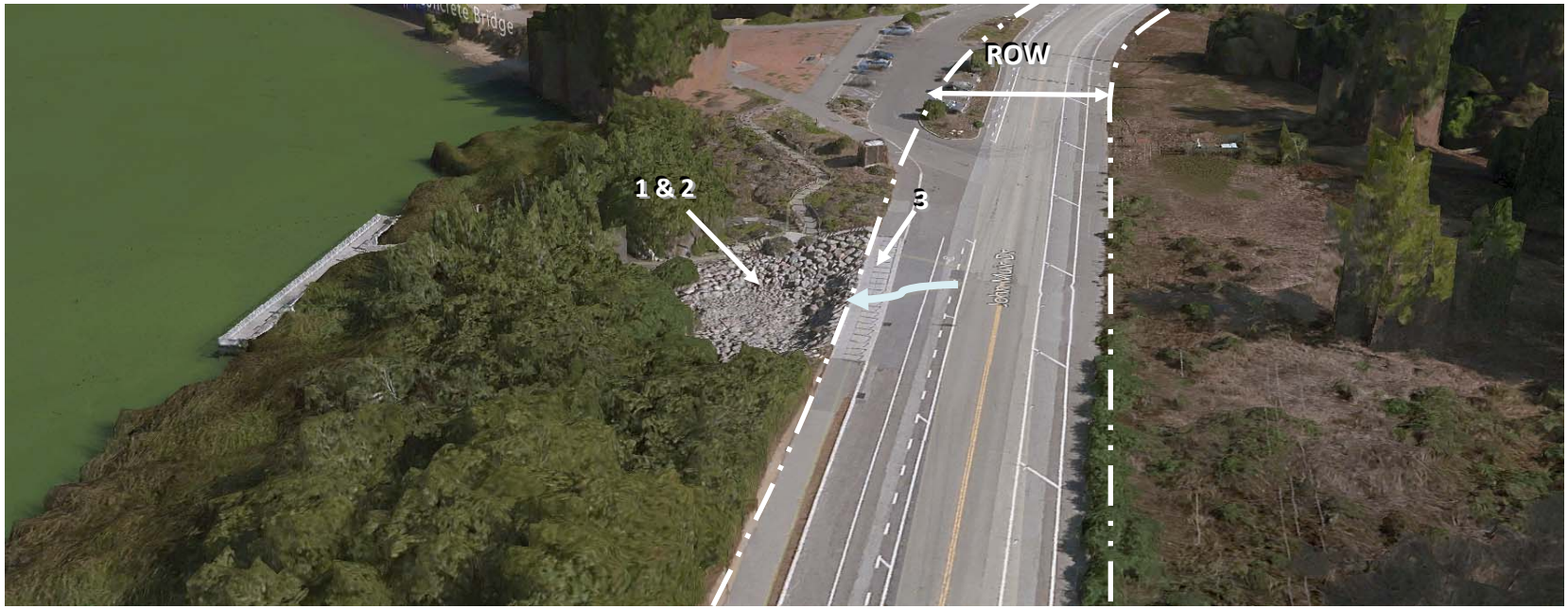


Figure F2 - John Muir Drive Erosion Control Structure No. 2

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside triggers modification to erosion control structure
2. Widening to lakeside would encroach into Park ROW
3. Widening to street side must maintain hydraulic grades (run off drains to lake over 5% cross slope) and drainage inlets

Cross Section: F
Pinch Point: John Muir Drive Erosion Control Structures – Location 3 of 3

Minimum existing paved path width = 8-ft 6-in +/- typical and 13-ft +/- and 12.5-ft +/-at Structure
Gross width from curb to right of way line = 5-ft +/- (inside path)

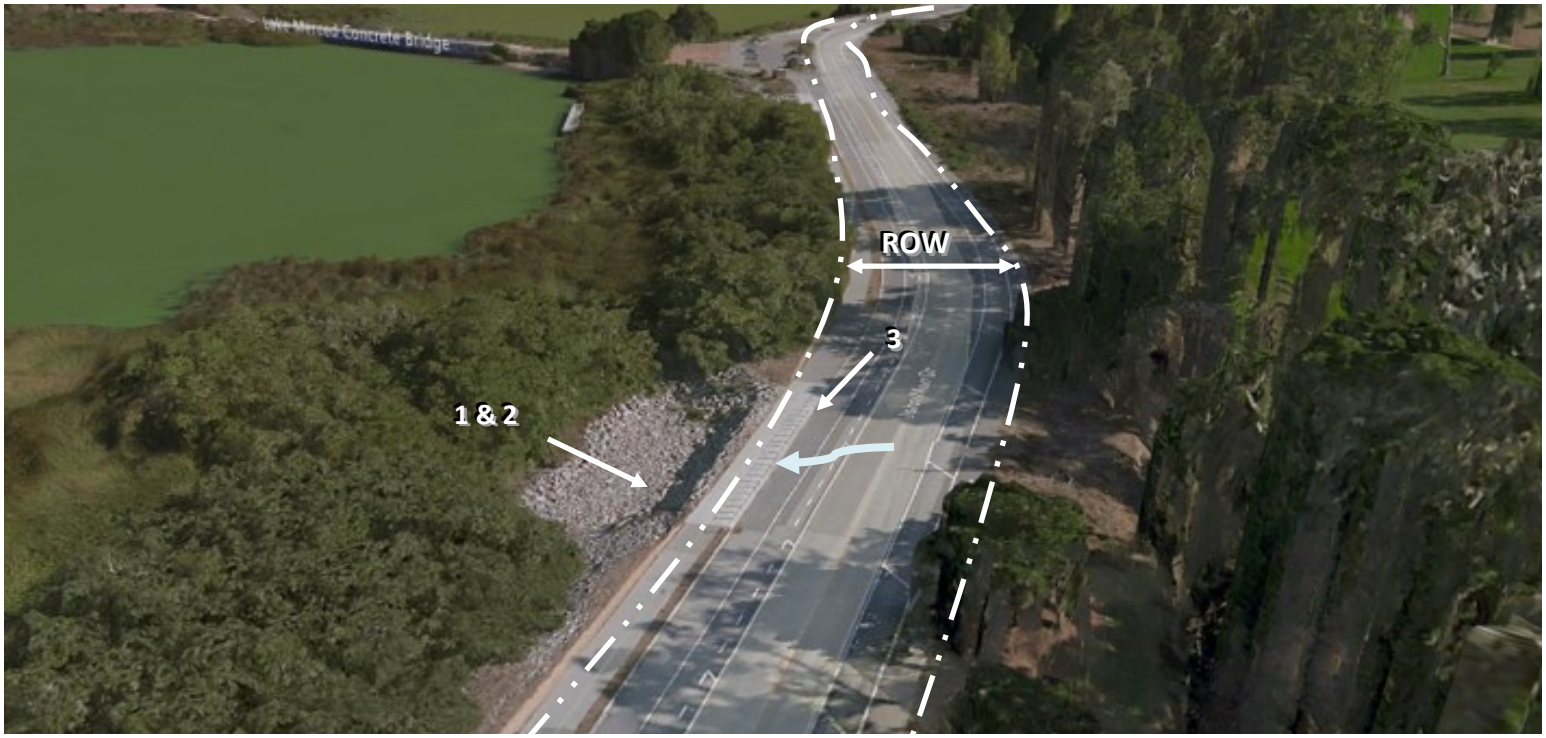


Figure F3 - John Muir Drive Erosion Control Structure No. 3

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside triggers modification to erosion control structure
2. Widening to lakeside would encroach into Park ROW
3. Widening to street side must maintain hydraulic grades (run off drains to lake over 5% cross slope) and drainage inlets
4. Lakeside right of way line crosses into path

Cross Section: F
Pinch Point: John Muir Drive at Fence along Old Rod & Gun Club site

Minimum existing paved path width = 8.ft +/-
Gross width from curb to right of way line = 6-ft +/- (inside path)

Figure F4 - John Muir Drive – Fence at Rod & Gun Club Site (South End)

IMPROVEMENT CONSIDERATIONS

1. Widening to the lakeside of paved path is limited by fence (21-ft +/- from curb per spot field measure) and the embankment slope (15-ft min +/- per City Topo, survey needed)
2. Widening to lakeside would encroach into Lake Merced LLC recreational development (See Figure G2)
3. Widening to street side would impact parking, signage and drainage inlets

Cross Section: G
Pinch Point: John Muir Drive at Fence along Old Rod & Gun Club site

Minimum existing path width = 9-ft +/- (and 3-ft-6-in +/- buffer and 4-ft +/- border per spot field measure)
Gross width from curb to right of way line = 12-ft 6-in +/- (ROW inside path)

Figure G1 - John Muir Drive, Fence at Rod & Gun Club Site (Middle)

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by fence(16-ft 6 in +/- per spot field measure)
2. Widening to lakeside would encroach into Lake Merced LLC recreational development (proposed See Figure G2)
3. Widening to street side would impact parking, crosswalk, signage and drainage inlets

Cross Section: G

Figure G2 - John Muir Drive, Fence at Rod & Gun Club Site (Existing and Future Entrance)

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by fence south of entrance and vegetation and trees in setback north of the entrance
2. Widening to lakeside, south side of entrance would encroach into Lake Merced LLC recreational development (proposed)
3. Widening to street side would need to consider sight lines of new entrance, parking and crosswalk

Cross Section: G
Pinch Point: John Muir Drive at Fence along Old Rod & Gun Club site

Minimum existing paved path width = 8-ft +/- (and 5-ft +/- buffer)
Gross width from curb to right of way line = 11-ft +/- (ROW inside path)

Figure G3- John Muir Drive, Fence and Setback at Rod & Gun Club Site (North Section similar in 3 locations)

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by right of way (11-ft from curb)and vegetation and trees (varies 16-ft +/-to 40-ft +/-from curb)
2. Widening to lakeside, would need to consider setback to Lake Merced LLC recreational development (proposed)
3. Widening to street side would impact parking crosswalk and signage

Cross Section: G
Pinch Point: John Muir Drive at Fence along Police Pistol Range site

Minimum existing paved path width = 8-ft 9-in +/- (and buffer = 4-ft +/-) per spot field measure
Gross width from curb to right of way line = 6ft +/- to 13-ft +/- (City) and 20-ft (per Caltrans plans)

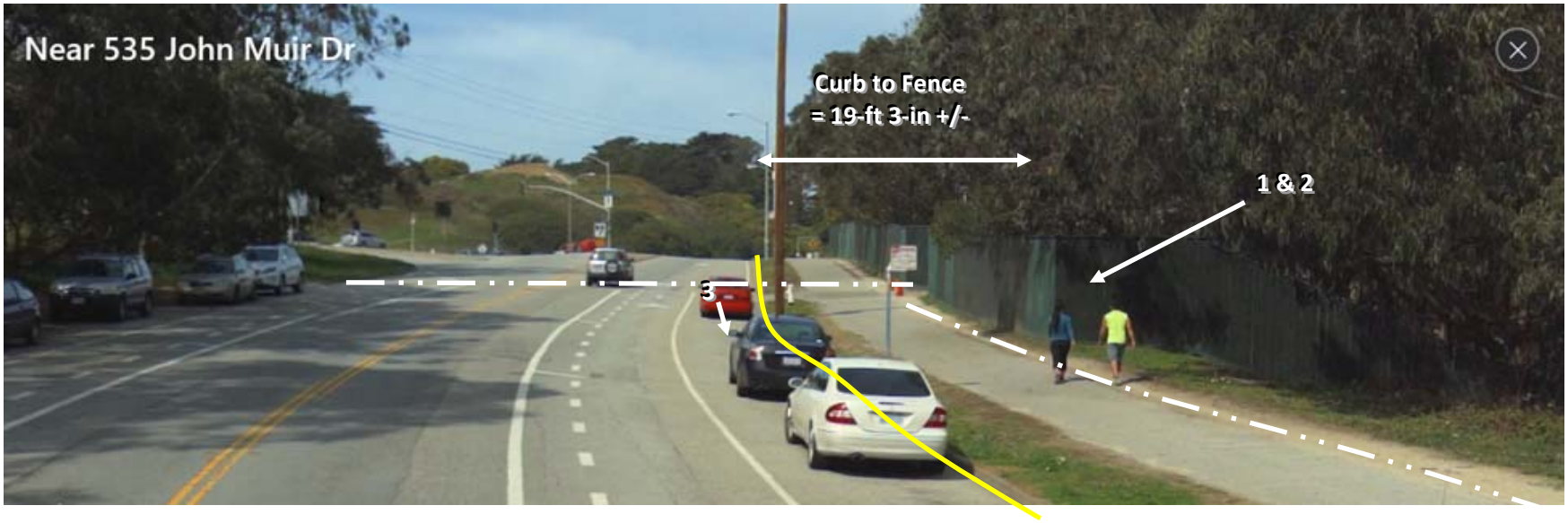


Figure G4 - John Muir Drive, Fence at SF Police Pistol Range Site (South)

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by fence at SF Police Pistol Range, right of way and vegetation and trees
2. Widening to lakeside, would need to consider SF Police Pistol Range entrance
3. Widening to street side would need to consider merge with SR 35 Skyline an would likely impact parking, pole mounted electric lines, fire hydrant , CALTRANS lighting standards and drainage inlets
4. Transition from CITY street operating right-of-way to CALTRANS state highway operating right-of-way

Cross Section: G to H Transition
Pinch Point: John Muir Drive at Fence along SF Police Pistol Range

Minimum existing paved path width = 8-ft 9-in +/- (and 4-ft +/- buffer) per spot field measure
Gross width from curb to right of way line = 19-ft 6-in min (City Mapping) 20-ft max (Caltrans plans)

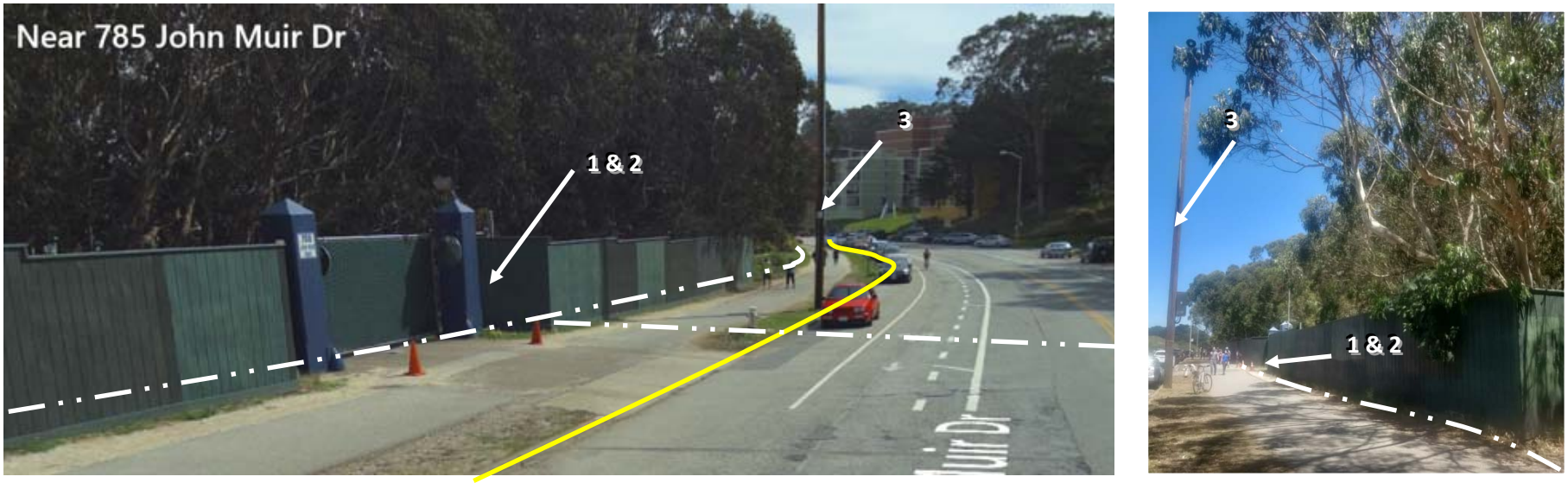


Figure G5 - John Muir Drive, Fence at SF Police Range Site (Entrance looking south and looking north)

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by fence at SF Police Pistol Range (19-ft 3-in +/-) and right of way (at or behind fence)
2. Widening to lakeside, would need to consider SF Police Pistol Range entrance and its limited sight lines
3. Widening to street side would need to consider merge with SR 35 Skyline an would likely impact parking, pole mounted emergency siren, fire hydrant , CALTRANS lighting standards and drainage inlets

Cross Section: G to H Transition
Pinch Point: John Muir Drive at Fence along SF Police Pistol Range

Minimum existing paved path width = 8-ft 9-in +/- per spot field measure (and 4-ft 6-in +/- buffer)
Gross width from curb to right of way line = 20-ft (Caltrans)

Figure G6 - John Muir Drive, Fence at SF Police Pistol Range Site (North End Connection to Skyline SR-35)

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by fence at SF Police Pistol Range
2. Widening to lakeside, would need to trees and poles between SF Police Pistol Range fence and paved path
3. Widening to street side would be limited at need to transition back to curb prior to merge with SR 35 Skyline and consider impact on signage and utility poles

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 8-ft (and buffer = 4-ft +/-)
Gross width from curb to right of way line = 20 ft

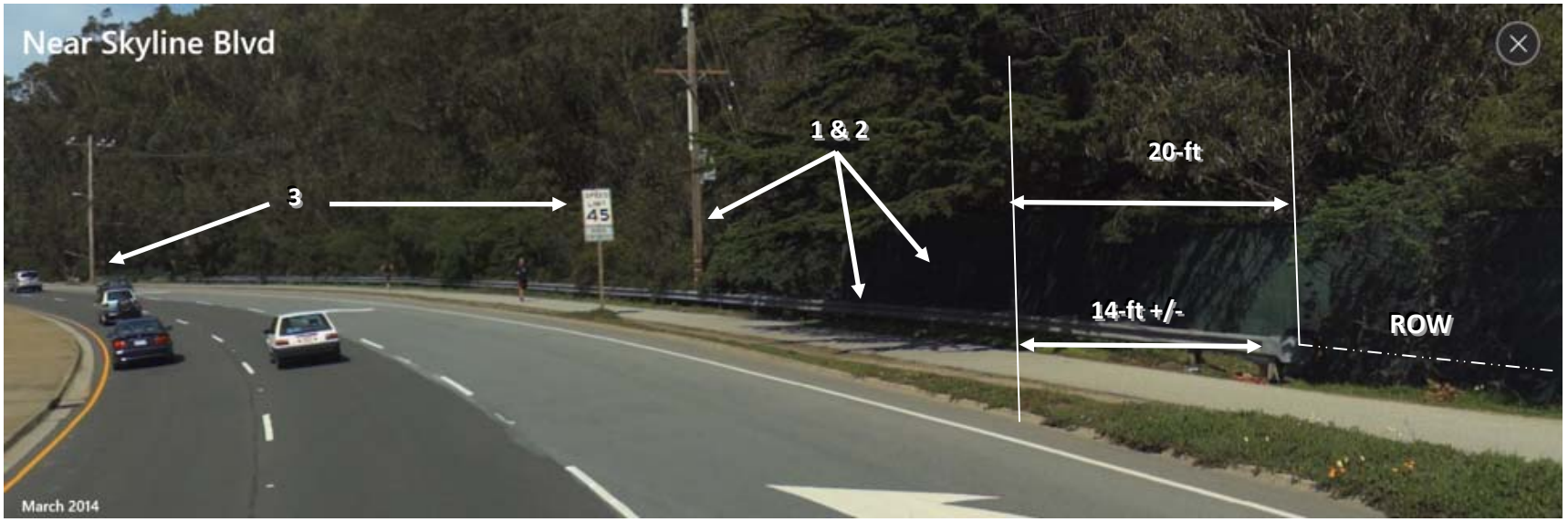


Figure H1 – Skyline Boulevard (SR 35) at SF Police Pistol Range

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence at SF Police Pistol Range and Caltrans metal beam guard rail (face of rail = 14-ft +/- from curb per spot field measure)
2. Widening to lakeside needs to consider utility pole and guys and vegetation
3. Widening of paved path to street side curb would need to consider pole mounted electric lines, CALTRANS lighting standards and signage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 8-ft (per Caltrans plans and spot field measure)
Gross width from curb to right of way line = 20 ft (6-ft grass, MBGR to path=2-ft, 8-ft path, 4-ft buffer)

Figure H2 – Skyline Boulevard (SR 35) North of John Muir Drive

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by CALTRANS Metal Beam Guard Rail (MBGR) (face of rail = 14-ft +/- from curb per spot field measure)
2. Trees, shrubs and shrubs encroach into paved path
3. Widening of paved path to street side is limited by electricity pole and guy

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 10-ft per spot field measure (8-ft per Caltrans plans)
Gross width from curb to right of way line = 20 ft (5-ft sloped vegetated ground with trees, 1-ft 6-in dirt path, 10-ft path, 3-ft 6-in buffer)

Figure H3 – Skyline Boulevard (SR 35) between Great Highway and John Muir

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by fence, embankment slope, trees, shrubs and CALTRANS right-of-way(ROW)
2. Trees, shrubs and shrubs encroach into paved path
3. Widening of paved path to street side curb would need to consider pole mounted electric lines and signage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 8-ft (per Caltrans plans and spot field measure)
Gross width from curb to right of way line = 20 ft (1-ft grass, 3-ft dirt path, 8-ft paved path, 8-ft buffer)

Figure H4 – Skyline Boulevard (SR 35) between Great Highway and John Muir

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside is limited by trees & shrubs (varies 19-ft +/- min from curb), pole guys (21-ft 6-in from curb per spot field measure), embankment slope (22-ft min from curb per Caltrans plans, survey needed) and CALTRANS ROW (20-ft from curb per plans)
2. Widening of paved path to street side curb would need to consider pole mounted electric lines, CALTRANS lighting standards and signage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 8-ft (per Caltrans plans and spot field measure)
Gross width from curb to right of way line = 20 ft (1-ft grass, 3-ft dirt path, 8-ft paved path, 8-ft buffer)

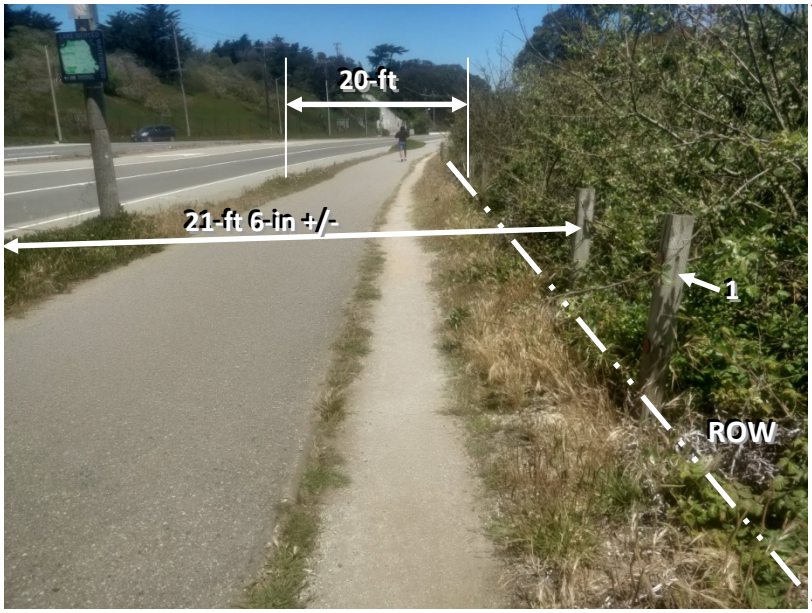
Figure H5 – Skyline Boulevard (SR 35) approaching Great Highway Intersection

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside is limited by trees & shrubs (varies 19-ft +/- min from curb), pole guys (21-ft 6-in from curb per spot field measure), embankment slope (22-ft min from curb per Caltrans plans, survey needed) and CALTRANS ROW (20-ft from curb per plans)
2. Need to determine the ownership/maintenance responsibility for shrubs (shrubs impact sight lines)
3. Widening of paved path to street side curb would need to consider pole mounted electric lines, CALTRANS lighting standards and signage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9-ft (per spot field measure, 8-ft)
Gross width from curb to right of way line = 20 ft



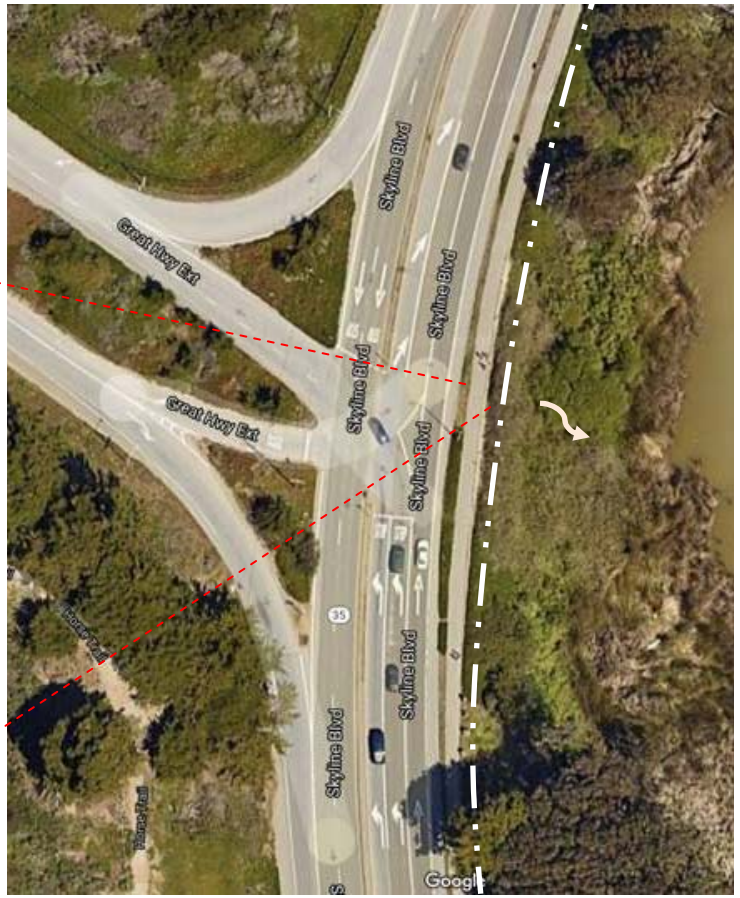


Figure H6 – Skyline Boulevard (SR 35) at Great Highway

IMPROVEMENT CONSIDERATIONS

1. Widening to of paved path is limited by rope fence (post visible in shrubs), embankment slope and Caltrans ROW
2. Widening of paved path to street side curb would need to consider pole mounted electric lines, CALTRANS lighting standards, signage and vegetation that appears to discourage crossing

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9-ft (per spot field measure)
Gross width from curb to right of way line = 20 ft (3-ft dirt path, 9-ft paved path, 8-ft bus pullout "pocket")

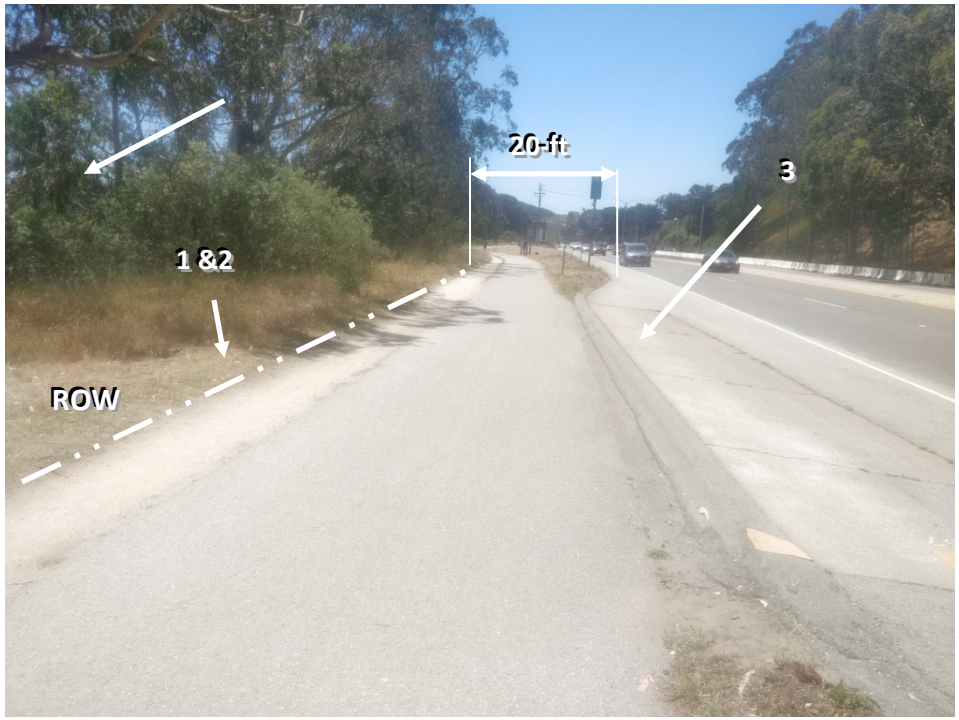


Figure H7 – Skyline Boulevard (SR 35) Bus Pull-out south of Herbst crosswalk

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by CALTRANS ROW , Trees and embankment slope approx. 20-ft from curb
2. Trees were recorded in DPW survey and are located in plan
3. Widening of paved path to street side curb would need to consider bus pullout, signage and drainage inlets

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9-ft per spot field measure (and buffer = 4-ft 6-in +/-)
Gross width from curb to right of way line = 20 ft

Figure H8 – Skyline Boulevard (SR 35) North of Herbst

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by Trees
2. Trees were recorded in DPW survey and are located in plan
3. Widening of paved path to street side curb would need to consider pole mounted electric lines, CALTRANS lighting standards, signage, bus pullout and cross walk

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9-ft (per spot field measure, 8-ft on Caltrans plans)
Gross width from curb to right of way line = 20 ft

Figure H9 – Skyline Boulevard (SR 35) north of Herbst

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by Trees shrubs and embankment slope
2. Trees were recorded in DPW survey and are located in plan
3. Widening of paved path to street side curb would need to consider pole mounted electric lines, CALTRANS lighting standards, signage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9-ft (per spot field measure, 8-ft on Caltrans plans)
Gross width from curb to right of way line = 20 ft

Figure H10 – Skyline Boulevard (SR 35) south of bus pullout (Zoo Stop)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by trees , shrubs, signage and embankment slope
2. Trees were recorded in DPW survey and are located in plan
3. Widening of paved path to street side curb would need to consider signage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9ft (per spot field measure, 8-ft on Caltrans plans)
Gross width from curb to right of way line = 20 ft (4-ft bus pullout "pocket", 9-ft path, 2-ft dirt path, 5-ft on sloping ground)

Figure H11 – Skyline Boulevard (SR 35) at end of bus pullout (ZOO Stop)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by trees, shrubs and embankment slope (within the right-of way)
2. Trees were recorded in DPW survey and are located in plan, some of these have been cut down since the survey (see Fig H12)
3. Widening of paved path to street side curb would need to consider bus pull out, signage and drainage

Cross Section: H
Pinch Point: Skyline

Minimum existing paved path width = 9-ft (per spot field measure, 8-ft on Caltrans plans)
Gross width from curb to right of way line = 20 ft

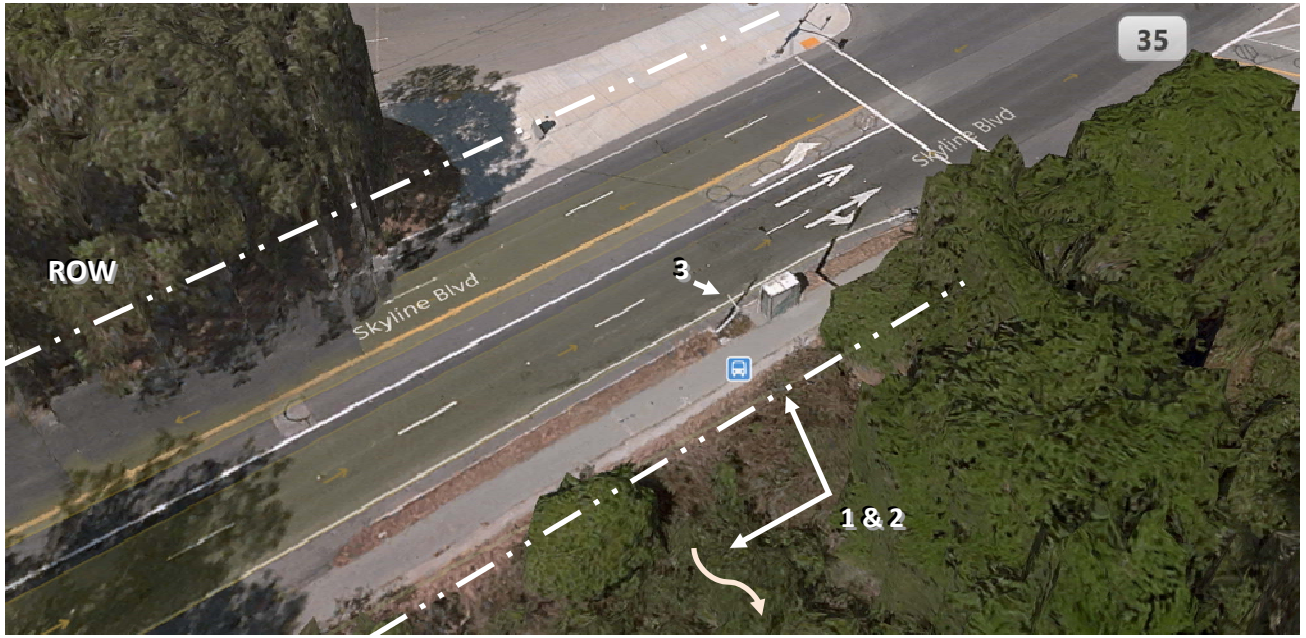


Figure H12 – Skyline Boulevard (SR 35) at end of bus shelter (ZOO Stop)

IMPROVEMENT CONSIDERATIONS

1. Widening to lakeside of paved path is limited by embankment slope
2. Caltrans c.1930s plans indicate minimum 22-ft offset from curb to top of slope, currently this is 16-ft per recent DPW survey; it is judged that erosion has taken place and will need to be considered in development of a widening concept
3. Widening of paved path to street side curb would need to consider bus pull out, bus stop shelter, Caltrans light standards and signals and guyed electric poles