



BART Bicycle Program Capital Plan

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In association with Parisi Transportation

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Table 1 | Bicycle parking efforts by station

Numbers refer to page numbers where more information about planned and recommended improvements can be found.

<i>Station</i>	<i>Efforts underway</i>	<i>Rec'ed bike stations</i>	<i>Incremental changes</i>
12 th Street / Oakland			35
16 th Street / Mission	5		
19 th Street / Oakland		16	
24 th Street / Mission	5		
Ashby			35
Balboa Park			35
Bay Fair			35
Castro Valley			35
Civic Center			35
Coliseum			35
Colma			35
Concord	6		
Daly City			35
Downtown Berkeley	7		
Dublin / Pleasanton		18	
El Cerrito del Norte		20	
El Cerrito Plaza			35
Embarcadero	8		
Fremont		22	
Fruitvale			35
Glen Park			35
Hayward			35
Lafayette	9		
Lake Merritt		24	
MacArthur	10		
Millbrae			35
Montgomery Street			35
North Berkeley		26	
North Concord / Martinez			35
Orinda			35
Pittsburg / Bay Point			35
Pleasant Hill	11		
Powell Street			35
Richmond			35
Rockridge		28	
San Bruno			35
San Leandro		30	
South Hayward			35
South San Francisco			35
Union City			35
Walnut Creek	12		
West Dublin / Pleasanton			35
West Oakland		32	



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Introduction

This BART Bicycle Program Capital Plan is the third in a series of documents commissioned by the Bay Area Rapid Transit District to help plan capital improvements that encourage bicycle access to BART. The two previous versions focused on expanded secure bike parking; this volume updates those publications and expands the scope to include some additional bicycle access capital efforts. This plan provides the following information:

Bicycle parking

1. **Efforts underway:** Bicycle parking expansion efforts that were underway at nine stations at publication time.
2. **Recommended bike stations:** Profiles of nine additional stations with higher projected demand where new bike stations are recommended, including proposed locations and bike storage capacity.
3. **Incremental changes:** A listing of the stations where increased demand can be accommodated with additions of various types of bicycle racks and lockers, as needed.

Additional bicycle access-related capital improvements

4. **Networking eLockers:** A status report on efforts to link BART's stock of 1,500 eLockers to the internet and the benefits of doing so.
5. **Stairway channels:** An analysis of where bicycle stair channels are needed to help passengers transport their bikes up and down BART station staircases.
6. **Accessible Fare Gates:** A prioritized list of BART stations that would benefit from additional wide fare gates that allow wheelchairs, luggage and bicycles to pass through.

Appendices

- A. **Bicycle parking demand projections:** The projected need for bicycle parking at each BART station in 2022, ten years after the last BART Bicycle Plan was published (July 2012).
- B. **Bicycle parking survey methodology:** A description of BART's annual survey of bicycle parking occupancy and results from the 2016 survey.
- C. **Proposed BART Bicycle Stair Channel Facilities Design Criteria:** The portion of BART Facilities Standards that governs stair channels.

In addition to the capital improvements detailed in this plan, a separate study is underway to begin supporting the connection between the surrounding bicycle network and destinations within the station, a strategy to encourage passengers to bike that was identified in the 2012 BART Bicycle Plan. The Bike/Walk Access Network Gap Study will develop a methodology for identifying improvements to the path of travel between local streets and BART bike parking and fare gates.

Plan purpose

A goal of the 2012 BART Bicycle Plan update was to double the system-wide rate at which passengers access stations by bike from four to eight percent by 2022, ten years later. At the midway point, in 2017 when this plan was published, 6.6 percent of BART passengers rode a bike to the station. Another important goal of the 2012 plan – to increase the proportion of passengers who park their bikes at the station rather than bringing them onboard a train – became a lot more important in 2013, when the BART Board lifted most restrictions on when bikes can be brought onto trains. While 41 percent of BART passengers who rode a bike in 2012 parked at their home station, in 2015 that figure had dropped to 25 percent. Therefore, an overarching purpose of this document is to help make parking a bicycle at BART stations so appealing that double the percent of biking passengers who parked at their home station in 2015 leave their bicycles at the station in 2022, up to 60 percent.

Projection methodology

A projection of how many bicycles should be able to park at each BART station in 2022 forms the basis of much of this document. These estimates were made using the following steps (see Appendix A for details):

- Develop station-specific future projections for bike access and for the percent of these passengers that will park at stations versus taking their bicycles onboard trains;
- Subtract the quantity of existing secure bicycle parking; and
- Adjust these numbers to account for passengers who value convenience over security and for spaces that are used more than once each day due to some passengers leaving a given station early and others arriving at that station later in the day.

If estimates of future bicycle parking demand turn out to be low, more bicycle parking can be added, but given limited resources, underestimating demand is a more prudent approach than overbuilding.

Another tool BART staff use to assess current and predict future demand for each type of bicycle parking at each station is an annual bicycle parking occupancy survey. This activity has yielded important information, but not without some puzzling results. Therefore, an improved survey methodology is recommended in Appendix B.

1 | Efforts underway

Bicycle parking and related improvements were in progress at nine stations when this plan was being developed. These include experiments with new high-security bicycle racks; modular bike stations¹; construction within a new city auto parking garage; making an existing bike station more visible and welcoming; and plenty of other new bicycle parking. Please note that some of the technical drawings in this section are not as clear as the conceptual plans in the following section.

16th Street/Mission & 24th Street/Mission

High security smart racks

BART currently provides bicycle racks in the paid areas of the twin 16th Street/Mission and 24th Street/Mission stations. Unfortunately, there is a high degree of theft of bicycles and bike parts from these locations, but because the areas are somewhat narrow, they are not ideal for enclosed bike stations, which work better where a larger footprint is available.

To provide secure bike parking in this environment, BART is exploring the use of one of several new high-security smart racks that are just coming to market. The racks being tested lock the frame and one wheel with a significantly stronger mechanism (compared with a traditional bike rack and U lock combination) and also include an alarm if they're tampered with. The initial product that BART is testing is called Bikeep (see photograph below). Ten of these units each were installed at the 16th Street/Mission and Pleasant Hill stations in early 2017. If this pilot is successful, BART can install these racks at the 24th Street/Mission station, as well.

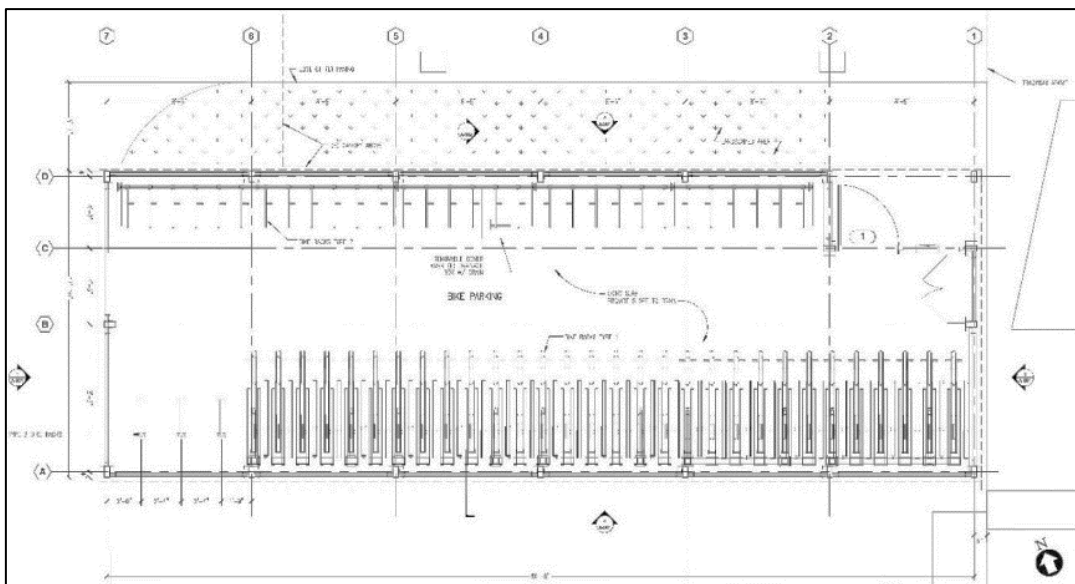
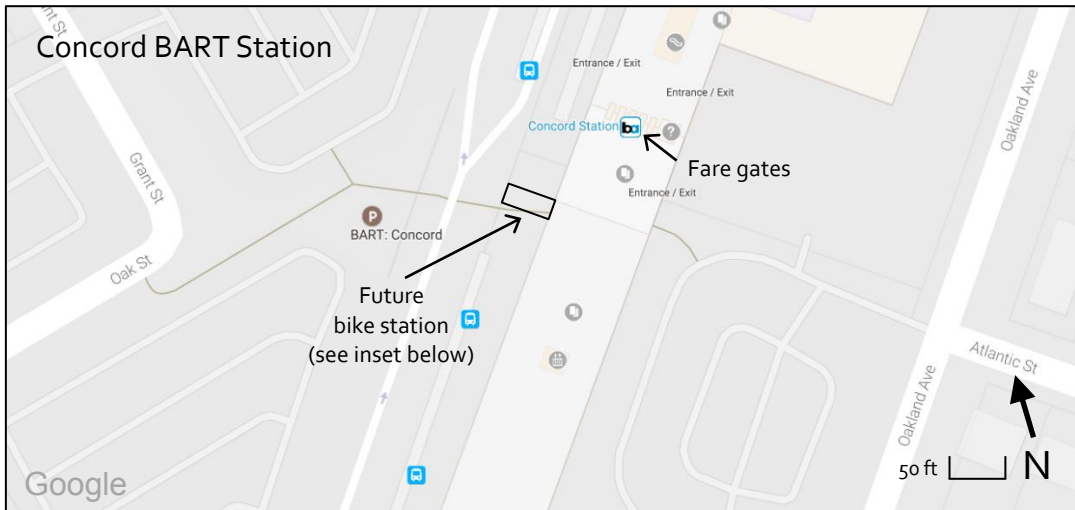


¹ See Section 2 of this report for a more detailed discussion of bike stations.

Concord

First modular bike station

BART has commissioned an architectural firm to design and engineer a customized, modular structure to be used for BART bike stations (see Recommended Bike Stations section for color renderings). The first installation will be in a currently landscaped area at the Concord BART station, just steps south of the fare gates. This self-serve facility will require a key card to enter and will be able to house approximately 100 bikes. It will provide full shelter from the elements, security cameras, and a self-serve bike maintenance station and will be accessible 24/7.



Concord bike station (Plan view)

Downtown Berkeley

Center Street Garage bike station

The City of Berkeley – BART’s partner in the operation of the Downtown Berkeley bike station – is constructing a new space to house the bike station, as part of the Center Street Parking Garage replacement project. The garage is located on Center Street between Milvia Street and Shattuck Avenue, about one-half block from the main BART station entrance on Shattuck Avenue.

When this project is completed in early 2018, the bike station will vacate the current leased storefront on Shattuck Avenue and move to the new space, which will hold 272 bikes in the valet area and 56 bikes in the 24/7 self-park area. The preliminary arrangement is for BART to lease the space from the City of Berkeley and to operate the facility. The City of Berkeley will, under this preliminary arrangement, continue to make an annual financial contribution toward operating the facility.



Downtown Berkeley Center Street Garage (artist's rendering)

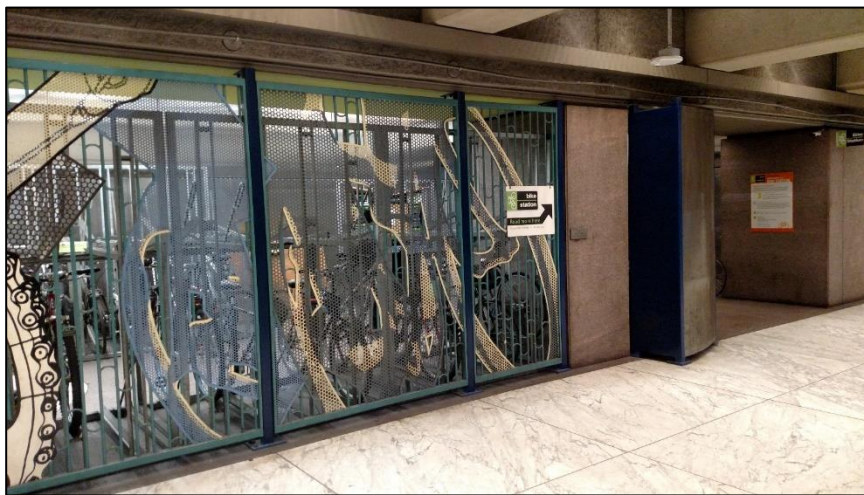
Marcy Wong Donn Logan Architects

Embarcadero

Modernizing the existing facility

BART passengers do not currently park their bicycles at the Embarcadero self-serve bike station to the degree expected based on the number of people who bike to the station. It is likely that this is at least partly a result of passengers' lack of awareness of the facility due to its poor visibility.

This effort will increase the bike station's visibility and transparency by replacing the dense perforated metal entryway with glass, similar to the Civic Center station's bike station entrance, and removing a small enclosed office (which is a legacy from when the facility was attended and is no longer used). It will also increase awareness of and create a brighter, more visible facility by installing wayfinding signs to the bike station, a bicycle channel on a nearby stairway and new LED lighting to brighten the interior. There will be no change in the facility's bike storage capacity.



Existing Embarcadero bike station entrance

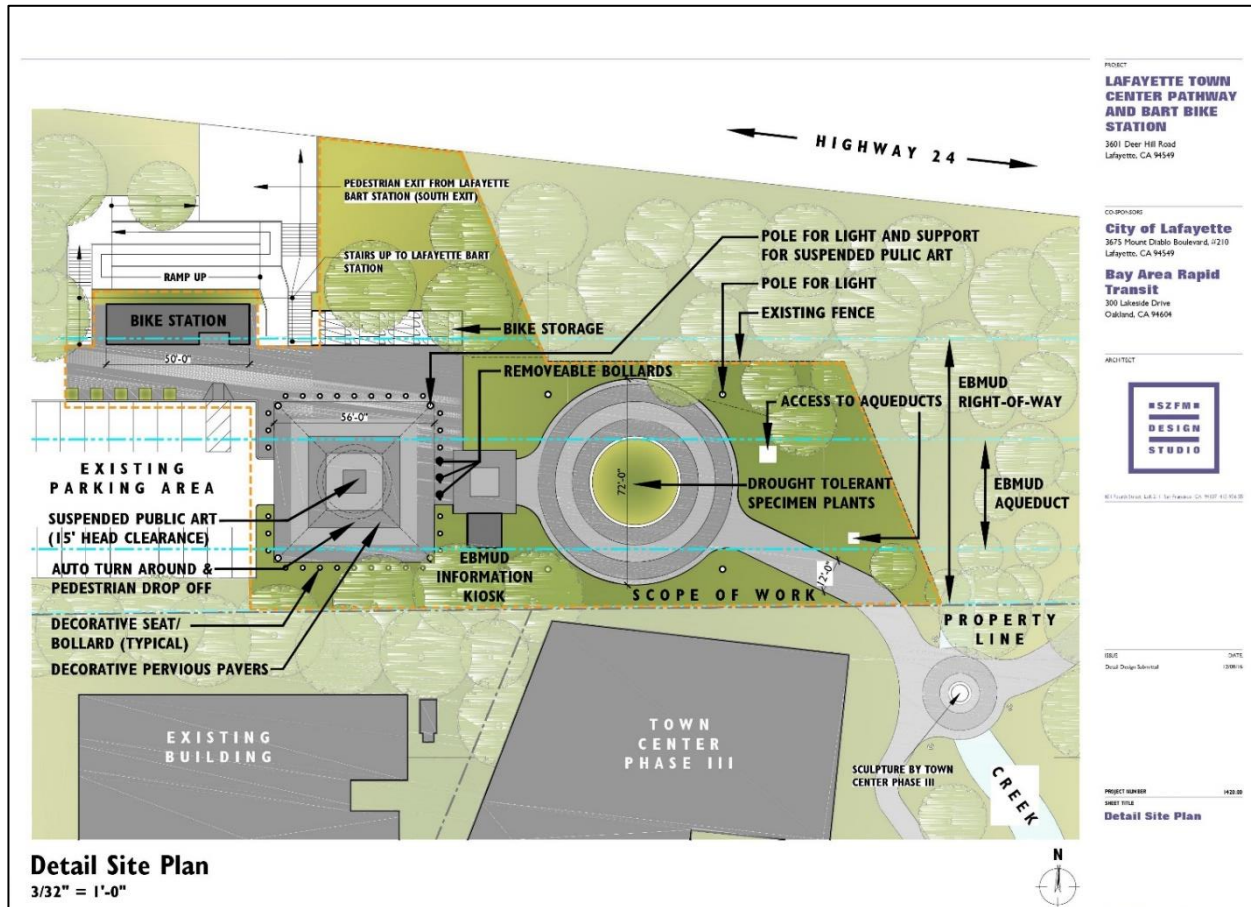


Proposed enhancements to Embarcadero bike station entrance

Lafayette

Connecting the BART station with downtown

The City of Lafayette is planning to make walking and biking between its downtown and the BART station more inviting with a number of investments, including an improved pedestrian path, landscaping, lighting and the creation of a small plaza. These plans also include a new 60-to-90-bike self-park bike station at the base of the stairways, adjacent to the existing bike lockers and racks.

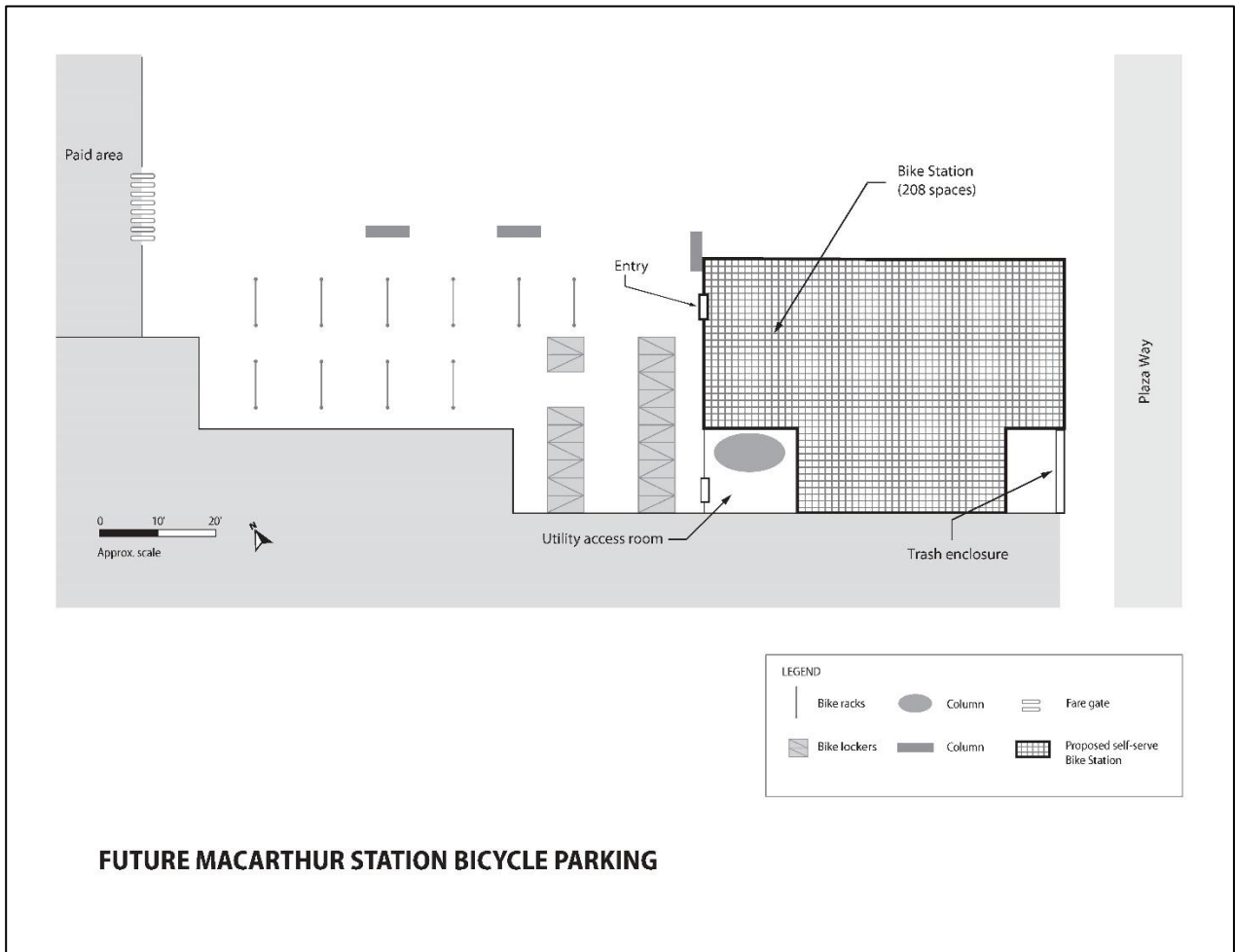


Lafayette planned walking and bicycle improvements

MacArthur

Plaza modernization

A much-awaited transit-oriented development was under construction on the MacArthur BART station parking lot when this plan was being written. The project includes modernizing the station plaza, including reconfiguring the existing bike lockers and racks and construction of a new 174-bike self-park bike station.



MacArthur bike station (plan view)

Pleasant Hill/Contra Cost Centre

First self-park bike station with retail/maintenance

The Pleasant Hill/Contra Costa Centre BART station currently has 112 electronic lockers and over 200 bike rack spaces. On a typical day the lockers are filled and most bike racks occupied. There is clearly a need for significant bike parking expansion at this station to meet current and future demand and to encourage additional bike access. At publication time, a combination self-park/self-lock bike station and retail/maintenance facility was under construction at the station, in a leased spaced at the adjacent Avalon Bay development.

The bike station at Pleasant Hill/Contra Costa Centre will be the first wholly self-park facility to provide retail and maintenance services. It will include a controlled access 230-bike self-park area, which will be accessible 24/7 and an adjacent bike retail/maintenance shop. The retail facility will be staffed each morning, which will also allow bikes to be maintained and parked in the BikeLink area for pick up at the owner's convenience. BikeLink cards will also be sold there. In addition to the new bike station, the Pleasant Hill/Contra Costa Centre station will also be home to one of two pilots of the new higher-security Bikekeep racks (see 16th Street/Mission write-up for more information).



Pleasant Hill bike station (North elevation (above) & East elevation (below))

Walnut Creek

Bike parking plaza

Just before this plan was published, BART refurbished and expanded a space just south of the Walnut Creek station fare gates, behind the existing BART Police substation, for 96 electronic lockers and 64 bike rack spaces. The project includes an expanded plaza area, new lighting, landscaping and pigeon control. The police substation will be relocated to a new facility as part of a transit-oriented development project, which will provide an opportunity to further expand bike parking and visually connect the station agent booth/fare gate area to the station's bike parking facilities.



Walnut Creek bike parking plaza

2 | Recommended bike stations

Bike stations are locked enclosures inside which BART patrons can store their bicycles. Some, like Downtown Berkeley, Fruitvale and 19th Street/Oakland are staffed (also known as valet parking); Downtown Berkeley, Ashby, Embarcadero and Civic Center provide self-serve (or “self-park”) bike stations, which are accessible with the same BikeLink card that operates BART’s electronic lockers (also known as eLockers). Staffed and valet bike stations are both popular with BART passengers, are more space-efficient than electronic lockers, and provide a much higher level of security than bicycle racks that are not inside an enclosure.

New bike stations are recommended at the nine BART stations where demand in 2022 is expected to exceed the number of electronic lockers for which there is room:

- 19th Street/Oakland
- Dublin/Pleasanton
- El Cerrito del Norte
- Fremont
- Lake Merritt
- North Berkeley
- Rockridge
- San Leandro
- West Oakland

The following pages provide descriptions and conceptual drawings of proposed locations, each of which will need to be further vetted as the projects proceed. For each station, a table shows actual parking demand in 2015, BART’s bicycle parking goal for 2022² (ten years after the BART Bicycle Plan was published) and the number of new secure parking spaces that will be needed in that year, where “secure” includes bicycle racks in the paid area, bike lockers (eLockers and keyed) and bike stations³. This number is calculated by subtracting the current parking supply from what’s projected to be needed, and adding to that number any bicycle locker spaces that will need to be removed from the new bike station site when there is not room for them elsewhere at the station. Calculations assume that bike rack spaces, which may need to be removed to make space for the bike station, do not need to be replaced because they are not considered to be secure.

² BART has established a goal of passengers parking 60 percent of bicycles ridden to stations; however, they recognize it is not realistic to expect the 2015 rate at a given station to more than double by 2022, so for stations whose 2015 bike access rate was less than 30 percent, the goal is double the 2015 rate.

³ Footnoted sources & assumptions for bicycle parking summaries on pages 16–32:

1. Source: 2015 BART Station Profile Study
2. Assumes 2015-2022 bike access rate change is same as 2008-2015 change. (Source: Station Profile Studies)
3. 2022 park-at-station goal is double 2015 rate (not to exceed 60%) minus 25% because not all spaces need to be “secure.”
4. Secure spaces include racks in paid area, bike lockers (eLockers and keyed) and bike stations.

Recommended bike stations

The criteria used to identify bike station locations at these nine stations include:

- Near or visible from fare gates;
- Don't block walk access or accessible pathways to fare gates, ticket machines or other BART facilities; and
- Safe-feeling location (not isolated); the bike station design can enhance this by providing features such as good visibility into the enclosure and good lighting.

The renderings below and on the next page show the exterior and interior of the bike station that has been designed for BART. These structures are modular to control costs and come in 14-, 18- and 22-foot widths and in lengths that are multiples of 8.5 feet (each 8.5-foot unit is called a "bay"). Table 2 shows the number of bicycles that can be accommodated using various numbers of bays. These calculations were used to estimate the capacity of the bike stations recommended in this chapter. Descriptions and drawings of the bike stations recommended at the nine BART stations are on pages 16-33.

Table 2 | Sample bike station capacities & costs*

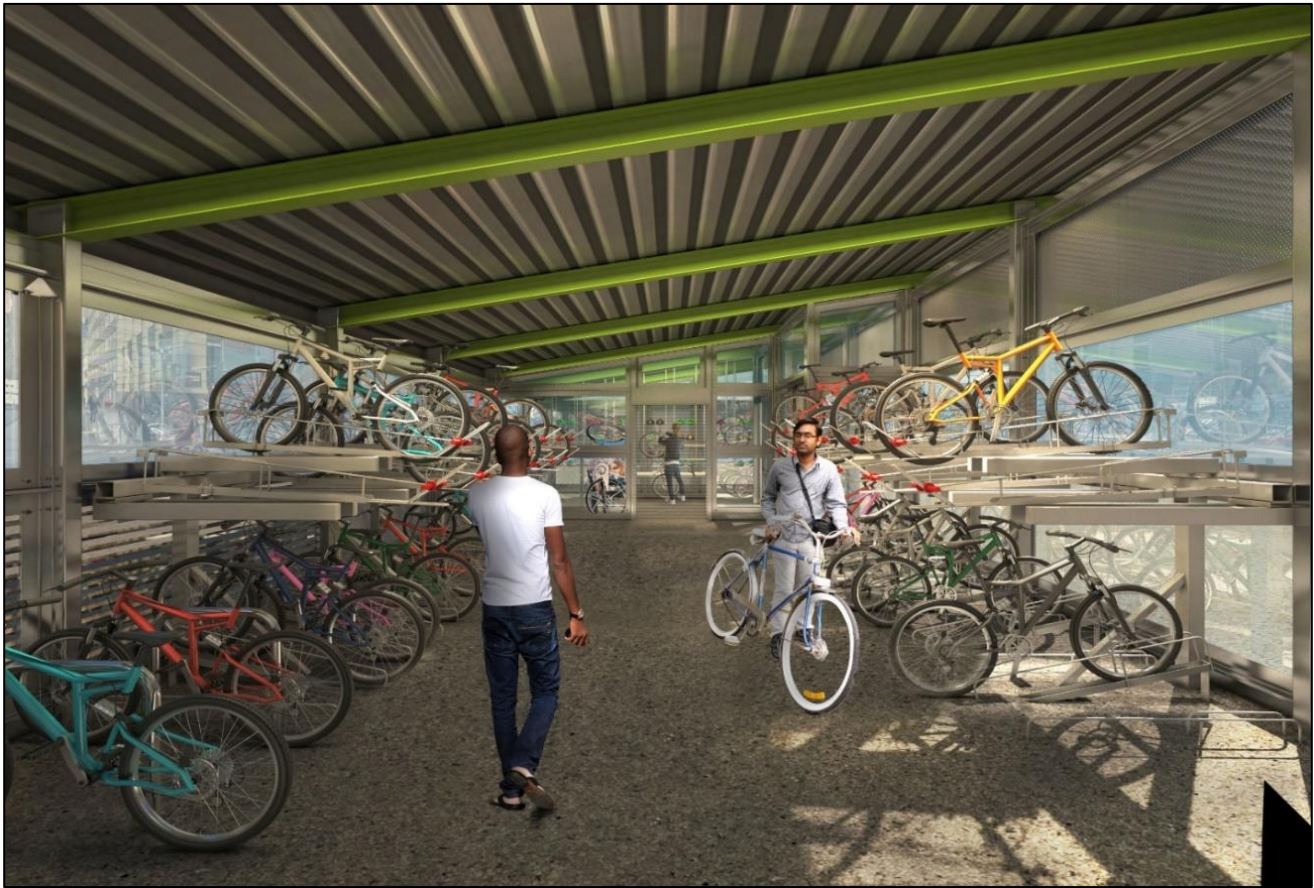
<i>Width</i>	<i>Length</i>	<i># Bays</i>	<i># Bikes</i>	<i>Estimated Construction Costs (2017)</i>
14'	51'	6	60	\$625,000
18'	51'	6	90	\$675,000
22'	51'	6	120	\$775,000
14'	102'	12	132	\$850,000
22'	76.5'	9	192	\$975,000

* This table reflects a sampling of configurations; modular bike stations can be constructed in many others, as well.



BART Modular bike station (Exterior view)

STV Architects



BART Modular bike station (Interior view)

STV Architects

19th Street/Oakland

Current bicycle parking situation

The 19th Street/Oakland BART station provides 136 well-used bike parking spaces in double-decker racks located on the concourse level, a 130-space storefront valet parking bike station on Broadway at 19th Street and eight electronic street-level locker spaces that are managed by City of Oakland. There is very high demand for all of these spaces; in particular, the bike station routinely fills weekday mornings. As part of the station modernization that was in progress at the time this plan was being developed, most of the double-decker spaces will be moved to the south end of the station and augmented with single-level inverted-U rack spaces to create better view corridors for station agents. There will be a total of 170 rack spaces on the concourse level when the modernization project is complete, an increase of 48 spaces. In 2015, 53 percent of passengers who biked to this station parked there, the highest rate in the BART system. Given the growing residential and employment populations in the immediate vicinity, this demand is expected to continue to grow.

Opportunities for bicycle parking expansion

In order for the 19th Street/Oakland station to provide secure bicycle parking for 60 percent of biking passengers, 234 additional spaces will be needed to meet projected BART demand alone. Considering employment, new housing and corresponding bike parking demand in the vicinity of the station and given the popularity of the existing bike station, the best opportunity for new bicycle parking would be to build or lease a space in which to create a significantly larger facility. Ideally, this site would be within a block of a station entrance and be large enough to accommodate at least 400 bicycles for BART passengers, customers of local businesses and those who work nearby. The best option is the BART-owned lot on the southwest corner of Broadway and 21st Street, next door to the Paramount Theatre, which is currently used as a surface parking lot. Two conceptual bike station footprints at this location are shown in the diagrams on page 17.

19th Street/Oakland BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 659
- Park-at-station: 352 (53%)

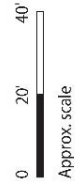
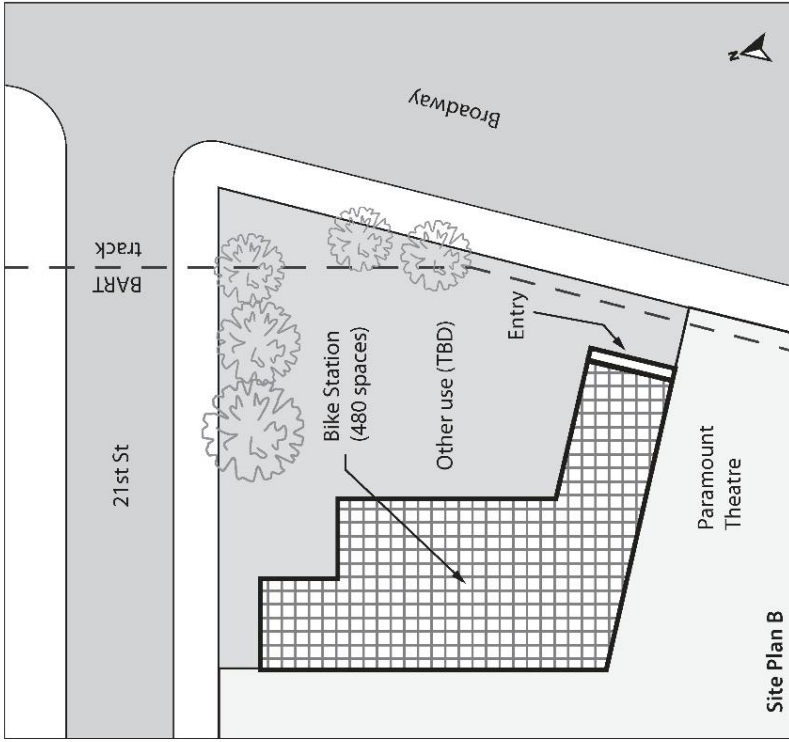
2022 projected weekday bike access passengers

- Total bike access:² 1,237
- Secure park-at-station goal:³ 556 (3/4 of 60%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 264
- Needed new secure spaces: 234
- Proposed new bike station spaces: 435-480 (Will also accommodate nearby shoppers and workers)

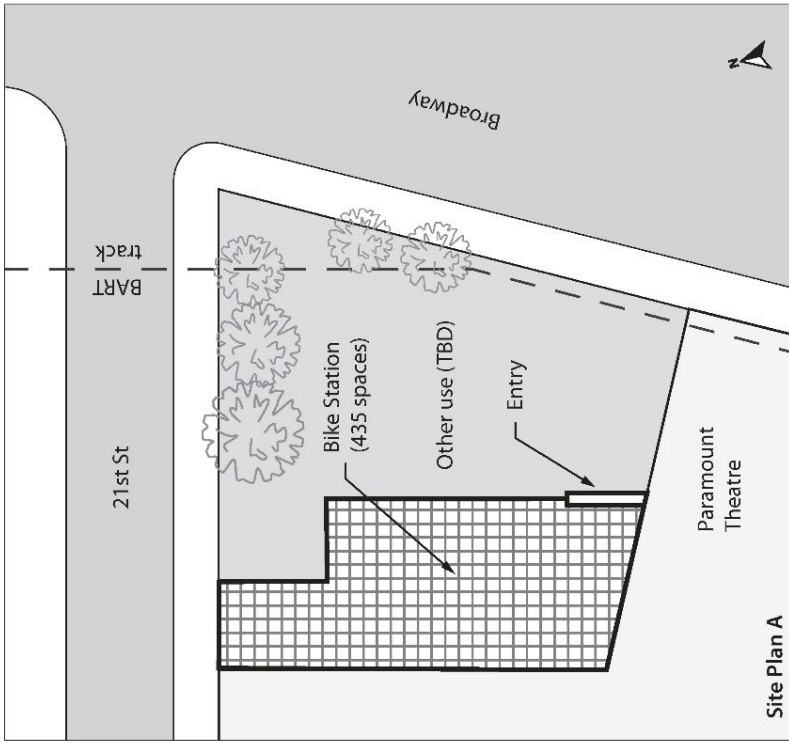
Footnotes 1–4: See page 13 for data sources and assumptions.



LEGEND



Bike Station, including retail, café, and parking



19th Street / Paramount Park

Dublin/Pleasanton

Current bicycle parking situation

Bicycle racks located inside the Dublin/Pleasanton station fare gates and on both sides of the station entrance are extremely well-used, as are the electronic lockers north of the station entrance. Passengers also routinely lock their bicycles on the railing between the two directions of car/bus traffic, indicating that demand for bicycle parking at the station far outstrips supply. In 2015, 41 percent of passengers who biked to the station, parked their bicycle rather than bringing it aboard a train.

Opportunities for bicycle parking expansion

The best opportunity for new secure bicycle parking at the Dublin/Pleasanton station is to construct a 130-space self-serve bike station on the north side of the station entrance, which would allow more than 60 percent of passengers who are expected to bike to the station in 2022 to park there, BART's goal for this station. This location is immediately adjacent to the station entry. By placing the bike station entrance at the south end of the enclosure, it will also be naturally lit from above during the day. The concrete bollards that separate the sidewalk and bike parking from the roadway may need to be removed to provide adequate space for people to pass by the new bike station on foot. The inverted-U racks and electronic locker spaces that are now at this location can be relocated to the opposite side of the street.

Dublin/Pleasanton BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 316
- Park-at-station: 128 (41%)

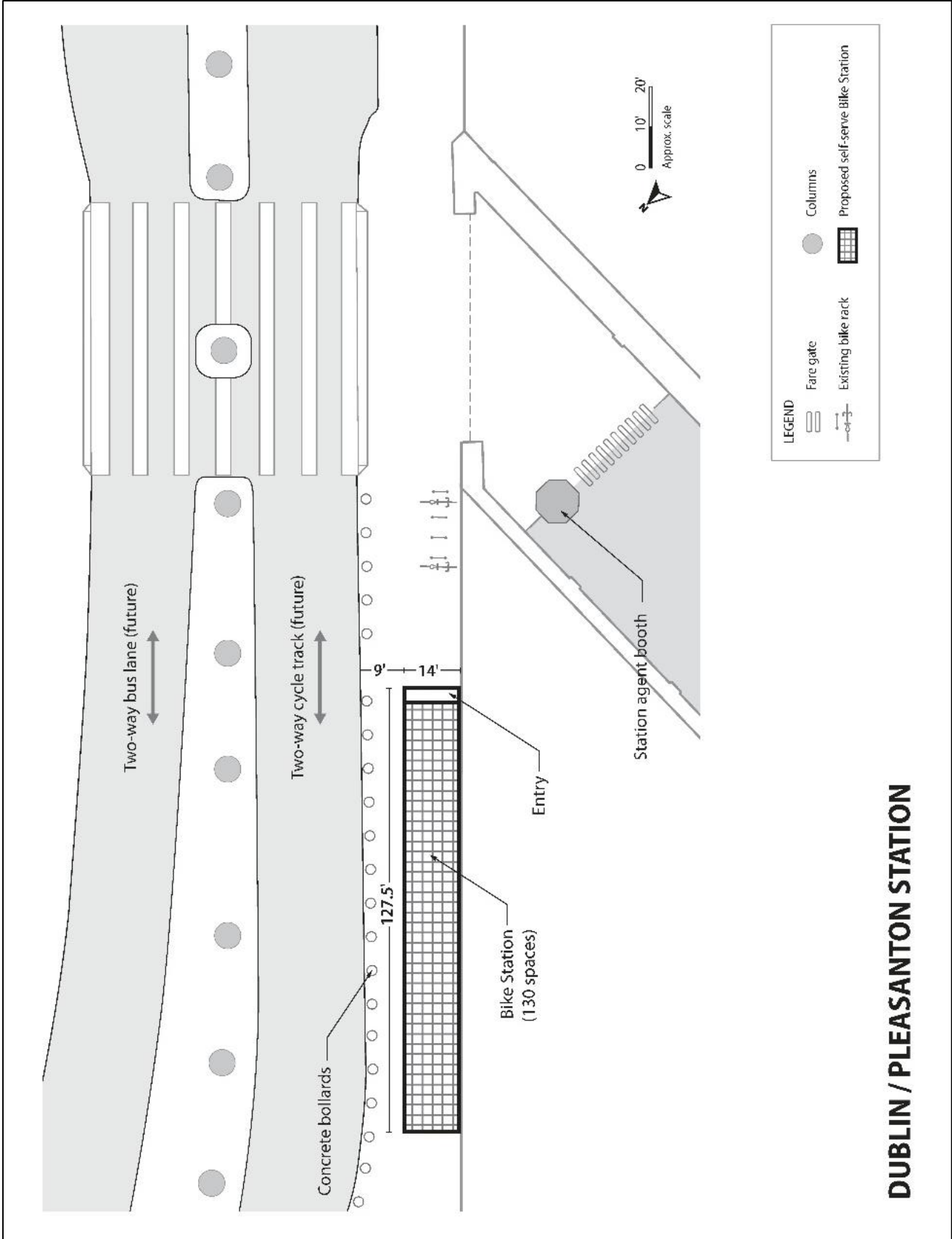
2022 projected weekday bike access passengers

- Total bike access:² 570
- Secure park-at-station goal:³ 256 (3/4 of 60%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 120
- Needed new secure spaces: 109
- Proposed new bike station spaces: 130

Footnotes 1–4: See page 13 for data sources and assumptions.



El Cerrito del Norte

Current bicycle parking situation

The El Cerrito del Norte station has bicycle racks for 126 bikes and 44 electronic bicycle lockers. Although just one-third of racks are full on a typical day, the lockers are well-used. In 2015, just 16 percent of passengers who biked to del Norte stored their bicycle at the station.

Opportunities for bicycle parking expansion

As part of a station modernization effort, the existing bicycle lockers will be moved to just east of the Ohlone Greenway and room will be set aside for a future 60-space self-park bike station. This additional parking will allow at least double the current rate, or 32 percent, of biking passengers to park securely at the station.

El Cerrito del Norte BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 282
- Park-at-station: 44 (16%)

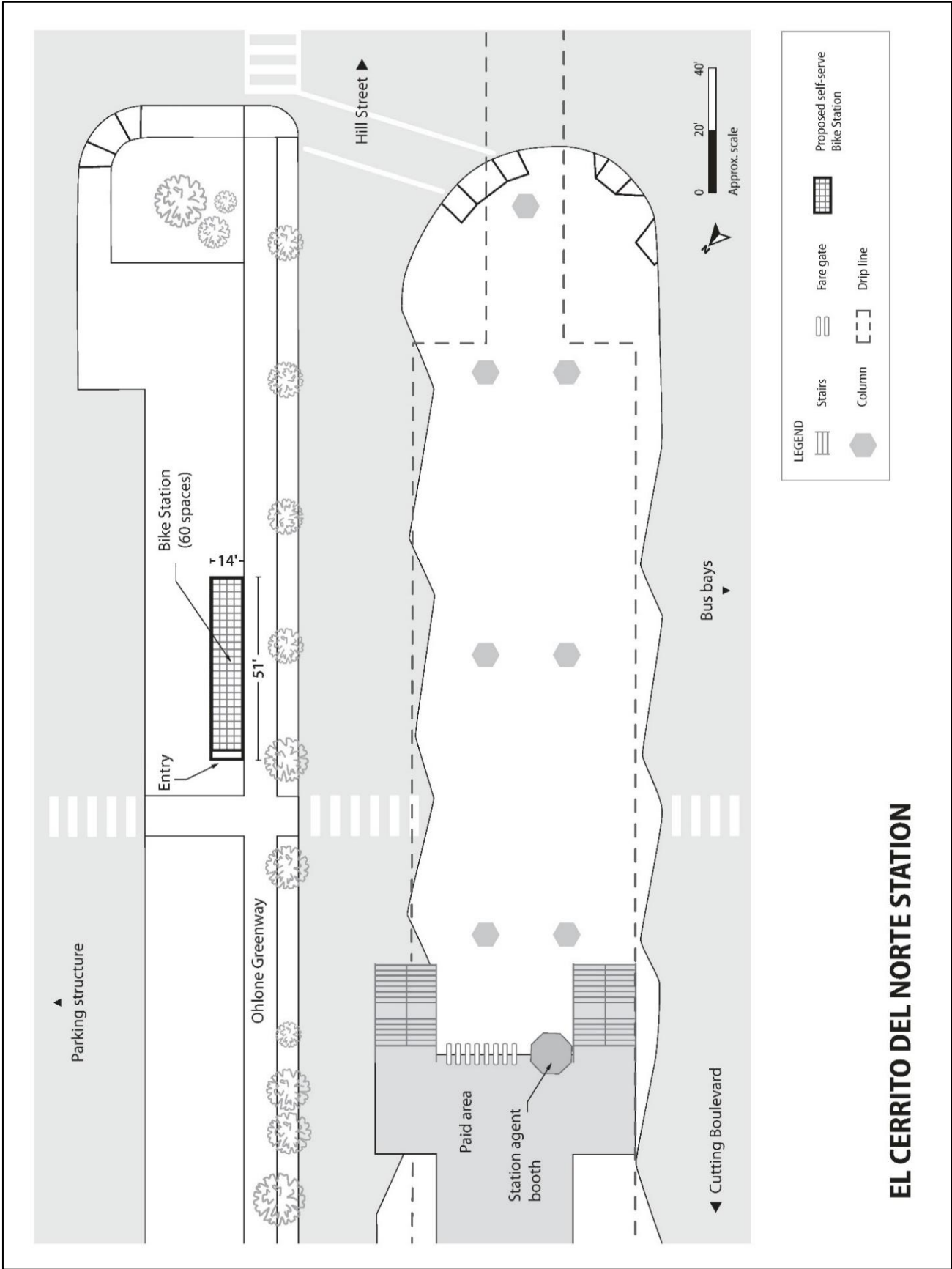
2022 projected weekday bike access passengers

- Total bike access:² 363
- Secure park-at-station goal:³ 85 (3/4 of 31%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 44
- Needed new secure spaces: 33
- Proposed new bike station spaces: 60

Footnotes 1–4: See page 13 for data sources and assumptions.



EL CERRITO DEL NORTE STATION

Fremont

Current bicycle parking situation

The Fremont station provides racks for parking 121 bikes outside the fare gates and electronic lockers for 76 bicycles. Although the racks are typically about half-full, the electronic lockers are often at their maximum capacity. About a quarter of BART passengers who access the Fremont station by bike park at the station, about the system-wide average, but a much lower portion than the system-wide goal of 60 percent.

Opportunities for bicycle parking expansion

The best option for secure parking at the Fremont station is a 145-space bike station on the plaza just north of the fare gate entrance on the west side of the station. There are currently 48 electronic bicycle lockers in this location, which could be redeployed elsewhere at this station or to a nearby station where there is insufficient demand for a bike station. This location will leave open walkways to the west and south of the bike station while being in a well-traveled, safe area. Many more secure bike parking spaces are recommended than projections show will be needed because the rate at which demand for bicycle parking at this station is growing is faster than it has been in the past.

Fremont BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 207
- Park-at-station: 53 (26%)

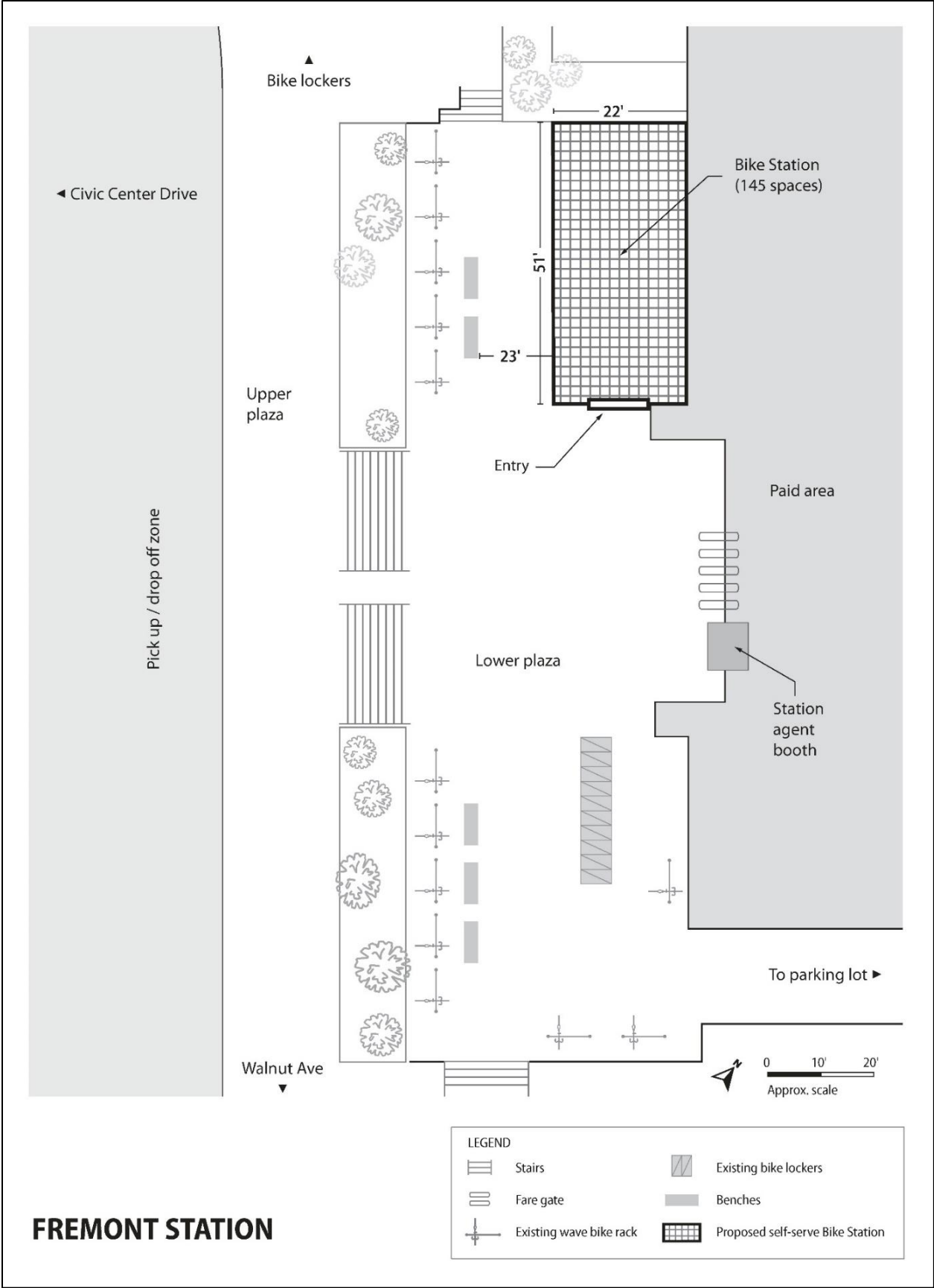
2022 projected weekday bike access passengers

- Total bike access:² 313
- Secure park-at-station goal:³ 121 (3/4 of 51%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 76
- Needed new secure spaces: 36
- Proposed new bike station spaces: 145

Footnotes 1–4: See page 13 for data sources and assumptions.



FREMONT STATION

LEGEND			
	Stairs		Existing bike lockers
	Fare gate		Benches
	Existing wave bike rack		Proposed self-serve Bike Station

Lake Merritt

Current bicycle parking situation

The Lake Merritt BART station is located in Oakland Chinatown, a half-block from Laney College, with entrances at the four corners of Oak Street and Eighth/Ninth Streets. The station has 156 inverted-U racks on the concourse level within and just outside the paid area, 21 racks at street level and 84 electronic lockers, located on both sides of Oak. The paid area racks and electronic lockers are extremely well-used, but just 19 percent of passengers who biked to the Lake Merritt station in 2015 parked their bikes there.

Opportunities for bicycle parking expansion

There are two potential areas that could eventually house a new bike station at the Lake Merritt BART station. There is ample space on the west side of Oak Street on the former BART headquarters site; however, development plans for this location are in flux. Another good bike station site is on the east side of Oak Street, where there are currently 28 electronic bicycle lockers on two sides of a large landscaped rectangular planter (see diagram), particularly if these well-used lockers can be moved to the west side of Oak. This location would leave ample walkways along its north and west sides and, by placing the entrance of this L-shaped station at its corner, would allow users to see down both bike parking aisles when they enter. This site, which is adjacent to the BART station's northeast entrance, will yield 145 bicycle parking places. One caveat is that a future transit-oriented development on the BART parking lot could encroach on this spot. At either location, many more bike parking spaces are recommended than projections show will be needed due to at least three factors:

- Bicycle parking demand at this station is growing faster than it has in the past.
- BART Operations staff would like to reduce clutter on the concourse by removing some racks.
- With the eventual redevelopment of the plaza on the west side of Oak Street, the number of BikeLink lockers will likely be reduced.

Lake Merritt BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 630
- Park-at-station: 117 (19%)

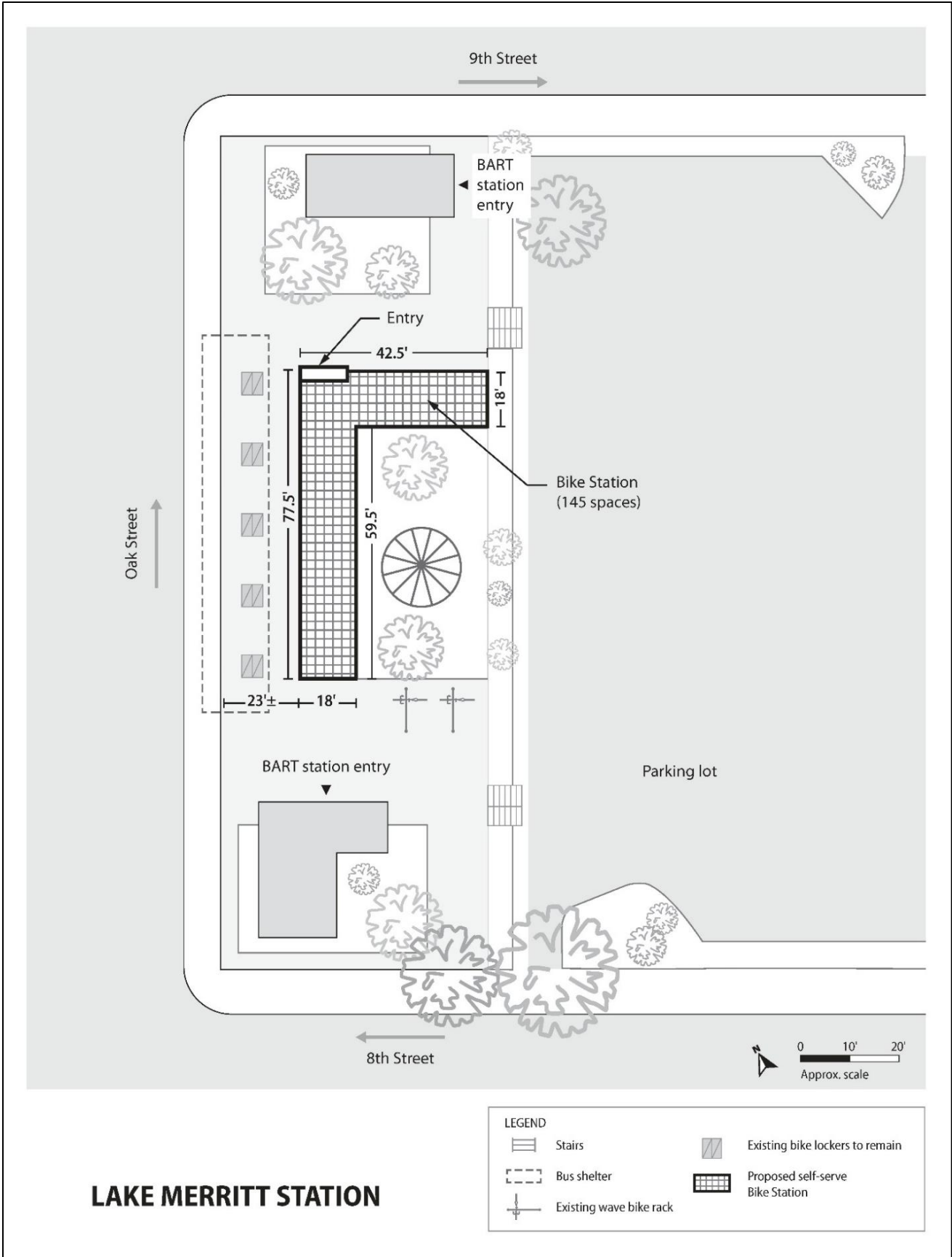
2022 projected weekday bike access passengers

- Total bike access:² 1,032
- Secure park-at-station goal:³ 272 (3/4 of 37%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 233
- Needed new secure spaces: 44
- Proposed new bike station spaces: 145

Footnotes 1–4: See page 13 for data sources and assumptions.



LAKE MERRITT STATION

North Berkeley

Current bicycle parking situation

The North Berkeley station provides double decker bicycle racks along the north boundary of the station plaza, a mixture of racks on the south side of the station and electronic lockers along the station’s west edge. All parking on the north and west sides of the station is very well-used; the south side bicycle racks are less popular, likely because the station structure hides them from the station agent’s view and from much of the station’s activity, which is focused on the north and east sides. In 2015, 35 percent of passengers who biked to the North Berkeley station parked at the station, 40 percent higher than the system-wide average, but still lower than the 2022 goal of 60 percent.

Opportunities for bicycle parking expansion

Replacing the bicycle racks and electronic lockers on the south side of the station with a new self-serve bike station would allow a large increase in the number of bicycles that can be securely parked at North Berkeley. This arrangement would net 134 new bike parking spaces, sufficient to accommodate demand projected by 2022. Although this location is not visible from the fare gates, by placing the door at the east end of the structure, it will be visible from the busy east side of the station. By making sure to construct the new bike station south of the stairway from the east parking lot and west of the ramp from the south parking lot, it will not impede people walking at the station.

North Berkeley BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 419
- Park-at-station: 146 (35%)

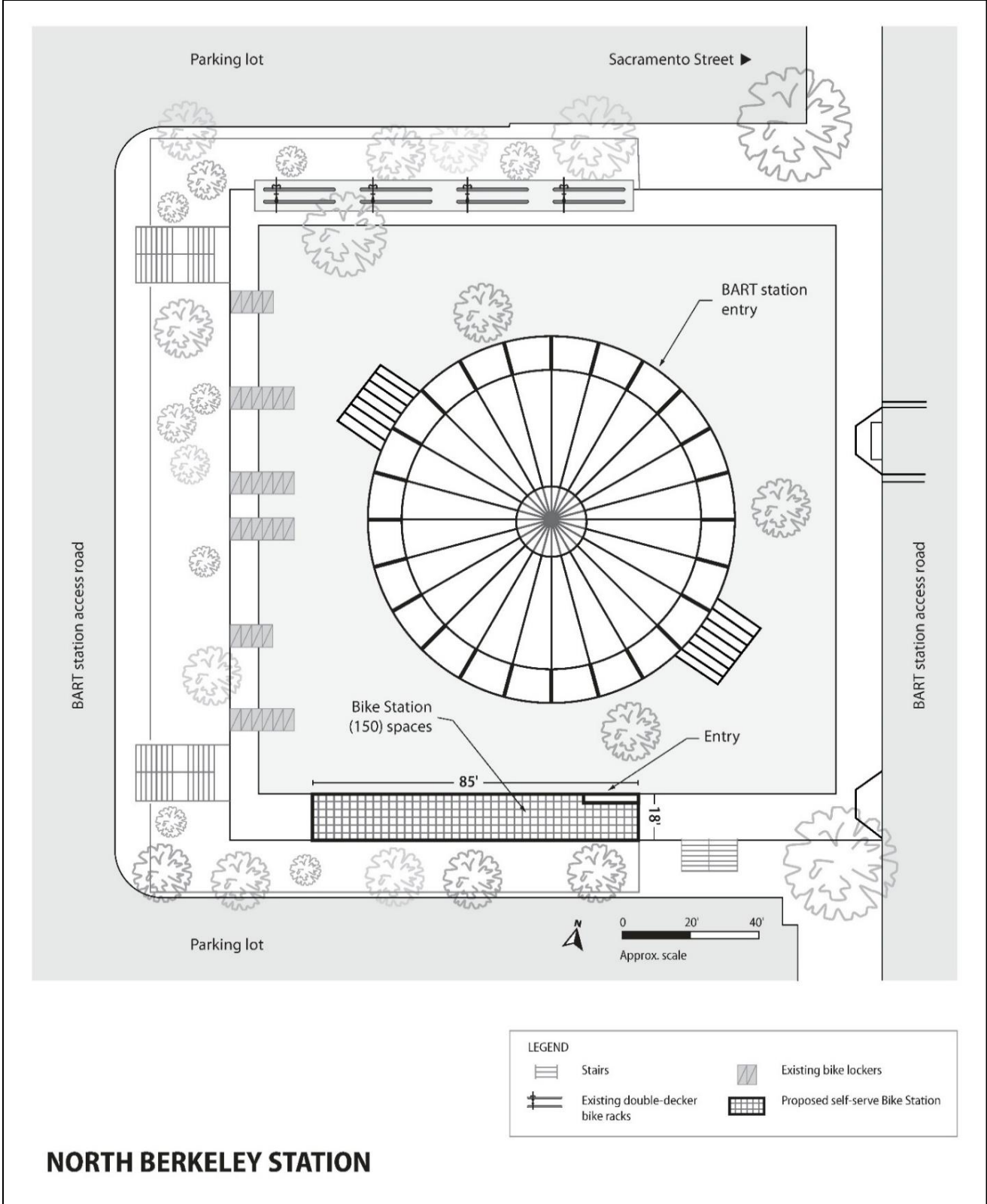
2022 projected weekday bike access passengers

- Total bike access:² 551
- Secure park-at-station goal:³ 248 (3/4 of 60%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 96
- Needed new secure spaces: 122
- Proposed new bike station spaces: 150 (134 net new spaces)

Footnotes 1–4: See page 13 for data sources and assumptions.



Rockridge

Current bicycle parking situation

The primary entrance to Oakland’s Rockridge station is on the east side of College Avenue. There is a stairway to a walkway over College on the west side of the street. One hundred sixty wave rack bike parking spaces and 72 electronic locker spaces are sprinkled around the base of the station’s escalators and stairways on both sides of the street. The bicycle racks located closest to the main station entrance on the east side of College and all of the electronic lockers are most popular, although the racks on the west side of the street are also well-used. In 2015, 35 percent of Rockridge passengers who biked to the station parked rather than bringing their bike onboard the train.

Opportunities for bicycle parking expansion

To encourage 60 percent of passengers who arrive at the Rockridge station by bike to leave their bicycles at the station, rather than bringing them onboard trains, BART should erect a self-serve bike station on the east side of College Avenue, north of the escalators. This location is close to the station’s main entrance, without interfering with the large pedestrian flows that traverse the area during the morning and evening commute periods. Placing the entrance along College Avenue will keep the facility from feeling isolated. This bike station could allow up to 150 bicycles to park securely. The racks that are currently located at this site could be moved to the west side of College Avenue.

Rockridge BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 283
- Park-at-station: 99 (35%)

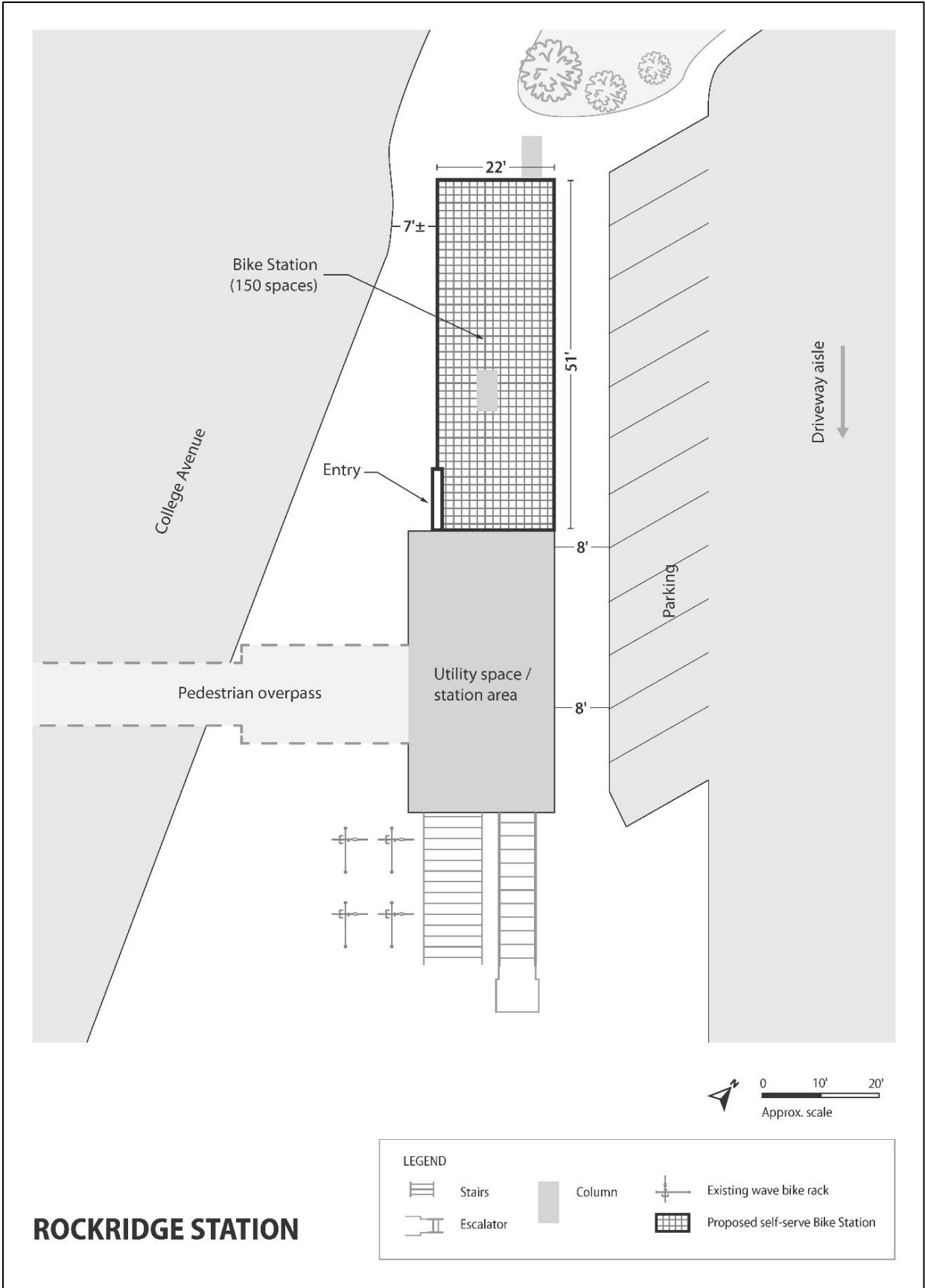
2022 projected weekday bike access passengers

- Total bike access:² 392
- Secure park-at-station goal:³ 177 (3/4 of 60%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 72
- Needed new secure spaces: 84
- Proposed new bike station spaces: 150

Footnotes 1–4: See page 13 for data sources and assumptions.



San Leandro

Current bicycle parking situation

The San Leandro BART station offers bicycle racks and electronic lockers south of the fare gates and additional eLockers on the north side of the station. Passengers use the racks at a fairly high rate and they depend on the electronic lockers even more consistently. Twenty-three percent of passengers who biked to the station in 2015 parked at the station, slightly less than the system-wide average of 25 percent.

Opportunities for bicycle parking expansion

The best opportunities to provide additional secure bicycle parking spaces at the San Leandro BART station are to replace the lockers north of the station with a new 150-space self-service bike station⁴ and to replace the bicycle lockers that are immediately south of the fare gates either with two rows of back-to back double-decker bicycle racks (180 spaces) or with inverted-U racks (100 spaces)⁵. The bike station should be situated to leave ample width for walkways on the west and east (see diagram). By extending this location beyond the station drip line to the east, the bike station entrance will be visible to passengers coming from downtown San Leandro and from the adjacent bus stop. This activity will provide eyes on the station to keep it from feeling isolated. Together, the new racks and bike station will provide the spaces needed to achieve the San Leandro BART station’s 45 percent park-at-station goal, and replace the number of locker spaces that will be lost when the new racks and bike station are installed.

San Leandro BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 415
- Park-at-station: 94 (23%)

2022 projected weekday bike access passengers

- Total bike access:² 800
- Secure park-at-station goal:³ 272 (3/4 of 45%)

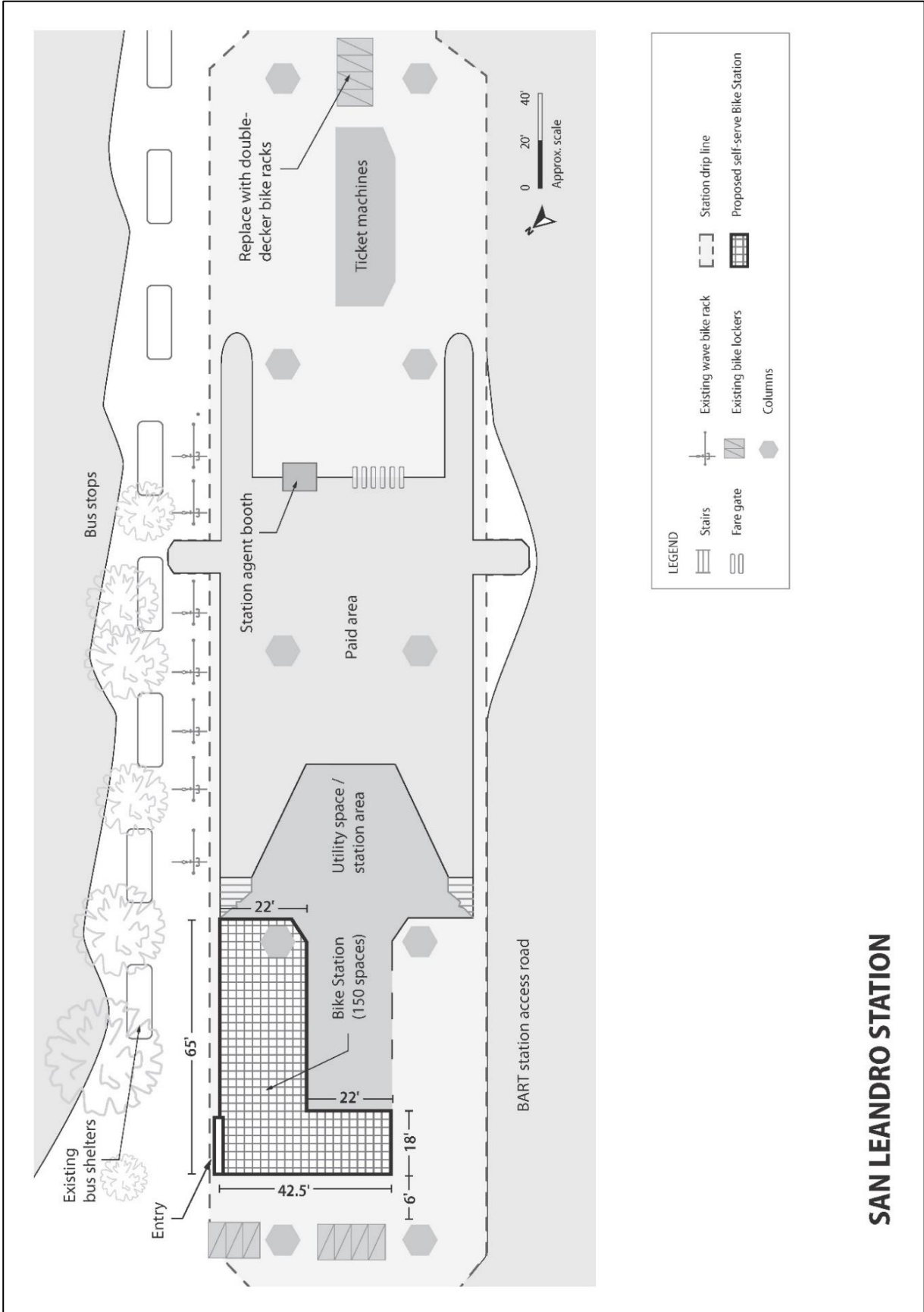
Additional secure parking spaces needed

- Current secure parking spaces:⁴ 79
- Needed new secure spaces: 155
- Proposed new bike station spaces: 155 (123 net new spaces)
- Proposed new double-decker racks: 180 net new spaces

Footnotes 1–4: See page 13 for data sources and assumptions.

⁴ BART will need to work with AC Transit to carefully design and site a bike station at this location because the bus agency is interested in building a driver break room on part of the footprint we have identified.

⁵ Although these racks will be less secure than the lockers they’ll replace, the nearby wave racks, which have a similar level of security, are often full.



SAN LEANDRO STATION

West Oakland

Current bicycle parking

Bicycle parking at the West Oakland station is distributed in four areas. Bicycle racks are mainly congregated immediately to the north (street side) and south (parking lot side) of the fare gates. There are groupings of electronic bicycle lockers, west, south and north of the fare gates. All bicycle racks are well-used, particularly those in the plaza just south of the fare gates. Bicycle lockers also routinely fill up, with the exception of those tucked under the station drip line on the north side of the station, in an area with less foot traffic than the other locker locations. As of 2015, 35 percent of passengers who bike to the West Oakland station park their bicycle before boarding the train.

Opportunities for bicycle parking expansion

BART’s goal is for 60 percent of bicycling passengers to park their bikes at the West Oakland station by 2022. This translates to a need for at least 330 new secure parking spaces by 2022. The best site for a new group parking facility, such as a self-serve bike station, is the southeast station corner, under the station drip line (see diagram). This location is visible from the south entrance to the fare gates and from the popular bicycle rack area just south of the fare gates, is protected from the weather, will not obstruct the adjacent walkway and, given its transparent walls, will feel safe due to pedestrian activity in the adjacent plaza, bus stop and parking lot; however, it can house just 150 bikes, not enough to cover the projected need. Therefore, when planning the new transit-oriented development at this station, plans should include relocation of any displaced bicycle lockers and a second bike station incorporated into the TOD, preferably one that provides valet parking.

West Oakland BART Station Bicycle Parking Summary

2015 weekday bike access passengers¹

- Total bike access: 705
- Park-at-station: 248 (35%)

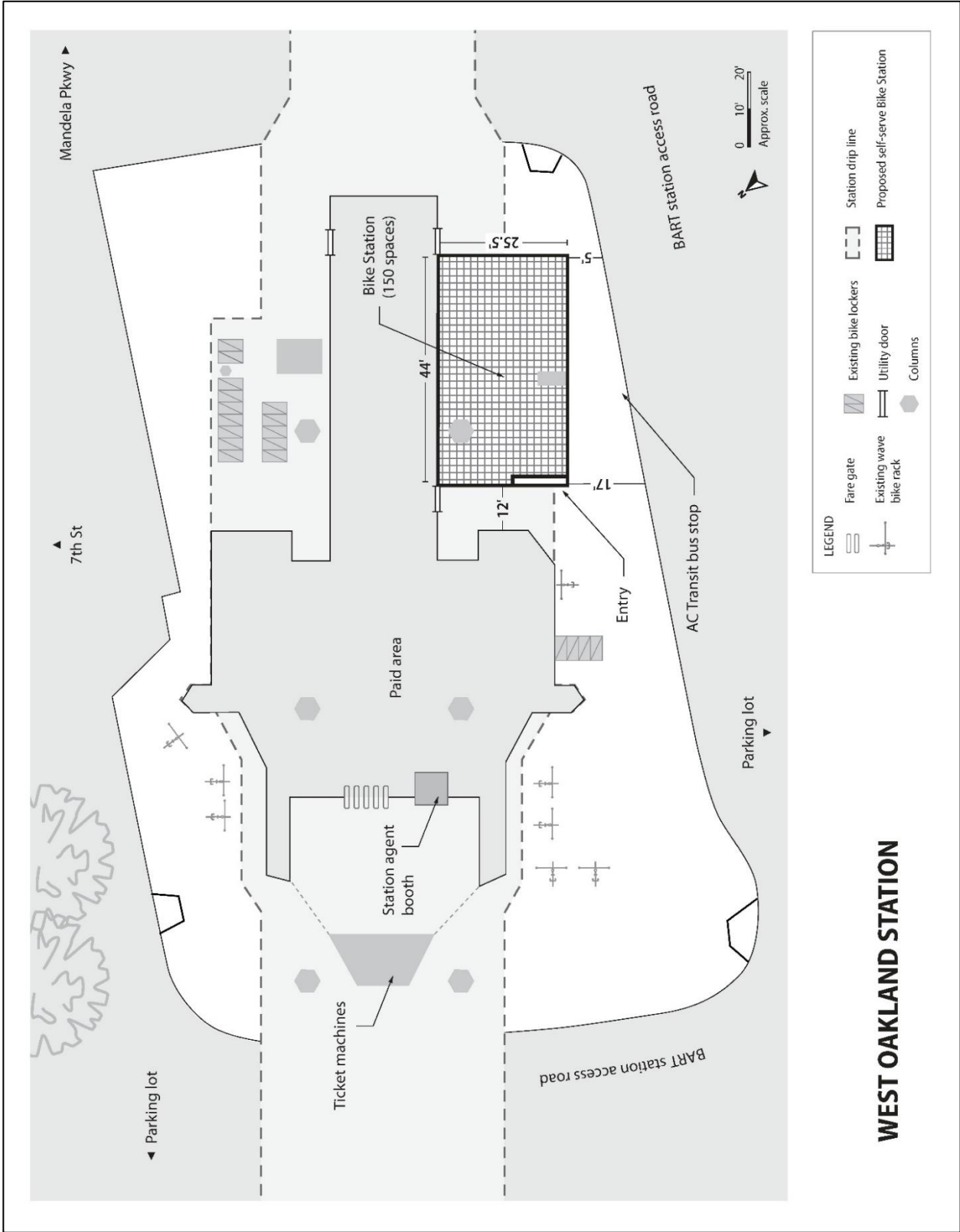
2022 projected weekday bike access passengers

- Total bike access:² 1,232
- Secure park-at-station goal:³ 554 (3/4 of 60%)

Additional secure parking spaces needed

- Current secure parking spaces:⁴ 142
- Needed new secure spaces: 330
- Proposed new bike station spaces: 150
- Shortfall to be filled by new TOD: 180

Footnotes 1–4: See page 13 for data sources and assumptions.



WEST OAKLAND STATION



VADER

SADDLE VADER

SADDLE

BEST OF ME

VADER

OnGuard

3 | Incremental changes

Based on the projection methodology described in Appendix A, incremental increases in bicycle rack spaces, electronic lockers and high-security smart racks (see 16th Street/Mission write-up under Efforts Underway section) can meet increased demand at the following BART stations.

12th Street/Oakland	El Cerrito Plaza	Powell Street
Ashby	Fruitvale	Richmond
Balboa Park	Glen Park	San Bruno
Bay Fair	Hayward	South Hayward
Castro Valley	Millbrae	South San Francisco
Civic Center	Montgomery Street	Union City
Coliseum	North Concord / Martinez	Warm Springs
Colma	Orinda	West Dublin / Pleasanton
Daly City	Pittsburg / Bay Point	

BART staff will continue to monitor demand at these stations and make incremental changes to stay ahead of demand and encourage high levels of parking at these stations.



4 | Networking eLockers

BART and partner agencies currently own and operate almost 1,500 BikeLink eLockers, located at 37 stations. Each pair of locker doors has a standalone controller/card reader, which cannot be monitored or updated remotely. Electronically linking these eLocker controllers would bring the following benefits to people who park their bikes in the lockers, as well as to eLocker operations and maintenance.

Benefits to eLocker users

1. **Clipper, credit card and smart phone compatibility:** Currently, BART passengers must order a BikeLink card online or go to a limited number of retail outlets in order to rent a bike locker. This creates a barrier for patrons who don't plan ahead or don't want another card in their wallet. If the brains behind each of BART's eLockers were connected to an online system, then people could rent them using a Clipper, BikeLink, credit or debit card that is linked to an account established for this purpose.
2. **Ability to check eLocker availability:** At stations where eLockers typically fill up, not knowing if a locker will be available can be a deterrent to choosing to ride a bike to the station. If eLockers were connected to an online system, potential users would be able to see both current and typical locker availability, thereby giving them a higher level of confidence in the availability of locker space.
3. **Less locker down time.** Out of service lockers can be frustrating if other lockers are full and can reduce passengers' confidence in the ability to park their bike safely every day. Electronic lockers that are connected to a central system can automatically notify technicians of maintenance issues, which can result in quicker repairs.
4. **Adding value, clearing errors.** Today, adding value to an eLocker account or performing other routine functions must be done at the locker and can be a bit cumbersome to carry out. Networked controllers will minimize the need for these transactions and, when they are necessary, allow them to be handled online. Furthermore, networked controllers could allow common functions, like auto-reload, which would simplify managing a bike locker account.

Operational benefits

1. **Real-time tracking:** Alerts in real time in the event of a possible security breach or rentals that are days or weeks overdue will allow technicians to respond more quickly than they can today.
2. **Real time data.** BART staff will be able to look at usage data, identify capacity issues in real time and add new lockers and deploy available lockers to stations with the greatest demand more quickly.
3. **Improved enforcement.** There have been cases of one eLocker-user breaking into an adjacent locker to steal a bike, and others where an eLocker-user uses a stolen BikeLink card. With a networked system, accounts that are being misused or linked to security issues can be immediately blocked, potentially preventing theft and giving users greater peace of mind.
4. **Software maintenance/upgrades.** Software updates currently need to be physically loaded onsite onto each individual controller. The software in linked eLockers will be able to be updated from a central location, which will save BART operating costs and will create a more consistent user experience.

Pilot program

In February 2017, the BART Board of Directors approved a pilot program to test new bicycle parking controllers that will accept any Clipper, BikeLink or credit card that is registered with BikeLink. These will be tested on lockers at the Rockridge station and at the self-park bike station and eLockers at Ashby in 2018.



5 | Stairway channels

The BART system contains hundreds of staircases passengers can use to travel between street level and stations' concourse levels (where the fare gates and station agent booths are located) and platforms (where the trains operate). Patrons sometimes need to carry their bikes up and down these stairways to park (where there is bike parking on the concourse level) and to reach the platform, if they're bringing their bicycle onboard a train. In an effort to provide as much space as possible aboard trains, BART encourages passengers with bicycles to park them rather than bringing them aboard trains. For those who need or want their bicycle on both ends of their trip, BART allows bikes on all trains at all times with some restrictions.



Credit: Streetsblog.org

By facilitating access to bicycle parking and platforms that are up or down a flight of stairs, stair channels are one way for BART to encourage more passengers to access stations by bike. The agency installs these mini-ramps beneath the handrail to allow passengers to roll their bicycles as they walk up or down staircases.⁶ Stairways at the 16th Street/Mission, Downtown Berkeley, Lafayette and Warm Springs stations have been retrofitted or constructed with channels. There are plans to expand this program to other stations throughout

⁶ An automated Dutch variation was being rolled out on Golden Gate Transit ferries when this plan was being developed. These systems carry the bicycle, rather than the user pushing it. Depending on the results of this pilot project, BART may consider experimenting with it as well.

the BART system using the following criteria to prioritize the stations where stairway channels should be installed first:

1. **Concourse level parking:** The highest priority to install stairway channels is at stations with bike parking on the concourse level, when that level is below or above the street.
2. **Bicycle entries:** All things being equal, stairway channels at stations where more passengers access the station by bike are a better investment than those with lower bike access rates and numbers. Related, BART prioritizes stairways at destination stations with higher-than-average numbers of passengers who bring their bikes on the train and, therefore, must carry them from the platform to the street level. Although the agency does not encourage passengers to bring their bikes onboard, it also seeks to provide alternatives to bringing bikes on escalators when possible. (Note: this criterion is considered in the Bike Entries Rank column in Table 3 on the facing page since most every bike that enters the system at a given station needs to exit from the same station later the same day.)
3. **Longer staircases:** Stations with longer vertical accents and descents pose a bigger barrier to passengers with bicycles than other stations.

This methodology leads to the station priorities for stairway channel retrofits shown in Table 3. When plans are being developed to add stairway channels at a particular station, the following criteria should be used to identify which ones to prioritize:

1. **Guiding cyclists' path of travel:** Besides facilitating access to bike parking, stairway channels, in conjunction with wayfinding signs, can also encourage cyclists to use staircases at each station that are widest and potentially the least heavily traveled by other BART passengers.
2. **Connections to local bikeways:** Selecting stairways to retrofit that serve station entrances closest to bike lanes and other local infrastructure is another way of prioritizing stair channels.

Table 4 provides the cost to retrofit existing staircases with a channel. Appendix C, Proposed BART Bicycle Stair Channel Facilities Design Criteria, provides the portion of BART Facilities Standards that governs stair channels. The report addresses code considerations, materials, handrail interactions, channel width, transitions and other physical aspects of the channels.

Table 3 | Stairway channel priority locations

Station	Bike entries rank*	Stairway length**	Priority	Rationale for Priority
<i>Stations where stair channels are needed to reach bike parking</i>				
12 th Street / Oakland	Medium	•••	High	Parking access + Medium bike access
19 th Street / Oakland	High	•••	High	Parking access + High bike access + Deep station
24 th Street / Mission	High	••	High	Parking access + High bike access
Civic Center	High	•••	High	Parking access + High bike access + Deep station
Downtown Berkeley	High	••	High	High bike access + Parking access
Embarcadero	High	•••	High	Parking access + High bike access + Deep station
Lake Merritt	High	••	High	Parking access + High bike access
Millbrae	Low	•••	High	Parking access + High station
Pittsburg / Bay Point	Low	••	High	Parking access
Richmond	Low	••	High	Parking access
Rockridge	Medium	••	Medium	Medium bike access + limited concourse parking
Warm Springs	NA	•••	Existing	Street to concourse and concourse to platform exits
West Dublin / Pleasanton	Low	••	High	Parking access
16 th Street / Mission	High	••	Existing	Street to concourse stair channel exists
<i>Stations where stair channels are needed to reach platform only</i>				
Ashby	High	•	Medium	High bike access + short stair from concourse to platform
Balboa Park	High	••	High	High bike access
Bay Fair	Medium	•	Medium	Medium bike access
Castro Valley	Low	•	Low	Low bike access
Coliseum	High	•	High	High bike access
Colma	Low	•	Low	Low bike access
Concord	Medium	•	Medium	Medium bike access
Daly City	Low	•	Low	Low bike access
Dublin / Pleasanton	Medium	•	Medium	Medium bike access
El Cerrito Del Norte	Medium	•	Medium	Medium bike access
El Cerrito Plaza	Low	•	Low	Low bike access
Fremont	Medium	•	Medium	Medium bike access
Fruitvale	High	•	High	High bike access
Glen Park	Medium	••	Medium	Medium bike access + Deep station
Hayward	Medium	•	Medium	Medium bike access
Lafayette	Low	•	Low	ADA ramp adjacent to stair provides roll option
MacArthur	High	•	High	High bike access + Platform transfer
Montgomery Street	High	•••	High	High bike access + Deep station
North Berkeley	High	•	High	High bike access
North Concord / Martinez	Low	•	Low	Low bike access
Orinda	Low	•	Low	Low bike access
Pleasant Hill	Medium	•	Medium	Medium bike access
Powell Street	High	•••	High	High bike access
San Bruno	Low	••	Low	Low bike access
San Leandro	High	•	High	High bike access
South Hayward	Low	•	Low	Low bike access
South San Francisco	Low	••	Low	Low bike access
Union City	Low	•	Low	Low bike access
Walnut Creek	Medium	•	Medium	Medium bike access
West Oakland	High	•	High	High bike access

* High: 500+; Medium: 300-499; Low: below 300 (Source: 2015 Station Profile Study)

• Single flight of stairs •• Multiple flights of shorter stairways ••• Multiple flights of longer stairways

Table 4 | Stairway channel cost estimates

<i>Component</i>	<i>Low Cost</i>	<i>High Cost</i>
Design/Engineering		
New stairway type		\$25,000
Design for stairway type exists	\$10,000	
Station environment*		
Difficult construction access		\$25,000
Easy construction access	\$7,500	
Construction (assuming 125 linear feet)		
Cast-in-place concrete		\$40,000
Pre-fabricated metal	\$20,000	
Soft Costs (BART labor & construction management)		
Stand-alone project		\$40,000
Four or more under one contract	\$10,000	
Total	\$47,500	\$130,000

* Factors include level of passenger volumes, number of levels to reach stairway to be modified and distance between stairway and truck parking (e.g., Dublin/Pleasanton vs Powell Street).

6 | Accessible fare gates

Most BART fare gates are too narrow to accommodate passengers who use a wheelchair, stroller or bicycle or who are carrying luggage. Over the past decade, BART has installed at least one wider fare gate, known as “accessible fare gates (AFGs),” at each station; however, not all sets of fare gates (known as “arrays”) at every station include an accessible gate. Because AFGs are costly to install, even when replacing an existing fare gate, BART uses the following criteria to prioritize their installation:

- To equip each end and both sides of central exits with an AFG;
- To reduce the impact of closing swing/emergency gates in order to reduce fare evasion. (Note: Additional AFGs are only one variable BART considers when closing a swing gate; first and foremost, emergency egress capacity must be satisfied without the swing gate in operation in order for one to be closed or replaced with an AFG.);
- To accommodate high volumes of passengers, particularly those with wheelchairs, luggage or bikes; and
- To provide more direct access to elevators.

Table 5 lists the arrays at each station where AFGs should be added.



Table 5 | Recommended accessible fare gate locations*

<i>Station</i>	<i>Array**</i>	<i>Priority</i>	<i>Rationale for priority</i>
12 th Street / Oakland	GA_S2	H	Either S2 or S3 would provide access to new side of central fare gates since they are adjacent to each other.
12 th Street / Oakland	GA_S3	H	
19 th Street / Oakland	GA_3	NA	Although not currently in place, planned and funded
24 th Street / Mission	GA_1	H	Will help with high level of fare evasion through swing gate; shorten path between street and platform elevator
Balboa Park	GA_1	L	Arrays relatively close, small advantage to second AFG
Bay Fair	GA_2	L	Array with and without AFG are close and lead to same entry/exit
Civic Center	GA_N1	H	Significant distance between arrays with and without
Civic Center	GA_S2	M	Relatively close arrays with and without, easy move between in free area, but high passenger volumes
Coliseum / Oakland Airport	GA_1	L	Really one long array but for tracking purposes they are separated into two arrays
Colma	GA_1	L	Low passenger volume station
Concord	GA_1	L	Although AFG is only on one side of station it is relatively easy to move from one side to other in free area
Concord	GA_3	M	
Daly City	GA_1	L	Really one long array but for tracking purposes they are separated into two arrays
Daly City	GA_3	M	Would allow entry/exit at both north and south ends of paid area
Downtown Berkeley	GA_1	L	Unusual set-up with "stand alone" AFG in middle of two arrays, little advantage
Downtown Berkeley	GA_2	L	
Downtown Berkeley	GA_4	M	Would improve direct access to elevator
Downtown Berkeley	GA-5	H	Far south end of station
El Cerrito Del Norte	GA_2	NA	Although not currently in place, planned and funded
El Cerrito Plaza	GA_2	M	Would allow entry/exit at both north and south ends of paid area
Embarcadero	GA_S2	H	
Embarcadero	GA_S3	H	Provides access to discrete side of Market St.; supports closure of swing gate to prevent fare evasion.
Embarcadero	GA_N2	H	
Embarcadero	GA_N3	H	
Fremont	GA_1	M	Although AFG is only on one side of station it is relatively convenient to move from one side to other in free area
Lafayette	GA_2	NA	Although not currently in place, planned and funded
Lake Merritt	GA_2	H	Will allow entry/exit on both sides of station
MacArthur	GA_1	M	Close to array with AFG but high passenger volume station
Millbrae	GA_P4	L	Low passenger volume array
Montgomery Street	GA_S1	M	Close to array with AFG but high passenger volume station
Montgomery Street	GA_S3	L	Space constraints outside this array make this poor location for AFG
Montgomery Street	GA_N2	M	Close to N1 but high passenger volume station
Montgomery Street	GA_N1	H	Would allow entry/exit from south end of secondary area
North Concord / Martinez	GA_2	L	Array with and without AFG are close and lead to same entry/exit
Powell Street	GA_S1	H	Either S1 or S2 can be the High (H) priority at M20 South (S)
Powell Street	GA_S2	H	Either S2 or N1 would provide access to new side of central fare gates since they are adjacent to each other.
Powell Street	GA_N1	H	
Rockridge	GA_2	L	Array with and without AFG are close and lead to same entry/exit

* See page 45 for discussion of need for and criteria to prioritize AFGs.

** See www.bart.gov/sites/default/files/docs/floorplan.pdf for location of each fare gate array.

L: Low; M: Medium; H: High

NA: Not applicable because no additional AFGs are needed.

Appendices



Bicycle parking demand projections

This appendix lists the number of secure bike parking spaces that are projected to be needed in each station throughout the system in 2022, ten years after the BART Bicycle Plan was adopted. BART staff estimated these numbers using projections of future bike access and the percent of those bicycles passengers are likely to park at stations versus bringing them aboard trains. They used the following methodology and assumptions to develop these figures for each station (letters refer to columns in Table A.1):

1. **Calculate 2015 park-at-station rates:** From the latest BART Station Profile Study (2015), log the number of passengers who accessed each station by bike <col A> and the number of those passengers who parked at the station before boarding their train <col D> and, therefore, what percentage of passengers who biked to the station in 2015 parked there <col E>. For use later in the process, the growth in the park-at-station rate since 2008 (the previous Station Profile Study) is also calculated <cols B and C>.
2. **Project 2022 park-at-station numbers:** BART has developed complex models to project how many passengers will use each station in the future. Anticipating how many secure bicycle parking spaces will be needed at each station in 2022 begins with the number of passengers projected to enter each station from home since that's the trip for which those who don't bring their bikes aboard need parking <col F>. BART then assumes the same growth in the percentage of passengers who accessed each station by bike between 2008 and 2015 <col C> will occur as the seven years between 2015 and 2022 to estimate the number of passengers who will bike to the station <col G>.

BART's goal is for an average of 60 percent of passengers who bike to stations system-wide to park at the station by 2022, up from the 2008 rate of 41 percent and the 2015 rate of 25 percent.⁷ To calculate the number of spaces needed to begin to make meeting this goal possible, the target parking rate at each station <col H> is assumed to be 60 percent or, because BART recognizes that it is not realistic to expect the rate to more than double at a given station, double the 2015 rate, whichever is lower <col H>. This rate is then multiplied by the 2022 projected number of bikes <col G> to anticipate the number of bicycles to park at each station <col I>.

3. **Anticipate 2022 secure bike parking spaces needed:** A few adjustments are needed to translate the number of bicycles that are projected to park at BART stations in 2022 to the number of new, secure bike parking spaces that will be needed. First, BART assumes that three-quarters of passengers who bike to BART value the highest possible security over convenience <col J> and that one-quarter prefer to use bike racks outside of the paid area even where they're less secure. Then the number of existing "secure" parking spaces is subtracted <col K>. Twenty percent of these spaces are subtracted to account for turnover (i.e., more than one bicyclist can use a given space on a given day because some passengers leave early and others arrive late) <col M>.

⁷ The rate at which passengers parked their bicycles versus bringing them onboard the train dropped considerably in the wake of the BART policy change that lifted bike-onboard time restrictions. This shift was not unexpected and is a major impetus for the bicycle parking recommendations in this plan.

Table A.1 | Bicycle parking demand projections for stations where this plan recommends constructing new bicycle stations (2022)

Station	Step 1: Calculate 2015 bike parking rate					Step 2: Project 2022 bike parking #s				Step 3: Anticipate 2022 secure bike parking spaces					
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
	2015 (actual)		2008-15 rate change			2022 (projected)		2022 (projected)			2022 (projected)				
	Bike access					Bike access		Bike parking			Bike parking				
	#	%		#	%	Home-based entries	#	Goal (%)	#	Secure needed	Minus existing secure	New secure needed	Minus turnover	NEW SECURE NEEDED	
12 th Street / Oakland	221	6%	3%	34	15%	4,540	407	30%	123	92	42	50	10	40	
16 th Street / Mission	518	10%	5%	28	5%	5,550	810	11%	89	67	77	-10	-2	-8	
19th Street / Oakland	659	14%	8%	352	53%	5,534	1,237	60%	742	556	264	292	58	234	
24 th Street / Mission	529	7%	2%	34	6%	8,288	750	13%	97	73	70	3	1	2	
Ashby	454	11%	-1%	157	35%	4,142	433	60%	260	195	198	-3	-1	-3	
Balboa Park	495	6%	4%	76	15%	9,363	896	31%	277	208	91	117	23	93	
Bay Fair	272	6%	4%	72	26%	4,970	466	53%	246	184	20	164	33	131	
Castro Valley	227	9%	7%	27	12%	2,609	418	24%	98	74	119	-45	-9	-36	
Civic Center	351	7%	3%	52	15%	5,336	525	29%	154	116	248	-132	-26	-106	
Coliseum	227	5%	5%	30	13%	4,703	478	27%	127	96	16	80	16	64	
Colma	139	3%	3%	24	17%	4,090	257	34%	87	65	64	1	0	1	
Concord	237	5%	2%	52	22%	5,690	352	44%	155	116	89	27	5	22	
Daly City	186	3%	3%	39	21%	7,325	418	42%	175	132	20	112	22	89	
Downtown Berkeley	244	7%	-3%	68	28%	4,159	134	56%	75	56	356	-300	-60	-240	
Dublin / Pleasanton	316	5%	4%	128	41%	6,577	570	60%	342	256	120	136	27	109	
El Cerrito del Norte	282	4%	1%	44	16%	7,822	363	31%	114	85	44	41	8	33	
El Cerrito Plaza	209	5%	-1%	104	50%	4,385	172	60%	103	77	96	-19	-4	-15	
Embarcadero	185	6%	-3%	0	0%	3,350	118	0%	0	0	130	-130	-26	-104	
Fremont	207	3%	2%	53	26%	6,550	313	51%	161	121	76	45	9	36	
Fruitvale	764	11%	1%	150	20%	7,705	922	39%	363	272	264	8	2	6	
Glen Park	309	5%	3%	41	13%	6,421	530	27%	141	106	73	33	7	26	
Hayward	202	5%	4%	29	14%	4,239	381	29%	110	82	36	46	9	37	
Lafayette	151	5%	3%	43	28%	3,226	252	57%	143	107	104	3	1	3	
Lake Merritt	630	15%	7%	117	19%	4,813	1,032	37%	384	288	233	55	11	44	
MacArthur	792	14%	6%	311	39%	6,037	1,195	60%	717	538	138	400	80	320	
Millbrae	124	3%	2%	20	16%	5,049	208	32%	66	49	90	-41	-8	-33	
Montgomery Street	165	7%	6%	38	23%	2,744	341	46%	158	118	0	118	24	95	
North Berkeley	419	12%	4%	146	35%	3,572	551	60%	331	248	96	152	30	122	
North Concord / Martinez	97	4%	3%	39	41%	2,736	184	60%	110	83	52	31	6	25	
Orinda	84	4%	2%	14	17%	2,369	127	35%	44	33	98	-65	-13	-52	
Pittsburg / Bay Point	196	3%	3%	15	8%	4,654	284	15%	43	33	82	-49	-10	-40	

Table A.1 (continued) | Bicycle parking demand projections for stations where this plan recommends constructing new bicycle stations (2022)

Station	Step 1: Calculate 2015 bike parking rate					Step 2: Project 2022 bike parking #s				Step 3: Anticipate 2022 secure bike parking spaces				
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	2015 (actual)		2008-15 rate change			Bike access		Bike parking		2022 (projected)		Bike parking		
	#	%	%	#	%	Home-based entries	#	Goal (%)	#	Secure needed	Minus existing secure	New secure needed	Minus turnover	NEW SECURE NEEDED
Pleasant Hill	383	6%	3%	186	49%	6,445	568	60%	341	256	136	120	24	96
Powell Street	179	6%	4%	0	0%	3,281	342	0%	0	0	0	0	0	0
Richmond	205	5%	3%	16	8%	3,810	333	15%	51	39	57	-18	-4	-15
Rockridge	283	7%	2%	99	35%	4,095	392	60%	235	177	72	105	21	84
San Bruno	121	5%	3%	12	10%	2,614	219	20%	43	33	64	-31	-6	-25
San Leandro	415	9%	6%	94	23%	5,148	800	45%	363	272	79	193	39	155
South Hayward	130	5%	3%	27	21%	3,194	241	42%	100	75	46	29	6	23
South San Francisco	110	4%	3%	25	22%	3,076	218	45%	98	73	52	21	4	17
Union City	220	5%	4%	36	16%	4,394	387	33%	126	94	68	26	5	21
Walnut Creek	198	4%	2%	82	42%	5,590	328	60%	197	148	96	52	10	41
West Dublin / Pleasanton	105	4%	4%	19	18%	3,217	248	37%	92	69	52	17	3	13
West Oakland	705	12%	7%	248	35%	6,280	1,232	60%	739	554	142	412	82	330

Bold indicates addition of bike station recommended.

Sources:

- A. 2015 bike access #: 2015 Station Profile Study
- B. 2015 bike access rate: 2015 Station Profile Study
- C. 2008/15 bike access rate change: 2008 & 2015 Station Profile Studies
- D. 2015 bike parking #: 2015 Station Profile Study
- E. 2015 bike parking rate: col D/col A
- F. 2022 home-based entries: BART projections
- G. 2022 bike access #: (2015 rate + 2008-15 increase) x 2022 home-based entries
- H. 2022 bike parking rate goal: Double 2015 park-at-station rate or 60%, whichever is smaller
- I. 2022 bike parking #: col G x col H
- J. 2022 secure parking #: 75% of col I
- K. existing secure parking #: BART bike parking inventory
- L. new secure parking needed #: col J - col K
- M. turnover: 20% of col L to reflect that more than one bicyclist can use a given space on a given day
- N. total secure spaces needed #: col L - col M

The total number of new, secure bicycle parking spaces is shown in column N. Note that this methodology is conservative, i.e., it may anticipate the need for fewer secure bicycle parking spaces at one or more stations than are actually needed due to any or all of the following factors:

1. The station-specific bicycle access goals are based on adding the 2015 surveyed rate to the 2008-2015 increase.⁸ This assumes that the rate of increase that we've seen since 2008 will extend into the future; however, more recently, bike parking demand indicates that this rate is increasing at a faster pace at most stations.
2. New residential, commercial and office development is in various stages of planning and construction at and near a number of BART stations. This growth will yield a higher number of new passengers at some stations, many of whom may bike to the station.
3. Building new convenient, secure and highly visible bike parking at BART stations will encourage some passengers, who now take their bikes onboard trains, to leave them at their home station. This new parking may also encourage new passengers or those who drive to BART today to use their bicycles instead.

⁸ The "2015 surveyed rate" is the rate of bicycle access estimated based on responses to BART's 2015 Station Profile Survey, a carefully thought-out research effort. On a system-wide basis, there is an 89 percent alignment of these figures with the one-day bicycle parking occupancy surveys that BART performs annually; however, due to daily fluctuations, there is not a perfect match, particularly at the station level.

Bicycle parking survey methodology

Once each year, BART staff take an inventory of every bicycle parking space in the system, primarily to obtain a snapshot of demand for each type of bike parking at each station (see figure below for the card surveyors use at each station). A secondary purpose of this work is to confirm the accuracy of BART's records of the number of bike parking spaces of each type at each station. These inventories are taken by the same BART staff who conduct other surveys for the system.

To improve the accuracy of the survey results, the following methodology is recommended:

1. Survey on one day per station between 10am and 3pm on Tuesdays, Wednesdays and Thursdays in late September, a time expected to reflect peak demand for the system because it is during normal work and school hours, on BART's busiest days, when Bay Area weather is typically still dry.
2. Compare the results at each station to the previous year's results. Where there are larger-than-expected changes, perform a second count to determine if the discrepancy reflects actual fluctuation or a surveying error.
3. Interview the surveyors to find out what tools would help them do the most accurate job possible.

Name: _____		
Station _____		
Date _____ Time _____		
	Capacity	Occupancy
Paid Area racks		
Outside Racks		
Bike Link		
Keyed Locker		N/A
# of bikes parked outside of racks (locked to fence, pole, etc..) _____		
Notes _____		

Bicycle parking inventory counting card



The design criteria shown in this appendix are intended to guide the design and engineering of stairway channels throughout the BART system by becoming part of the BART Facilities Standards. Following these criteria should lead to the most appropriate and functional design for each stairway location and application. Please see Stairway Channels section beginning on page 39 for more information.

Proposed Bicycle Stair Channel Facilities Design Criteria

8.1.H Revision

At each station, one or more routes, that includes public use stairs to each level, shall be designated as a “bicycle route” for the convenience of bicyclists and safety of passengers. Stairs identified as part of the “bicycle route” shall be designed and constructed to include bicycle stair channels. Bicycle stair channels can also be added to existing stairways to improve bike access and to support a preferred bicycle route through the station. Refer to Section 8.3, Bicycle Stair Channels, for bicycle stair channel design criteria. Refer to the Bicycle Program Capital Plan (bart.gov/bikes), dated March 2017, for stair channel priority rankings.

8.3 BICYCLE STAIR CHANNELS

- A. This article includes facility design criteria for bicycle stair channels located in passenger stations. A Bicycle Stair Channel (BSC) is a channel that runs alongside a pedestrian stairway that is intended for rolling a bicycle up or down as one walks along the stairway instead of having to carry it.
- B. BSCs are being installed as part of a greater circulation planning effort by BART to facilitate the movement of bikes vertically in stations, provide an alternative to elevator use (and the common use of escalators contrary to BART’s bike rules), and encourage bicyclists to utilize wider, less used stairways in lieu of narrower, more crowded stairways.
- C. Defined path of travel
 - 1. Engineer shall consider a logical path of travel for a bicyclist through a station, from street to platform level. BSCs shall be installed on stairways that are a part of the “bicycle route.”
- D. The following must be considered when selecting a stairway to install a BSC:
 - 1. Straight run stairs are preferred over stairways with switchbacks. Switch-back stairways make it more challenging to construct a functional stair channel because of the multiple transition points and congestion that occurs at each direction change.
 - 2. Shallower stairways are easier to use, and preferred over steep stairways.
 - 3. Stairway should lead to fare gate array that includes an accessible fare gate.
- E. Signage
 - 1. Signage must be installed to guide bicyclists to stair channels and to inform bicyclists how to utilize the channel, with information including, if necessary, tilting and using the brakes.

F. Placement

1. Bicycle stair channels should be placed parallel to the run of the stair, typically at the corner where the stair meets a wall or a guardrail.
2. BSCs may be wall-mounted or stair-mounted.
3. BSCs must be designed to prevent a foot or toe from getting wedged underneath to avoid toe-pinching or tripping. A gap of 4 inches or more, measured from the edge of the nosing to the bottom of the stair channel, is recommended if a bicycle stair channel is floating above the staircase. Narrower gaps should be closed with a solid vertical surface along the side of the channel.
4. Where appropriate, a channel may bisect a stairway, as long as there is an accompanying handrail that also bisects the stairway. A BSC cannot exist without an accompanying handrail.

G. Before designing and installing a stairway channel, the Engineer must calculate the required exit width for a given stair or set of stairs, and seek approval from the Authority Having Jurisdiction (AHJ) for changes to an existing or approved stair that reduce the stairway below its approved design width.

1. If the stairway has adequate width to accommodate it, a larger channel is preferred as they typically perform better. BSCs should be a maximum width of 11 inches wide to maintain a reasonable distance between a pedestrian and the handrail. Note the stairways handrail can overlap above the width of the BSC by up to four inches without impacting its use. See “Bicycle Stair Channels: Investigating

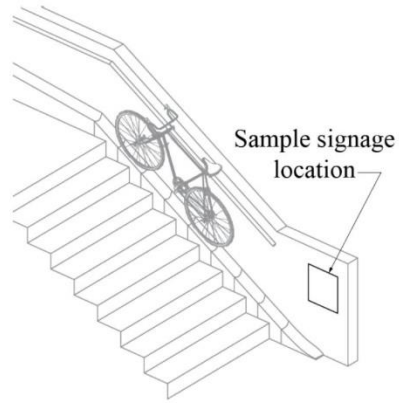


Figure 8.3.1 Sample wall signage location for BSC

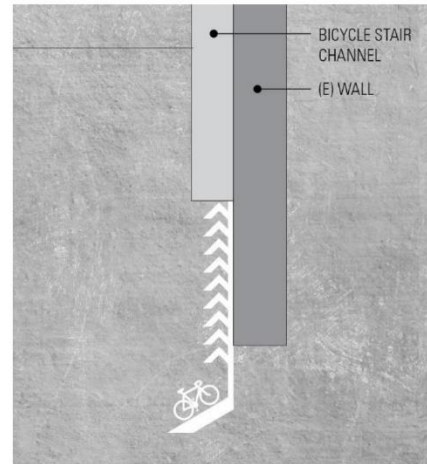


Figure 8.3.2 Sample floor signage location plan view

code requirements, surveying existing examples at BART, and learning from other precedents in the world,” (bat.gov/bikes) dated 2017-01-18.

2. A BSC must not be narrower than 4 ½ inches as anything narrower is not functional.

H. Shape

1. The shape of the bicycle channel should guide the bicycle in a straight line and prevent pedals and handlebars from colliding with elements adjacent to the stair channel such as escalator walls, handrail posts, or solid walls.
2. The final shape of the BSC will depend on its width. In a wider channel, the shape should support the tires and encourage an upright handling of the bicycle. In a narrower channel, the shape should encourage users to tilt their bicycle so as not to scrape or interfere with the adjacent walls or handrails.

I. Materials

1. Bicycle stair channels shall be designed such that bicycles do not slip or slide along the channel when applying bicycle brakes. Select materials such as concrete or galvanized steel that provide adequate friction for bicycle tires. Stainless steel and similar slick materials should be avoided. For a bicycle tire to gain traction, three-dimensional decoration or a textured finish may provide sufficient friction, although their long-term wear would need to be evaluated.
2. For wider channels, install hardware “bumps” along the edge every few feet to discourage skateboard / slide use.
3. Select durable materials requiring low or no maintenance.

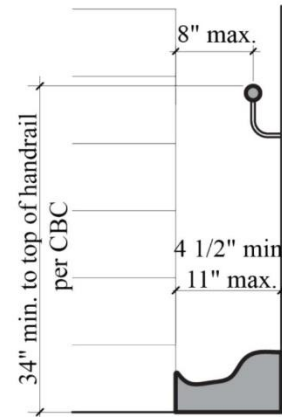


Figure 8.3.3 Recommended measurement constraints for channel

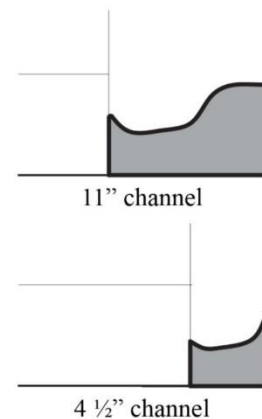


Figure 8.3.4 Channel widths and shape relationship

J. Visibility

1. The edge of the BSC should be marked in a high contrasting color and pattern for those who are sight-impaired. Purely functional options, such as a yellow and black stripes, are acceptable but more attractive options are encouraged.
2. Where possible, the Engineer is encouraged to illuminate the bicycle stair channel with a strip of LED lights along the channel to increase visibility. This can be embedded in either the handrail or the stair channel itself.

K. Transitions

1. Transitions from channel to landing, or at the beginning and end of each stairway, shall be designed such that collisions with the stairway and handrail are avoided. The Engineer must not allow the pedals to collide with the top or bottom stair upon approach of a landing or the end of a stairway. This will involve diverging from the slope of the stairs. See Fig. 8.3.6 and Fig. 8.3.7 for an illustration of these conditions.
2. Channels shall be clearly marked at the beginning and ending of the bicycle stair channel by tactile strips or other approved method detectable by the blind. An example of tactile strip use can be seen at the 16th Street Mission BSC. Additional methods such as color, ground texture change, or signage may also be used.

L. Adjacent vertical surfaces

1. It is easy for bicycle pedals, handlebars, paniers, and the like, to be caught in the open spaces between handrail posts. Handrails, guardrails, and adjacent walls are also vulnerable to scraping from bicycle pedals. It is recommended that the adjacent surface be constructed of a solid material that is resistant to scratching and prevents bike pedals, handlebars, etc. from catching.
2. Consider the distance from the bicycle stair channel to the handrail, and the tilt encouraged by the section to avoid collisions with adjacent surfaces.

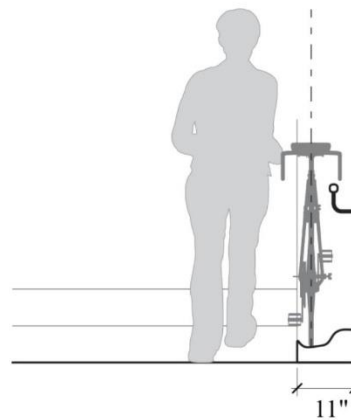
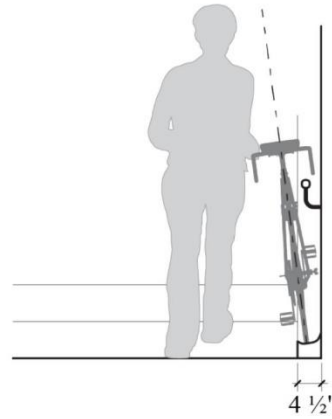


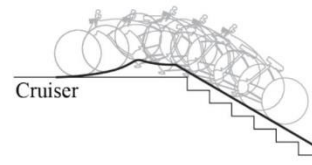
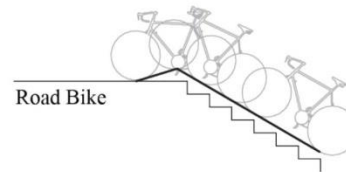
Figure 8.3.5 Considering bicycle tilt based on channel width

M. Handrails

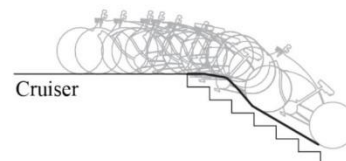
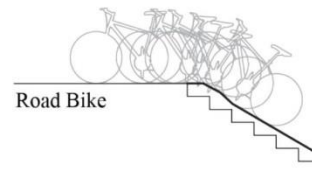
1. To avoid handlebar collisions with handrails, the Engineer shall consider installing the handrail at 34 inches, the lowest allowable by the California Building Code, to help avoid collision (See Fig. 8.3.3). Handrail extensions shall be designed such that bicycle parts do not get caught in them.

N. User Variables

1. A standard road bike wheel width is roughly $0\text{'}-7/8$ inches whereas a BMX bicycle can have a wheel as thick as 4 inches. The Engineer shall consider wheels as thick as 4 inches for full functionality.
2. User height is typically associated with the bicycle they ride—consider designing for a bicycle frame size between 14 and 19 inches (bicycle full height approximately $2\text{'}-8\text{'}$ to $3\text{'}-4\text{'}$).



A. Transition after last step



B. Transition before last step

Figure 8.3.6 Diagram considering multiple landing options

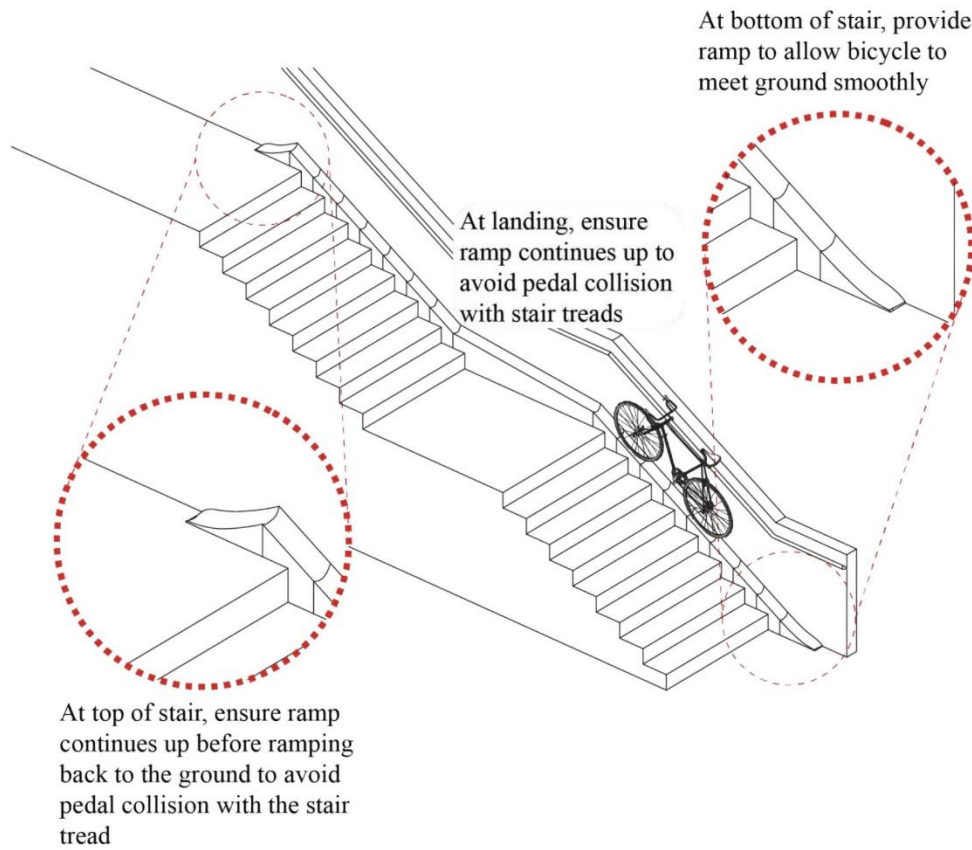


Figure 8.3. 7 Entry, landing, and exit conditions for BSC

