

POLICY ADVISORY COMMITTEE

Thursday, April 12, 2018

4:00 PM

VTA Conference Room B-106

3331 North First Street

San Jose, CA

AGENDA

COMMITTEE MISSION:

The Policy Advisory Committee (PAC) represents the prioritized transportation policy views of the Member Agencies, individually and collectively, to the VTA Board of Directors. The PAC proposes approaches to transportation issues identified by the Board, VTA staff, and the PAC itself.

CALL TO ORDER

1. ROLL CALL

2. ORDERS OF THE DAY

- The quorum requirement for this meeting is: 9

3. PUBLIC PRESENTATIONS:

This portion of the agenda is reserved for persons desiring to address the Committee on any matter not on the agenda. Speakers are **limited to 2 minutes**. The law does not permit Committee action or extended discussion on any item not on the agenda except under special circumstances. If Committee action is requested, the matter can be placed on a subsequent agenda. All statements that require a response will be referred to staff for reply in writing.

4. Receive Committee Staff Report. (Verbal Report) (Lawson)

- Receive Government Affairs Update.

5. Receive Chairperson's Report. (Verbal Report) (Miller)

CONSENT AGENDA

6. ACTION ITEM - Approve the Regular Meeting Minutes of March 8, 2018.

7. ACTION ITEM -Recommend that the VTA Board of Directors program a total of \$603,173 in Vehicle Registration Fee (VRF) Countywide Matching funds for the Los Gatos Boulevard, I-680 Soundwalls and the Freeway Performance Initiative projects.
8. INFORMATION ITEM -Receive information on the Year-in-Review 2017 - Land Use Transportation Integration Program.
9. INFORMATION ITEM -Receive the 2000 Measure A Transit Improvement Program Semi-Annual Report Ending December 31, 2017.
10. INFORMATION ITEM -Receive a report of the Google Sponsored North Bayshore Transportation Access Study.
11. INFORMATION ITEM -Receive a report on the use of Big Data for the Annual Monitoring and Conformance Report.

REGULAR AGENDA

12. DISCUSSION ITEM -Review and discuss a performance report on VTA's Express bus program.
13. INFORMATION ITEM -Receive information on the Fast Transit Program.
14. INFORMATION ITEM -Receive an informational update on the City of Santa Clara's Multimodal Improvement Plan.

OTHER

15. Review PAC Work Plan. (Lawson)

16. ANNOUNCEMENTS

17. ADJOURN

In accordance with the Americans with Disabilities Act (ADA) and Title VI of the Civil Rights Act of 1964, VTA will make reasonable arrangements to ensure meaningful access to its meetings for persons who have disabilities and for persons with limited English proficiency who need translation and interpretation services. Individuals requiring ADA accommodations should notify the Board Secretary's Office at least 48-hours prior to the meeting. Individuals requiring language assistance should notify the Board Secretary's Office at least 72-hours prior to the meeting. The Board Secretary may be contacted at ☎ (408) 321-5680 or ✉ board.secretary@vta.org or ☎ (408) 321-2330 (TTY only). VTA's home page is www.vta.org or visit us on Facebook www.facebook.com/scvta. ☎ (408) 321-2300: 中文 / Español / 日本語 / 한국어 / tiếng Việt / Tagalog.

All reports for items on the open meeting agenda are available for review in the Board Secretary's Office, 3331 North First Street, San Jose, California, (408) 321-5680, the Friday, Monday, and Tuesday prior to the meeting. This information is available on VTA's website at www.vta.org and also at the meeting.

April 2018 Advisory Committees

Committee Staff Report



2018 VTA Bus and Light Rail Rodeo Winners

Bus Operator Winners

1st - Harnam Sidhu
 2nd - Thomas Dominguez
 3rd - Ronald Langston

Forklift:

1st - Dennis Medina
 2nd - Brian Crowther
 3rd - Mike Belknap

Maintenance:

1st - Michael Faso,
 Jeff Poyer and
 Curtis Rodriguez

 2nd - Rupinderjit Bassi,
 Jess Martinez and
 Naiche Vida

Light Rail Operator Winners:

1st - Kuljinder Bath
 2nd - Hossein Ramirez

Maintenance Winners:

1st - Maroun Abi Najm (WPS)

Vehicle Maintenance Winner

1st - Luoc Kinh Nguyen
 2nd - Rudy Alcantar



Solutions that move you

Construction underway for SR 237 Express Lanes Project Phase 2



Clipper Customer Service now available at VTA Customer Centers Downtown and River Oaks

Locations	How Card is Provided	
	YOUTH	SENIOR
South Bay		
VTA Downtown Customer Service Center 55-A West Santa Clara St., San Jose Monday–Friday, 9 a.m.–6 p.m.	Immediately	Immediately
VTA River Oaks Administrative Offices 3331 North First St., San Jose Monday–Friday, 8 a.m.–4:30 p.m.	Immediately	Immediately



**Government Finance Officers
Association of the United States and
Canada's Certificate of Achievement
for Excellence in Financial Reporting
for the 2017 Comprehensive Annual
Financial Report (CAFR)**



Government Finance Officers Association
203 North LaSalle Street, Suite 2700
Chicago, Illinois 60601-1210
312.977.9700 fax: 312.977.4806

March 27, 2018

Nuria I. Fernandez
General Manager / CEO
Santa Clara Valley Transportation Authority
3331 North First Street
Building B-2
San Jose, CA 95134

Dear Ms. Fernandez:

We are pleased to notify you that your comprehensive annual financial report (CAFR) for the fiscal year ended 2017 qualifies for GFOA's Certificate of Achievement for Excellence in Financial Reporting. The Certificate of Achievement is the highest form of recognition in governmental accounting and financial reporting, and its attainment represents a significant accomplishment by a government and its management.

When a Certificate of Achievement is awarded to a government, an Award of Financial Reporting Achievement (AFRA) is also presented to the individual(s) or department designated by the government as primarily responsible for its having earned the Certificate. This award has been sent to the submitter as designated on the application.

We hope that you will arrange for a formal presentation of the Certificate and Award of Financial Reporting Achievement, and that appropriate publicity will be given to this notable achievement. A sample news release is enclosed to assist with this effort.

We hope that your example will encourage other government officials in their efforts to achieve and maintain an appropriate standard of excellence in financial reporting.

Sincerely,

Michele Mark Levine
Director, Technical Services Center



Ad Hoc Financial Stability Committee

Date: April 13, 2018

Time: 12:00 p.m.

Location: VTA River Oaks Auditorium

GOVERNMENT AFFAIRS REPORT

April 12, 2018

FEDERAL

FY 2018 Appropriations: On Thursday March 22, the House of Representatives voted 256 to 167 to approve H.R. 1625, “The Consolidated Appropriations Act, 2018”. The Senate followed the next day, voting 65 to 32 in favor of the omnibus appropriations bill which combines all twelve federal appropriations bills into a single package that keeps the government funded through the end of Fiscal Year (FY) 2018. In a ceremony and press conference in the afternoon of March 23, President Trump signed the bill into law. In doing so, the President criticized the bill for its lack of funding for a southern border wall, and a range of provisions that increased domestic spending, while he had previously proposed to pay for defense spending increases with cuts to domestic programs.

Overall, the \$1.3 trillion dollar spending bill increases defense spending by \$80 billion and domestic spending by \$63.3 billion in FY 2018. Discretionary spending for Transportation, Housing, and Urban Development for 2018 will be increased \$12.6 billion above the FY 2017 levels, to \$70.3 billion, which is also \$22.5 billion more than the Administration requested. Of the \$12.6 billion increase, approximately \$10 billion will be dedicated to transportation and housing infrastructure. Federal-aid Highways will receive \$47.5 billion, exceeding FAST Act authorization levels, with \$2.5 billion of that coming from the general fund.

The appropriations bill also makes important investments in transit as well, and preserves funding programs critical to the funding plan for VTA’s BART to Silicon Valley Extension, Phase II. The bill provides \$13.5 billion in total budgetary resources for the Federal Transit Administration (FTA), \$1 billion above FY 2017 funding levels and \$2.3 billion above the President’s FY 2018 budget request. Of this, \$9.7 billion is provided for all formula grant programs consistent with the FAST Act. For VTA, the Capital Investment Grant (CIG) Program is the most significant federal competitive grant program, and it will be funded at \$2.6 billion compared to \$2.3 billion in FY 2017. The three components of the CIG program will be funded at the following levels:

- \$1.5 billion for New Starts projects
- \$715.7 million for Core Capacity projects
- \$400.9 million for Small Starts projects

The Bus and Bus Facilities Program received increases of \$400 million. In total, formula programs in this category will receive \$655 million, and competitive grant programs \$408 million.

In addition to the FAST Act authorized formula funding Transit Infrastructure Grants will receive a total of \$834 million in additional General fund spending, including \$400 million for bus and bus facilities (\$209.1 million for formula and \$161.45 million for competitive discretionary grants and \$29.45 million for Low and No Emission buses) and \$400 million for State of Good Repair grants.

In addition to providing \$2.6 billion for the Capital Investment Grant Program the appropriations bill includes important provisions directing the FTA to continue to advance projects through the New Starts process:

"Provided further, that upon submission to the Congress of the fiscal year 2019 President's budget, the Secretary of Transportation shall transmit to Congress the annual report on New Starts, including proposed allocations for fiscal year 2019." ... "Provided further, that the Secretary shall continue to administer the capital investment grant program in accordance with the procedural and substantive requirements of section 5309 of such title."

Further,

"The agreement . . . directs the Secretary to administer the capital investment grants program in accordance with the requirements of 49 U.S.C. 5309 and move projects through the program from initial application to construction. The agreement directs the Secretary to obligate \$2,252,508,586 of the amount provided for the capital investment grants program by December 31, 2019. The agreement directs the Secretary to provide updated project ratings expeditiously at the request of the project sponsor."

The direction from Congress to continue to administer the CIG program is encouraging, though it highlights a stark contrast with the Administration's stated goal of winding down the program. Ultimately Congress cannot compel the administration to sign funding agreements, so there are still questions to be answered about the long-term future of this program, and its immediate administration.

Neither the recently enacted tax reforms, the two-year spending deal approved in February, nor the FY 2018 Appropriations bill identify any a revenue source to keep the trust fund solvent in future years. That is a significant concern for the transportation industry because most surface transportation programs fall under the Highway Trust Fund, not the General Fund. The revenues deposited into the Highway Trust Fund are derived from excise taxes levied on motor vehicle fuels and on various highway-related products, such as tires and heavy trucks, not from General Fund sources. For these reasons, the Highway Trust Fund programs are not subject to the General Fund spending caps, meaning any savings from these programs could not be used to offset increased spending in other areas, such as for defense or homeland security. As a result, the Trump Administration has no incentive to request spending levels for these programs below the amounts authorized in the FAST Act. The one-time increases in General Fund contributions to surface transportation programs will fund major infrastructure improvements nation-wide, but without new ongoing revenue sources the Highway Trust Fund is projected to become insolvent by 2021.

The FY 2018 authorized spending levels in the FAST Act for the key Highway Trust Fund programs are as follows:

- National Highway Performance Program (NHPP) = \$23.26 billion.
- National Highway Freight Program = \$1.19 billion.

- Nationally Significant Freight and Highway Projects Program = \$900 million.
- Surface Transportation Block Grant Program (STBGP) = \$11.67 billion.
- Congestion Mitigation & Air Quality Improvement Program (CMAQ) = \$2.41 billion.
- Section 5307 Transit Urbanized Area (UZA) Formula Program = \$4.73 billion.
- Section 5337 Transit State of Good Repair Formula Program = \$2.59 billion.
- Section 5339 Bus/Bus Facilities Formula Program = \$445.5 million.

The Capital Investment Grant Program, which consists of New Starts, Small Starts and Core Capacity projects, is one of a small number of surface transportation programs that receive their money from the General Fund and are at risk whenever Congress and the White House engage in negotiations over the spending caps for defense and domestic discretionary programs.

Finally, with mid-term elections looming, fiscal conservatives in Congress have begun to explore methods to reigning in federal spending. Proposals include a balanced budget amendment that would cap spending levels on a median level or previous years or symbolic votes on making individual tax cuts permanent. One strategy would offer the president a chance to rescind specific domestic spending items, with Congressional approval. The Congressional Budget and Impoundment Control Act of 1974 provides an expedited process for the president to propose and Congress to review a rescission resolution identifying appropriations that the administration does not want to spend and would provide a path for the Senate to consider a rescission resolution with only a simple majority support. However, getting 50 Republican votes to agree will be challenging, and could jeopardize negotiations on future bipartisan spending deals. Congress has just six months to attempt to another package of appropriations bills for FY 2019.

The House and Senate are in recess this week. Lawmakers are scheduled to return on Monday, April 9.

STATE

Proposition 69 Qualifies for the June 2018 Ballot: SB 1 (Beall), the “Road Repair and Accountability Act of 2017” was designed to make a massive impact on the maintenance and expansion of California’s local streets and roads, highways and transit systems. VTA estimates more than \$30 million allocated by formula to the cities and approximately \$20 million to the County in Santa Clara County for the maintenance of local roads. Other increases in funding distributed by formula include almost \$9 million in State Transit Assistance Program funds, \$4.3 million to fund light rail vehicle mid-life overhauls, and \$9 million toward the Eastridge to BART Regional Connector through the Local Partnership Program.

The approximately \$5 billion in annual revenues generated by tax and fee increases pursuant to SB 1 also fund a number of competitive grant programs to which VTA has applied for a number of projects across Santa Clara County. The California Transportation Commission (CTC) is expected to adopt grant awards in May 2018. However, when SB 1 was enacted in April 2017, the Legislature in effect chose to dedicate all the increased revenues for transportation purposes, as only some of the taxes and fees currently are dedicated to these uses.

Proposition 69, the “Transportation Taxes and Fees Lockbox and Appropriations Limit Exemption Amendment”, on the June 2018 statewide ballot, would extend this protection against the diversion of revenues to other purposes to diesel sales taxes and transportation improvement fees.

When all taxes and fees are in effect in 2021, the following sources that are already restricted to transportation purposes are projected to generate significant statewide revenues:

- Gasoline Excise Tax: \$2.4 billion
- Diesel Excise Tax: \$700 million
- Zero Emission Vehicle Registration Fees: \$18 million

Proposition 69 would ensure that approximately \$2 billion generated annually would also be dedicated to transportation:

- Transportation Improvement Fee: \$1.6 billion
- Diesel Sales Tax: \$300 million

Further, the state would be prohibited from loaning out these revenues or using transportation improvement fees to repay state bonds without voter approval.

Finally, Proposition 69 would also exempt these revenues from state and local per-capita spending limits. California Proposition 4, the "Gann Limit" Initiative, passed by the voters in 1979, amended the state constitution to limit the rate of growth in state and local spending to the percentage increase in the cost of living and the percentage increase in the state or local government's population. While there are some current exemptions, including most gasoline and diesel excise tax revenues, Proposition 69 would cover all SB 1 revenues.

REGIONAL

Metropolitan Transportation Commission Actions: On March 28, the MTC Commission met and approved several important programming actions that will fund transportation improvements in Santa Clara County. VTA will receive \$875,000 for Light Rail Speed and Safety Improvements in North San José and \$9.3 million in State Transit Assistance State of Good Repair funding to light rail mid-life overhauls. MTC also endorsed all eleven applications from the Bay Area to the state’s cap-and-trade Affordable Housing and Sustainable Communities Program. The City of San José submitted a \$12 million grant application for the Quetzal Gardens affordable housing project in Alum Rock, with \$1.5 million to fund an electric bus for VTA and related bus facilities. The Strategic Growth Council, which administers the program, will announce recommended awards in June 2018.



Policy Advisory Committee

Thursday, March 8, 2018

MINUTES

CALL TO ORDER

The Regular Meeting of the Policy Advisory Committee (PAC) was called to order at 4:02 p.m. by Chairperson Miller in Conference Room B-106, Valley Transportation Authority (VTA), 3331 North First Street, San José, California.

1. ROLL CALL

Attendee Name	Title	Status
Susan Landry	City of Campbell	Present
Rich Waterman (Alternate)	City of Campbell	NA
Rod Sinks	City of Cupertino	NA
Steven Scharf (Alternate)	City of Cupertino	Present
Daniel Harney	City of Gilroy	Absent
Cat Tucker (Alternate)	City of Gilroy	Absent
Lynette Lee Eng	City of Los Altos	Present
Jeannie Bruins (Alternate)	City of Los Altos	NA
Michelle Wu	Town of Los Altos Hills	Present
Gary Waldeck (Alternate)	Town of Los Altos Hills	NA
Rob Rennie	Town of Los Gatos	Present
Marico Sayoc (Alternate)	Town of Los Gatos	NA
Garry Barbadillo	City of Milpitas	Present
Marsha Grilli (Alternate)	City of Milpitas	NA
Marshall Anstandig	City of Monte Sereno	Absent
Evert Wolsheimer (Alternate)	City of Monte Sereno	Absent
Rich Constantine	City of Morgan Hill	Present
Rene Spring (Alternate)	City of Morgan Hill	NA
Lenny Siegel	City of Mountain View	Present
Margaret Abe-Koga (Alternate)	City of Mountain View	Absent
Liz Kniss	City of Palo Alto	Absent
Cory Wolbach (Alternate)	City of Palo Alto	Absent
Magdalena Carrasco	City of San Jose	Absent
Vacant (Alternate)	City of San Jose	-
Kathy Watanabe	City of Santa Clara	Present
Patrick Kolstad (Alternate)	City of Santa Clara	NA
Howard Miller	City of Saratoga	Present
Rishi Kumar (Alternate)	City of Saratoga	NA
Glenn Hendricks	City of Sunnyvale	Present
Nancy Smith (Alternate)	City of Sunnyvale	NA
Mike Wasserman	SCC Board of Supervisors	Present

A quorum was present.

2. ORDERS OF THE DAY

There were no Orders of the Day.

3. PUBLIC PRESENTATIONS:

There were no Public Presentations.

4. Committee Staff Report

Jim Lawson, Director of Government & Public Relations and Staff Liaison, provided a brief report, highlighting the following: 1) a summary of actions taken by the VTA Board of Directors (Board) at the March 1, 2018, meeting; 2) VTA's Bay Area Rapid Transit (BART) Silicon Valley Project update, noting VTA continues to identify more challenges than anticipated on Phase I, which in turn will delay handing the project over to BART; and 3) opportunities for funding sources related to the VTA's BART Silicon Valley Project Phase II.

5. Chairperson's Report

Chairperson Miller provided a brief report, highlighting the following: 1) County of Public Health in collaboration with VTA is holding a series of bicycle safety sessions; 2) noted the importance of bicycle safety on streets/roadways; and 3) announced Santa Clara Caltrain Station Pedestrian Underpass was named the 2018 Golden State Award Winner by the American Council of Engineering Companies (ACEC).

CONSENT AGENDA

6. Regular Meeting Minutes of February 8, 2018

M/S/C (Wasserman/Lee Eng) to approve the Regular Meeting Minutes of February 8, 2018.

7. VTP Highway Program Semi-Annual Report Ending October 31, 2017

M/S/C (Wasserman/Lee Eng) to receive the Valley Transportation Plan (VTP) Highway Program Semi-Annual Report Ending October 31, 2017.

8. Transit Operations Performance Report - Q2 FY 2018

M/S/C (Wasserman/Lee Eng) to receive the FY2018 Second Quarter Transit Operations Performance Report.

NOTE: M/S/C MEANS MOTION SECONDED AND CARRIED AND, UNLESS OTHERWISE INDICATED, THE MOTION PASSED UNANIMOUSLY.

9. Programmed Project Monitoring - Quarterly Report

M/S/C (Wasserman/Lee Eng) to receive the Programmed Projects Quarterly Monitoring Report for October - December 2017.

RESULT:	Approved – Consent Agenda Item #6 - #9
MOVER:	Mike Wasserman, Member
SECONDER:	Lynette Lee Eng, Member
AYES:	Barbadillo, Constantine, Hendricks, Landry, Lee Eng, Miller, Rennie, Siegel, Sinks, Wasserman, Watanabe, Wu
NOES:	None
ABSENT:	Anstandig, Carrasco, Harney, Kniss,

REGULAR AGENDA

10. Transit Service Guidelines Policy Update

Jason Tyree, Senior Transportation Planner, provided a presentation entitled, “Transit Service Guidelines,” highlighting: 1) 2007 Transit Sustainability Policy; 2) 2018 Transit Service Guidelines; 3) Document Elements; 4) VTA’s New Family of Services; 5) Incorporates: The Ridership Recipe; 6) Establishes Route Design Guidelines; 7) Revises Stop Spacing Guidelines; 8) Revises Service Span Guidelines; 9) Revises Service Frequency Guidelines; 10) Revises Service Productivity Guidelines; 11) Establishes New Quarterly Performance Monitoring Program; and 12) Summary.

Members of the Committee and staff discussed the following: 1) the importance of clearly understanding the purpose for the Transit Service Guidelines Policy; 2) how the newly formed Ad Hoc Financial Stability Committee will influence future decisions related to transit service; 3) if Next Network Phase II incorporated the foreseeable changes needed once BART service to Milpitas and Berryessa opens; 4) any mechanisms to determine if a slight detour on a route would make sense; 5) process for evaluating routes; 6) how the policy impacts the Transit Operations Performance Report (TOPR); 7) coverage routes versus ridership routes; and 8) how productivity minimums are established.

Members of the Committee made the following comments: 1) expressed appreciation to staff for their community outreach efforts, noting the importance to reach out to those communities that are most vulnerable; 2) noted the relevance of receiving feedback from the public; 3) urged staff to continue seeking new and innovative ways to engage the public for feedback; 4) expressed concern about the possibility of future cuts to service or reduced frequency in service; 5) requested staff include barrier-free and accessibility language in the policy; and 6) expressed concern about the loss of service around the senior centers/communities and the transit dependent areas.

Upon Committee Members comments, staff reported the following: 1) the majority of VTA’s riders are transit dependent; and 2) ridership demographics are part of the evaluations; 3) staff would include barrier-free and accessibility language in the policy; 4) the Service Planning page will be a major tool available for the public to provide feedback once the Next Network Phase II is implemented. Mr. Tyree informed the

Committee that staff is continuing to evaluate routes and seek input from the public through social media and VTA's customer service. He noted evaluating routes is an ongoing process and that routes can be changed based on the need or feedback received.

M/S/C (Wasserman /Rennie) to recommend that the VTA Board of Directors adopt a new Transit Service Guidelines policy that establishes a revised framework to objectively monitor and evaluate VTA's transit services, develop service change recommendations, and develop annual service plans that move VTA toward achieving the Strategic Plan's goal of providing fast, frequent, and reliable Transit. Further, the Committee requested that establishing barrier-free and accessibility language be included in the Guidelines.

RESULT:	Approved – Consent Agenda Item #10, as Amended
MOVER:	Mike Wasserman, Member
SECONDER:	Rob Rennie, Member
AYES:	Barbadillo, Constantine, Hendricks, Landry, Lee Eng, Miller, Rennie, Siegel, Sinks, Wasserman, Watanabe, Wu
NOES:	None
ABSENT:	Anstandig, Carrasco, Harney, Kniss,

11. **Santa Clara Countywide Bicycle Plan: Public Review Draft**

Lauren Ledbetter, Senior Transportation Planner, provided an overview of the staff report. Ms. Ledbetter provided a presentation entitled "Countywide Bicycle Plan," highlighting: 1) Our Visions; 2) Goals; 3) Plan Contents; 4) Evaluating the Current Bicycle Conditions; 5) Map of Cross County Bicycle Corridors (CCBCs); 6) Priority CCBCs; 7) Bicycle Superhighway Concept; 8) Across Barrier Connections (ABCs); 9) Education & Encouragement Programs; 10) Costs & Funding; 11) Implementation; and 12) What is Next.

A robust discussion ensued about the following: 1) areas in the various cities to include in the CCBC's; 2) omission of streets in the CCBC plan; 3) bus boarding islands; 4) opportunities to use Next Door for marketing and feedback mechanism 5) local versus regional needs; 6) updates regarding the San Thomas Aquino trail access during Levi's Stadium events; 8) opportunities for bicycle paths off busy streets; 9) crossing jurisdictions between two cities; 10) what future priorities look like; and 11) how traffic conditions should play a role in the CCBC plan.

Members of the Committee made the following comments: 1) expressed appreciation for the staff and employees from various agencies for their time and effort in making it safe for bicyclists/pedestrians; 2) requested including more local connections to shopping centers and schools; 3) requested a countywide view map that would allow for both a macro-level and micro-level view, including future plans for specific areas; 4) suggested a countywide policy for officials to ride bicycles in their community; 5) expressed the need to explore how to improve dangerous merges, where bicyclists/pedestrians are forced to enter vehicle traffic lanes due to elimination of a bike/pedestrian path; 6) noted the importance to improve the way kids are to getting to school whether walking and/or biking; and 7) commented about the increased traffic congestion as the population grows in the county and the need for bicycle safety.

Ms. Ledbetter reported that she would consider all the suggestions provided by the Committee. She further noted that the current map on the VTA website allows an individual to zoom in on a specific area.

On order of Chairperson Miller and there being no objection, the Committee discussed the Public Review Draft of the Updated Santa Clara Countywide Bicycle Plan.

OTHER

12. PAC Work Plan

Mr. Miller reported that he requested from staff a map detailing scheduled projects for 2018, noting the importance for the Committee to see a map detailing the projects for the year.

On order of Chairperson Miller and there being no objection, the Committee reviewed the PAC Work Plan.

13. ANNOUNCEMENTS

Mr. Lawson made the following comments: 1) reminded the Committee that VTA's first Ad Hoc Financial Stability Committee meeting will be held Friday, March 9, 2018; and 2) urged the Committee to reach out to their constituents and/or staff for feedback with bicycle related issues.

Mr. Miller announced the Government Affairs report is on the Members' table.

14. ADJOURNMENT

On order of Chairperson Miller and there being no objection, the Committee meeting was adjourned at 5:28 p.m.

Respectfully submitted,

Theadora Abraham, Board Assistant
VTA Office of the Board Secretary



Date: April 3, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: VRF Matching Grant Programming

Policy-Related Action: Yes

Government Code Section 84308 Applies: No

ACTION ITEM

RECOMMENDATION:

Recommend that the VTA Board of Directors program a total of \$603,173 in Vehicle Registration Fee (VRF) Countywide Matching funds for the Los Gatos Boulevard, I-680 Soundwalls and the Freeway Performance Initiative projects.

BACKGROUND:

On July 17, 2017, the Metropolitan Transportation Commission (MTC) released a call-for-projects for eligible Bay Area public agencies to submit applications for consideration under a new regional initiative called the Innovative Deployments to Enhance Arterials (IDEA). The core goals of the IDEA program are to improve travel time and travel time reliability along arterials for autos and transit vehicles, improve safety for all users, decrease emissions and fuel consumption, and improve knowledge of and proficiency in the use of advanced technologies for arterial operations.

The Town of Los Gatos applied for and received an IDEA Category 2 grant in the amount of \$700,000 for its Los Gatos Boulevard project, which includes Automated Traffic Signal Performance Measures (ATSPM) and Adaptive Signal Control Technology (ASCT) components.

Separately, Senate Bill 83 (Hancock) signed into law in 2009, authorized countywide transportation agencies such as VTA to implement a Vehicle Registration Fee (VRF) of up to \$10 on motor vehicles registered within the county for transportation programs and projects.

On June 3, 2010, the VTA Board of Directors (Board) adopted a resolution placing 2010 Santa

Clara Measure B before the voters of Santa Clara County to authorize a \$10 increase in the fees of motor vehicle registration for transportation-related projects and programs. The VTA Board also adopted an expenditure plan allocating the revenue to transportation-related programs and projects that have a relationship or benefit to the persons who pay the fee. On November 2, 2010, the voters of Santa Clara County approved Measure B by majority vote.

The expenditure plan dedicates 15% of the VRF revenue to the Countywide Program, which includes provision for using VRF funds to match federal/state/regional transportation grants applied to any roadway transportation project included in the adopted Valley Transportation Plan.

On 11/5/2015 and 5/4/2017, the VTA Board approved VRF matching grants of \$502,000 and \$500,000, respectively, for the I-680 Soundwalls project in San Jose.

DISCUSSION:

Three projects are requesting VRF matching funds:

Los Gatos Boulevard project

The Town of Los Gatos has requested \$376,400 in VRF matching funds to cover the local share for this project. Although this amount is greater than the minimum match requirement, VTA staff notes that in preparing for the IDEA grant application, Town of Los Gatos staff decided to go over the minimum match requirement to put this application in a highly competitive position. This strategy was based on the review of the evaluation criteria and feedback from MTC staff at the grant workshops. One of the evaluation criteria is local match percentage, and many agencies planned to provide more than the minimum match.

Staff notes that the Los Gatos project was one of six successful applications, out of 14 in the entire region, and supports their request for VRF matching funds for the Los Gatos Boulevard project.

I-680 Soundwalls project

The I-680 Soundwall project Fact Sheet is included as Attachment A. It needs an additional \$173,700 to cover increased scope stemming from additional noise report requirements from Caltrans; recently discovered archeological findings requiring field investigations, analysis and new reports; associated level of effort for project management, reviews, and coordination with Caltrans. Staff recommends programming \$173,700 of VRF matching funds for the I-680 Soundwalls project.

Freeway Performance Initiative (FPI)

The FPI project is a federally-funded program coordinated by MTC. Its purpose is to Design,

implement and maintain ramp metering, Traffic Operation Systems (TOS), and other FPI projects on major congested freeways throughout the region. The cost for the effort to implement ramp metering was higher than anticipated due to local agency concerns and the need to provide additional analysis. This resulted in a project funding shortfall and the project needs \$53,073 to close out the project.

ALTERNATIVES:

The Board could decline to award VRF grant matching funds to one or more of these projects.

FISCAL IMPACT:

This action would provide \$603,173 in VRF Countywide Matching funds for the Los Gatos Boulevard, I-680 Soundwalls and the Freeway Performance Initiative projects.

Prepared by: Bill Hough
Memo No. 6478

ATTACHMENTS:

- Attachment A-I680 soundwall fact sheet (PDF)

FACT SHEET: *Highways*

I-680 Soundwalls Project

Overview

Santa Clara Valley Transportation Authority (VTA), in cooperation with California Department of Transportation (Caltrans), proposes to construct new soundwalls along I-680 between Capitol Expressway and Mueller Avenue in San Jose.

Objective

The purpose of this project is to reduce noise by constructing soundwalls as an effective noise abatement measure.

Project Features

The proposed improvements include, but are not limited to, the following:

- Construct new soundwalls along northbound I-680 between Capitol Expressway and Muirfield Drive
- Construct new soundwalls along northbound I-680 between Gebhart Avenue and Mueller Avenue
- Construct new soundwalls along southbound I-680 between Alum Rock Avenue and Foss Avenue

Project Cost Estimate

Total project cost is estimated at \$5.6 million.

Project Schedule

2016 - 2018..... Project Approval/Environmental Studies
 2018 - 2019..... Design and Engineering
 2019..... Begin Construction
 2020..... Complete Construction

How to Reach Us

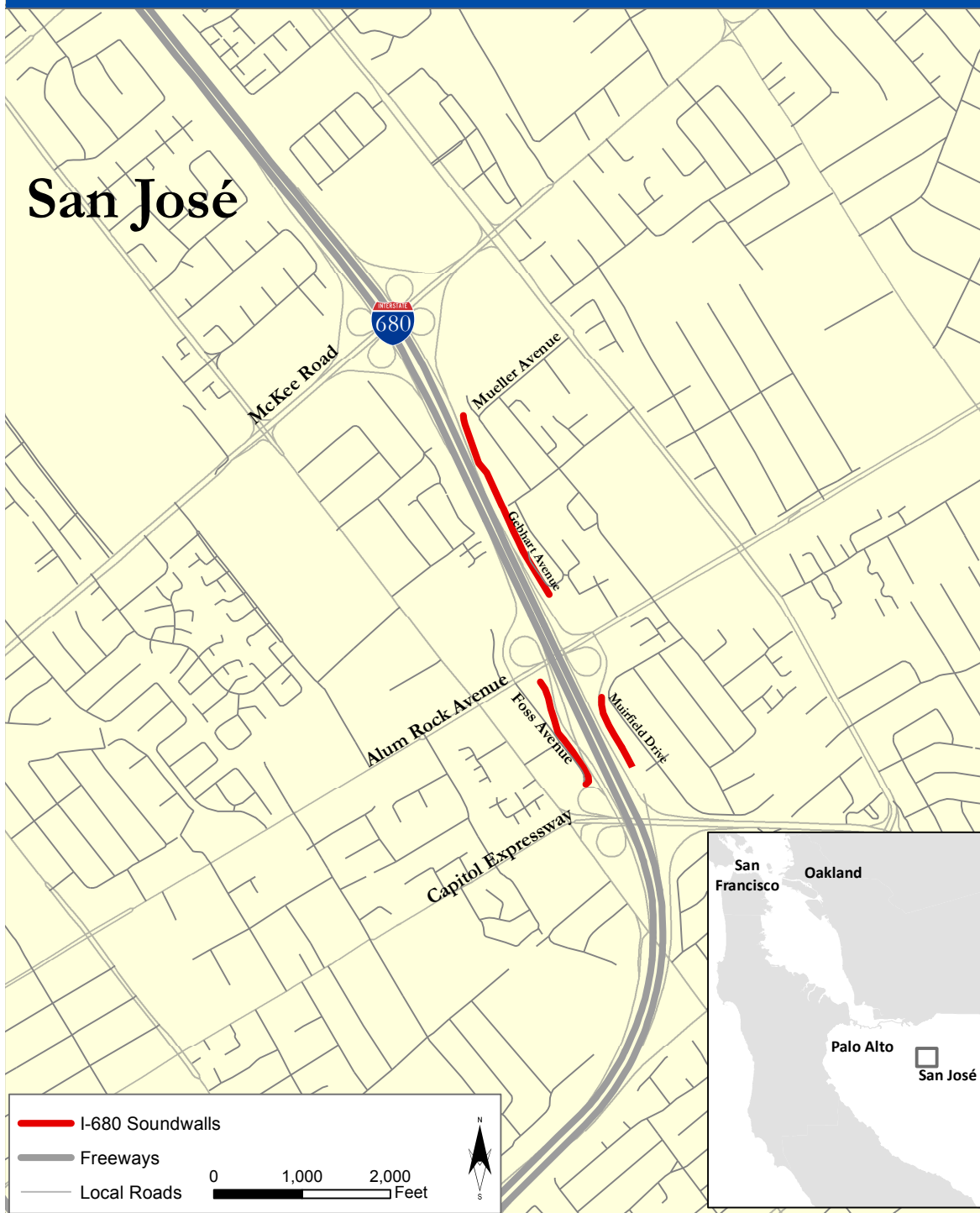
For more information on this project, please call VTA's Community Outreach at (408) 321-7575, (TTY) for the hearing-impaired (408) 321-2330. You may also visit us on the web at www.vta.org, or e-mail us at community.outreach@vta.org.

Continued on reverse side

Project Partners



I-680 Soundwalls Project





Date: April 3, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: Year in Review 2017 - Land Use Transportation Integration Program

FOR INFORMATION ONLY

BACKGROUND:

As the Congestion Management Agency (CMA) and transit agency for Santa Clara County, VTA plays an active role in integrating land use and transportation planning. VTA implements the Congestion Management Program (CMP), in part, through the Land Use Transportation Integration (LUTI) program, which has a core goal to connect land use decisions and transportation investments in order to increase walking, biking, and transit ridership as well as improve the livability and economic vitality of Silicon Valley. In support of this goal, VTA seeks to advance the following objectives in coordination with Member Agencies:

- ***Inform***
 - Provide technical guidance and forums for information-sharing;
 - Collect, analyze, and share data on land use projects and plans;
- ***Engage***
 - Review projects and plans to encourage a multimodal/transit-supportive approach to planning; and
- ***Partner***
 - Collaborate on projects and plans at the earliest planning stage, and throughout the planning process

Attached is the 2017 Year-in-Review report summarizing the following:

- A broad range of VTA LUTI activities that took place in calendar year 2017;
- “Great Projects” reviewed in 2017, which meet VTA’s best practice characteristics; and
- Projects under way or anticipated for 2018.

This report builds upon previous years’ Development Review Annual Report content, and

presents VTA's activities through each LUTI objective in a graphic format.

DISCUSSION:

The following information summarizes VTA's 2017 LUTI activities, as presented in the attached Year-In-Review 2017 report (Attachment A).

VTA LUTI Activities - Highlights

- *Inform* - Review of topics explored in the LUTI Working Group;
- *Engage* - "By-the-numbers" glance of the 93 projects/plans reviewed in 2017; and
- *Partner* - Projects and planning efforts involving VTA engagement at the onset of the planning process.

The report also includes maps of the 93 reviewed projects by project type/land use, and residential and non-residential size (Attachment B).

Great Projects

VTA selected four "Great Projects" from its review of land use and development projects and plans in 2017. These projects and plans reflect key VTA best practice characteristics per the *VTA Community Design and Transportation Manual of Best Practices*, such a mixed-use compact design (includes intensified development and/or diversity of uses), pedestrian scale design (design focused on the walking experience), and transit integration (transit blends with and clearly connects to the development).

The Museum Place (City of San Jose) and Mariani's Inn, Residences and Senior Living (City of Santa Clara) projects were selected as Great Projects because they represent mixed-use, intensified developments with pedestrian- and transit-supportive design. The North Bayshore Precise Plan Residential Update (City of Mountain View) was also chosen as a Great Project for increasing the diversity of uses in a predominantly office and commercial district with significant residential use. Lastly, the Stanford General Use Permit (County of Santa Clara), which is proposing to add growth while continuing a commitment to limiting automobile trips, is also featured as a Great Project.

2018 Look-Ahead

With 2018 well underway, VTA LUTI efforts will continue our focus on the following goals for the current year:

- Exemplify VTA land use and transportation principles internally, and in coordination with Member Agencies,
- Foster effective partnerships with Member Agencies, and emphasize early collaboration in planning processes,

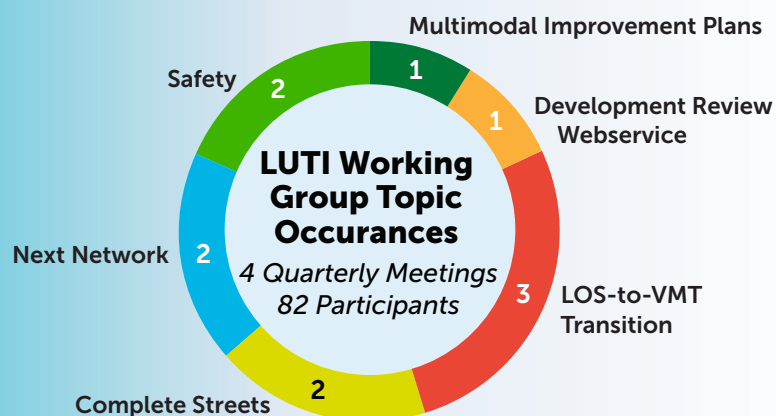
- Evaluate and streamline VTA's development review process and procedures, and
- Steer local agencies within Santa Clara County through the state-required transportation analysis change from Level-of-Service (LOS) to Vehicle Miles Traveled (VMT).

Prepared By: Brent Pearce
Memo No. 6399

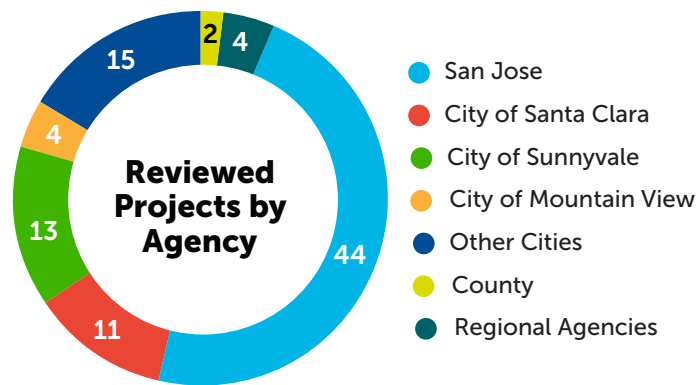
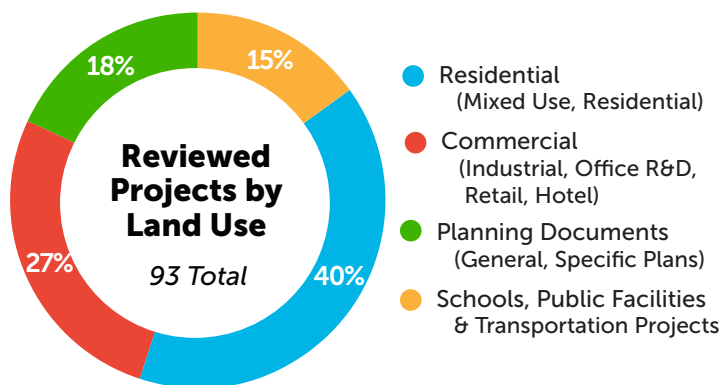
Land Use and Transportation Integration (LUTI)

Year in Review 2017

Inform: Provide info-sharing forums and specialized guidance to Member Agencies



Engage: Encourage a multi-modal/transit-supportive approach



Partner: Collaborate at the earliest planning stage and throughout

On-Going Land Use Engagement



El Camino Real
Planning
Efforts



San Jose
Urban Villages
Coordination



St. James Park
Visioning



Multimodal
Improvement Plans
Mountain View & Santa Clara



Great Projects

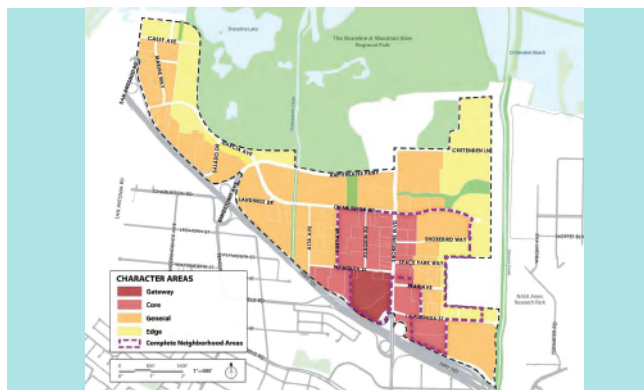
Projects that generally reflect key VTA best practices, including

- **Compact design** – diversity of uses, intensified development
- **Pedestrian scaled** – design focuses on the walking experience
- **Integrates transit** – transit blends with and clearly connects to development



Museum Place, City of San Jose

Mixed-use development containing, residential homes, hotel rooms, office, retail and museum uses



North Bayshore Precise Plan Residential Update City of Mountain View

New capacity for nearly 10,000 residential homes in concert with housing, office, retail and parks



Mariani's Inn, Residences and Senior Living City of Santa Clara

Mixed-use development containing residential homes, hotel, and restaurant uses



Stanford GUP, County of Santa Clara

Accommodating campus growth while continuing a commitment to maximize active transportation trips

What Does 2018 bring?



Applying Agency Land Use and Transportation Integration Principles



Fostering Effective Partnerships

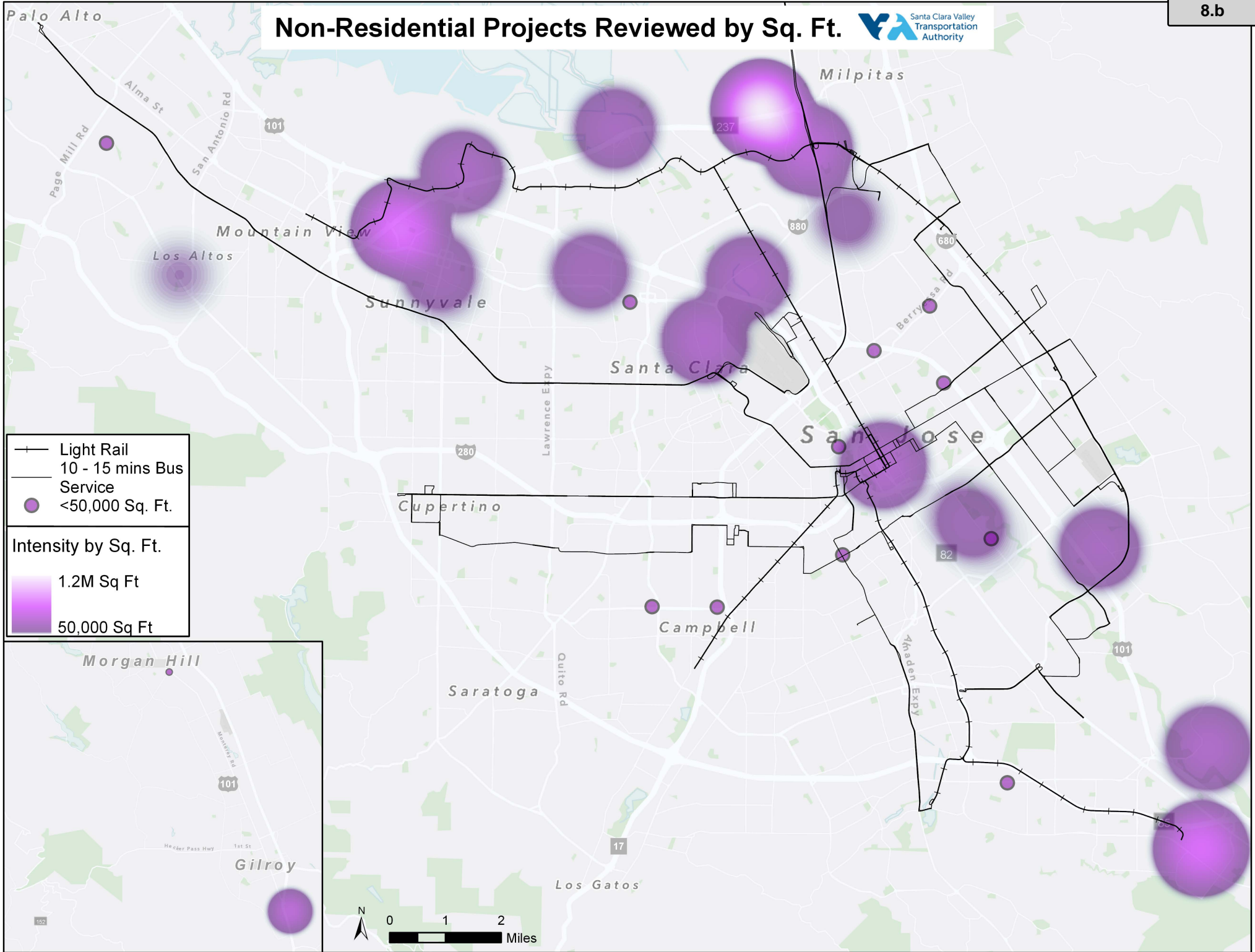


Streamlining Development Review

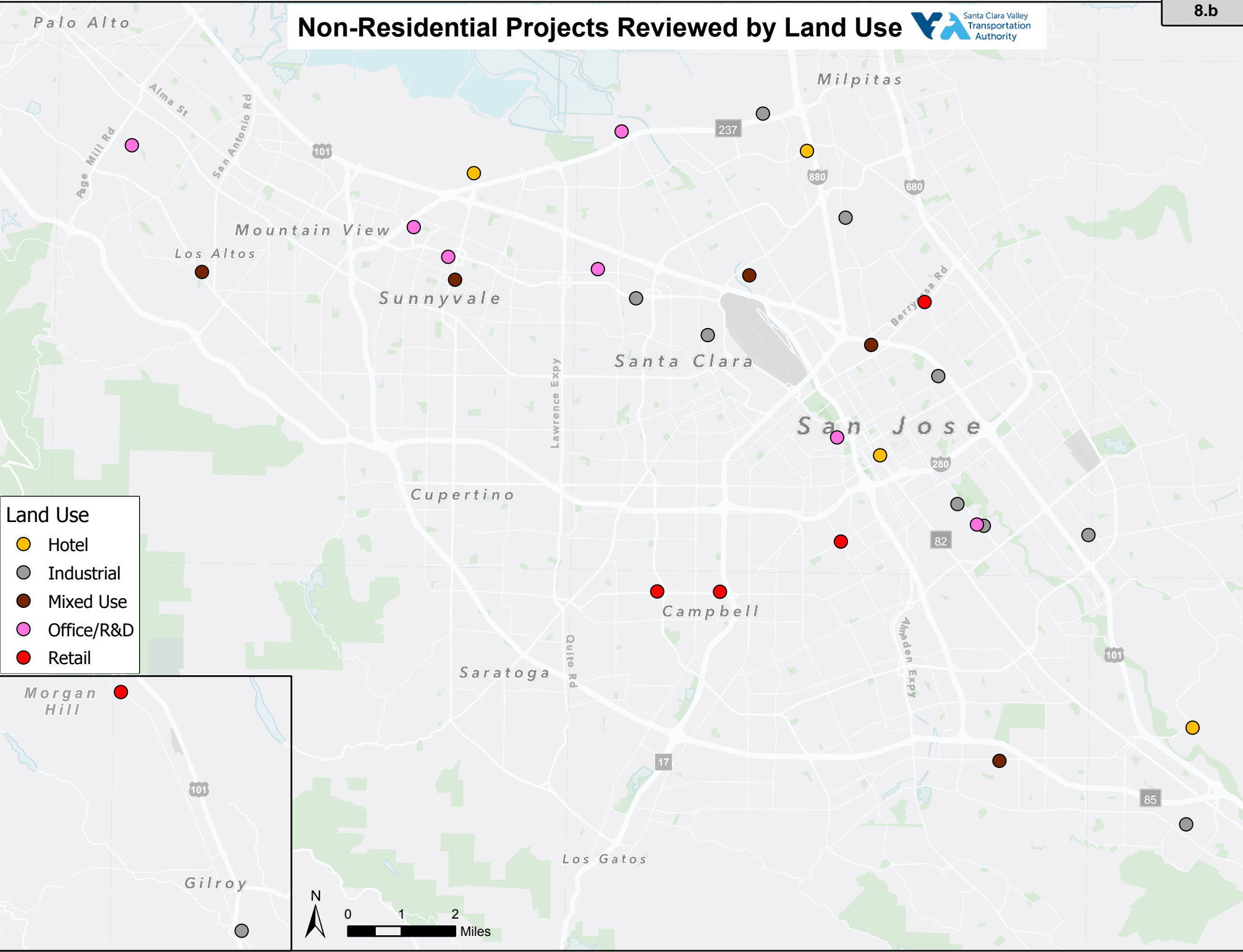


Steer VTA and Guide Member Agencies through LOS-to-VMT Transition

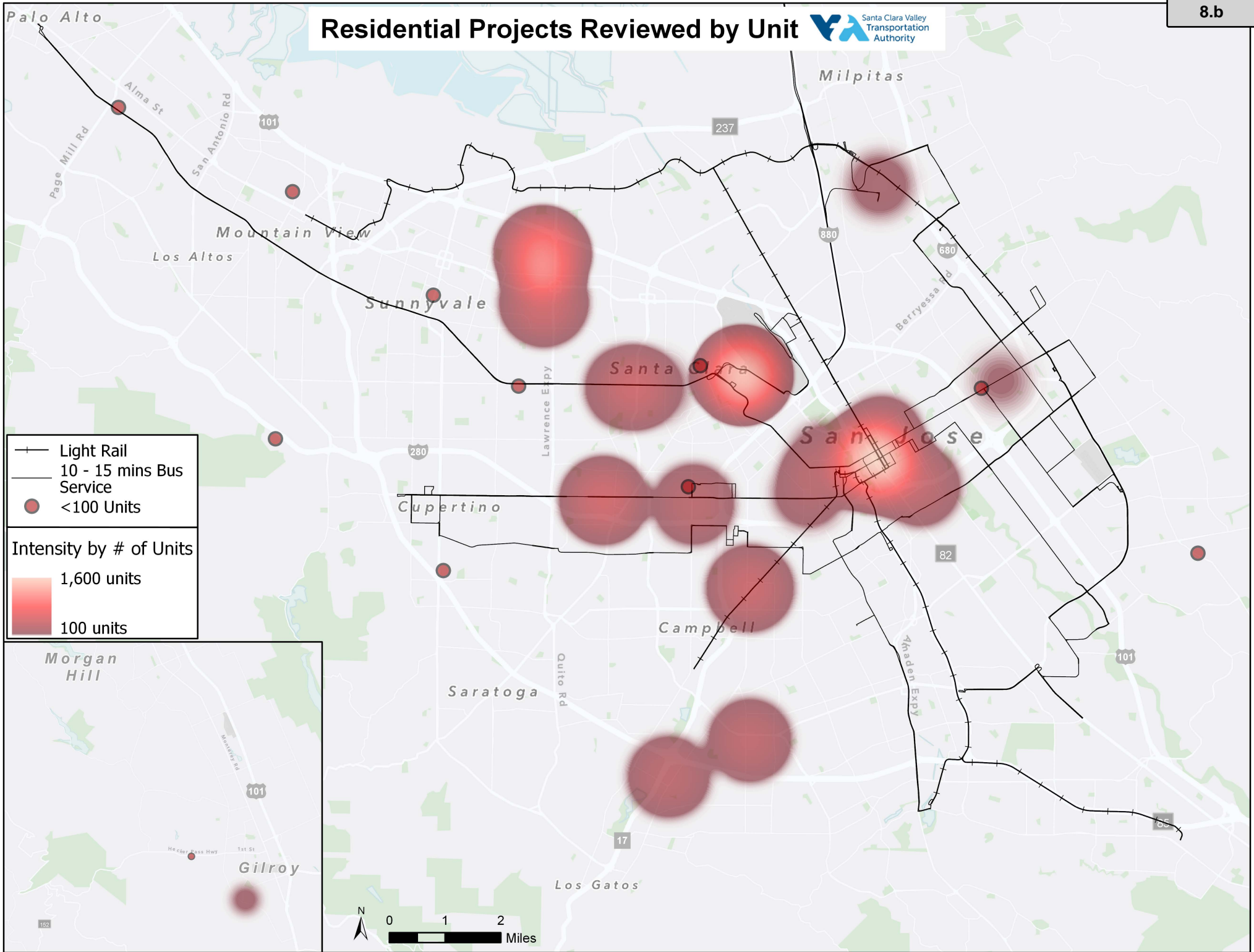
Non-Residential Projects Reviewed by Sq. Ft.

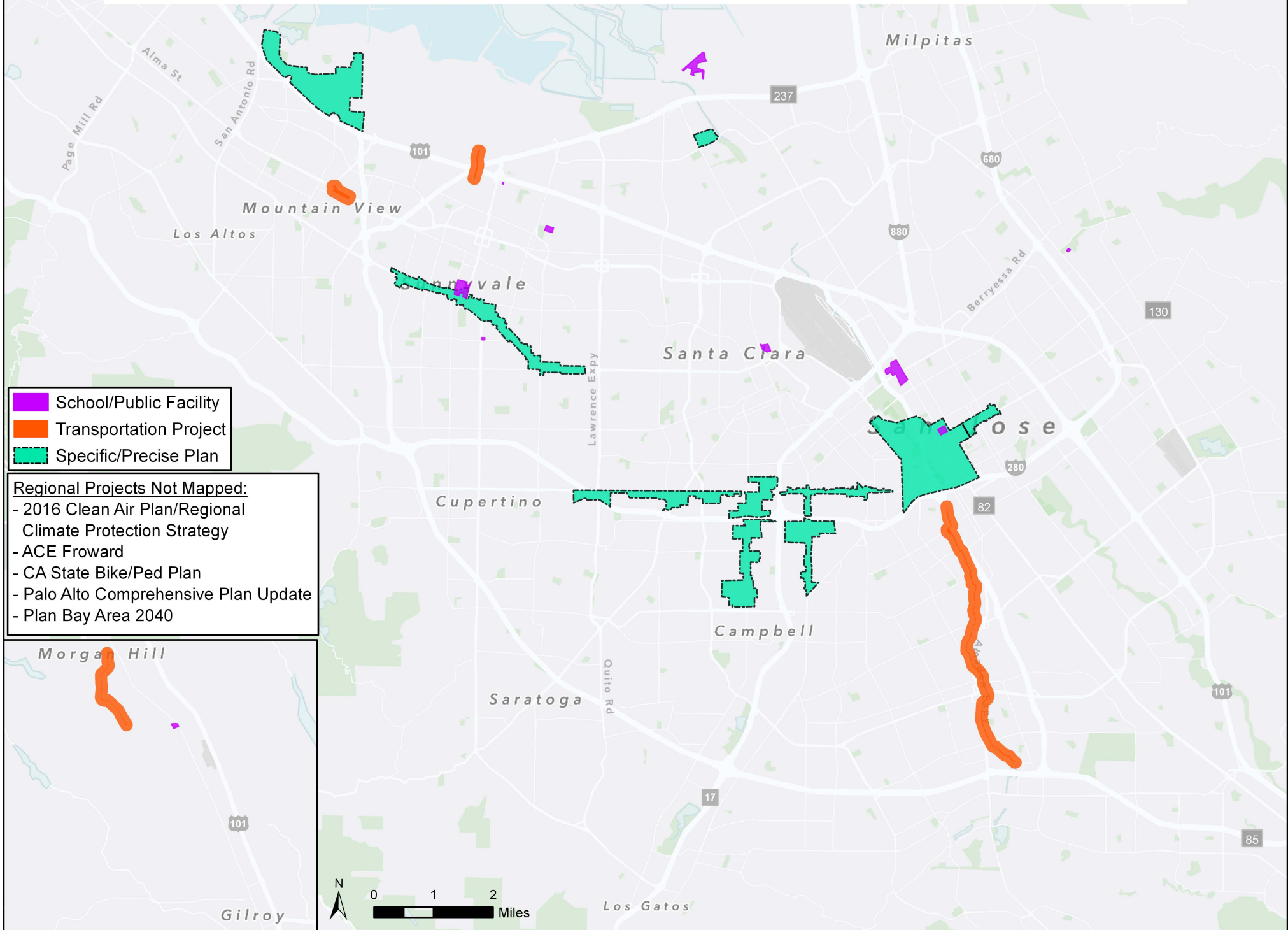


Non-Residential Projects Reviewed by Land Use



Residential Projects Reviewed by Unit







Date: April 4, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Chief Engineering & Program Delivery Officer, Carolyn M. Gonot

SUBJECT: 2000 Measure A Semi-Annual Report Ending December 31, 2017

FOR INFORMATION ONLY

Please find attached the Semi-Annual Report for the 2000 Measure A Program for the period of July 1, 2017 to December 31, 2017. Highlights for this reporting period include the following:

Extend BART from Fremont through Milpitas to Downtown San José and the Santa Clara Caltrain Station

Phase I extension to Berryessa/North San José: Construction is complete with minor punch list items remaining. Final road reconstruction at Capitol Avenue and Dixon Landing Road intersection median has been completed. Systems testing constitute the remaining activities leading to passenger service, now targeted for end of 2018.

Systems testing, including train control, is being conducted in three phases: Static Testing; Dynamic Testing; and Integration Testing. Static testing to test and verify completion of all track and wayside devices from the Project Test Center; dynamic testing will test and verify train movements on the extension from the Project Test Center; and integration testing will test and verify all operational requirements on the extension as part of the expanded BART service area from BART's Operations Control Center.

Static testing was completed in October 2017. Dynamic testing is ongoing. The expectation is to complete dynamic testing by June 2018 at which time BART will take control of the completed facilities and perform testing and training to fully integrate the system. Revenue service can begin after BART completes integration testing and pre-revenue service activities.

On the new vehicle procurement, the first production car was delivered in November 2017. BART had all ten pilot cars and eight production cars onsite at the end of December. Qualification testing of the pilot vehicles continues.

Phase II extension through downtown San José to Santa Clara: Several critical activities are underway on Phase II of the BART Silicon Valley Extension. VTA and FTA have completed the project's final state and federal environmental document, a Supplemental Environmental Impact Statement and Subsequent Environmental Impact Report (SEIS/SEIR). The document includes responses to comments that were received during the public circulation of the draft document (released in December 2016), and design refinements made to the project since then. The document contains, and environmentally clears, all station location options (east and west options at Downtown San Jose Station and north and south options at Diridon Station) and tunneling methodology options (both single-bore and twin-bore). The VTA Board of Directors will be asked to consider approving the Project, including the selection of station locations and tunneling methodology options at the April 5, 2018 Board of Directors meeting. Board approval of a project description is necessary to certify the Phase II environmental document under the State environmental process, and receive a Record of Decision (ROD) under the Federal environmental process.

Extend Light Rail from Downtown San Jose to the East Valley

At the December 2017 and February 2018 Eastridge to BART Regional Connector (EBRC) Policy Advisory Board meetings, staff presented a recommended light rail alignment change that includes an aerial structure for the entire extension from the Alum Rock station to the proposed Eastridge light rail station. The elevated guideway costs an additional \$76 million. Staff proposes to fund the additional scope through the use of Senate Bill 1 (SB-1) Local Partnership Program (LPP) Formula (FY17/18 and FY18/19) funds and 2000 Measure A funded projected savings. The Operations and Maintenance cost of the revised alignment is expected to be the same when compared to the Operations and Maintenance cost for the initial alignment, which is estimated at \$2-\$3 million annually depending on service frequency.

Improve Bus Service in Major Corridors

Alum Rock Santa Clara Bus Rapid Transit (BRT) revenue service along the corridor commenced in May 2017. All major construction was completed in December 2017. City of San Jose electrical punchlist work is in progress and will be completed April 2018. Administrative closeout of contracts and agreements is in progress.

Construction for new shelters, seating, lighting and other associated bus stop improvements for the Stevens Creek Rapid 523 is ongoing. All civil work is expected to be complete by March 2018 and shelters are expected to be installed by August 2018. Construction contract for the Stelling Road bus stop improvements project was awarded in June 2017 and construction will be completed in February 2018.

Develop New Light Rail Corridor

A Request for Proposal (RFP) for conceptual engineering services for the Vasona Light Rail Extension/Double Track project was issued in August 2017. Contract is expected to awarded at the May 2018 VTA Board of Directors meeting.

Prepared By: Suja Prasad, Sr. Cost & Schedule Coordinator
Memo No. 6271

2000 Measure A Program

Semi-Annual Report

December 2017

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1	EXECUTIVE SUMMARY AND PROJECT COSTS	
	A. Executive Summary	1-2
	B. Project Costs.....	1-5
	C. Measure A Fund Exchange	1-8
	D. Funding.....	1-9
2	PROJECT SUMMARY REPORTS	
1	Silicon Valley Rapid Transit	
1.	BART SV Program Development Implementation & Warm Springs	2-1-1
2.	BART SV Corridor Establishment and Maintenance.....	2-1-2
3.	Berryessa Extension Project SVBX - Phase 1	2-1-3
4.	Future Extension to Santa Clara – Phase II and NMF	2-1-4
5.	BART Core Systems Modifications (BCS)	2-1-5
6.	Other Supporting Project	2-1-6
2.	Mineta San Jose Airport People Mover	2-2
3.	Capitol Expressway Light Rail to Eastridge	2-3
4.	Low Floor Light Rail Vehicles.....	2-4
5.	Caltrain – Capacity Improvements & Electrification.....	2-5
6.	Caltrain Service Upgrades	2-6
7.	Palo Alto Intermodal Transit Center	2-7
8.	Bus Rapid Transit	2-8
9.	Upgrade Altamont Commuter Express (ACE)	2-9
10.	Highway 17 Bus Service Improvements.....	2-10
11.	Dumbarton Rail Corridor	2-11
12.	ZEB Demonstration and Facility Improvements	2-12
13.	Develop New Light Rail Corridors	2-13
A	APPENDIX A – 2000 MEASURE A BALLOT LANGUAGE.....	A-1
B	APPENDIX B – 2000 MEASURE A FUND SWAPS.....	B-1

SECTION 1.0

EXECUTIVE SUMMARY AND PROJECT COSTS

SECTION 1.0

EXECUTIVE SUMMARY AND PROJECT COSTS

A. EXECUTIVE SUMMARY

The Semi-Annual Report is a periodic update of the 2000 Measure A Transit Improvement Program prepared by VTA staff and provided to the 2000 Measure A Citizens Watchdog Committee and the VTA Board of Directors.

In the same manner VTA was committed to and completed all projects in the 1996 Measure B Program, VTA is committed to completing all the projects in the 2000 Measure A Program. During FY2016, VTA will advance projects to a ready state and advocate for outside fund sources and matched funds to advance projects including potential public-private partnerships.

This report shows a snapshot of the 2000 Measure A Program at the time of writing. However, it is important to understand that the timing and prioritization of projects in the program remains fluid. The report is based on the Program's budgeted, forecast, and incurred costs as of December 31, 2017.

Key activities that occurred in the six months leading up to December 31, 2017 are described below:

Extend BART from Fremont through Milpitas to Downtown San Jose and the Santa Clara Caltrain Station

- At the December 2017 Board of Directors meeting, the findings of the Phase II Tunnel Technology Methodology Peer Agency Review were shared, indicating a single-bore tunnel could be operated safely as an extension of the BART system. However, due to timing constraints related to the federal funding schedule, and BART's strong preference, the panel advised that twin-bore tunnels would be preferred.
- VTA has formally requested an extension of time from the Federal Transit Administration (FTA) to complete the Project Development Phase of the New Starts Funding Program. This request is intended to provide time to refine the single-bore configuration to satisfy BART's operational safety concerns in addition to further exploring construction impact mitigation strategies for the Downtown San Jose stations.
- The Board of Directors will be asked to approve a project description in April 2018, with a Record of Decision anticipated in June 2018.
- On new vehicle procurement, the first production car was delivered in November 2017. BART had all ten pilot cars and eight production cars onsite at the end of December. Qualification testing of the pilot vehicles continued.

- The SVBX Line, Track, Stations and Systems Design-Build contract has completed track installation at all locations. Guideway punch list items are all that remain. Final road reconstruction at Capitol Avenue was completed, as well as the Dixon Landing Road intersection median.
- On SVBX stations, Mechanical, electrical, and plumbing systems were largely completed, and testing is underway at both the Milpitas and Berryessa stations.
- Static train control testing necessary to allow start of Pre-Automatic Train Operation (ATO) was completed. Static train control testing of the WSX to SVBX interface was completed, and dynamic train control testing is in progress.
- Communications systems installation and testing continued throughout the wayside facilities.
- Closeout work continued on the parking structures. Landscaping was completed at Berryessa station, and irrigation installation began at Milpitas station. The Toroges Creek Headwall modification was completed.
- On the Hayward Maintenance Complex (HMC), the three new Lifts in the Hayward Main Shop area were put into service on October 2, 2017, marking the substantial completion of Milestone No. 1 for BART Contract No. 01RQ-110.
- Design for Santa Clara Pocket Track Phase 1 interlocking from Reamwood Station to Old Ironsides Station was completed in March 2017; construction will be completed in March 2018.

Extend Light Rail from Downtown San Jose to the East Valley

Phase I included pedestrian and bus improvements along Capitol Expressway from Capitol Avenue to Quimby Road (completed in 2012) and reconstruction of the Eastridge Transit Center (completed in May 2015). Phase II will extend light rail to the Eastridge Transit Center. An updated CEQA (California Environmental Quality Act) document is expected to be approved by the VTA Board in summer 2018. Final design and utility relocation is ongoing and is expected to be completed by fall 2019. Construction is expected to begin early 2020. Construction phase is dependent on securing funding. Staff presented a recommended light rail alignment change that includes an aerial structure for the entire extension from the Alum Rock station to the proposed Eastridge light rail station at the December 2017 and February 2018 Eastridge to BART Regional Connector (EBRC) Policy Advisory Board meetings. The elevated guideway change costs an additional \$76 million. Staff proposes to fund the additional scope through the use of Senate Bill 1 (SB-1) Local Partnership Program (LPP) Formula (FY17/18 and FY18/19) funds and 2000 Measure A funded projected savings. The Operations and Maintenance cost of the revised alignment is expected to be the same when compared to the Operations and Maintenance cost for the initial alignment, which is estimated at \$2-\$3 million annually depending on service frequency.

Improve Caltrain: Double Track to Gilroy & Electrify from Palo Alto to Gilroy

- A full Notice to Proceed was issued to Balfour Beatty and Stadler US, Inc in June 2017 after delay in execution of Full-Funding Grant agreement (FFGA) by FTA. Work is proceeding, Balfour Beatty is installing foundations for electrical system, working on final cost estimates. Stadler is producing vehicle mock-ups, and proceeding with construction of their US production facility in Utah. VTA continues to reimburse Caltrain for project related costs.

Improve Bus Service in Major Corridors

- Alum Rock Santa Clara Bus Rapid Transit (BRT) revenue service along the corridor commenced in May 2017. Construction was completed in December 2017. City of San Jose electrical punchlist work is in progress and will be completed April 2018. Administrative closeout of contracts and agreements is in progress.
- Construction for new shelters, seating, lighting and other associated bus stop improvements for the Stevens Creek Rapid 523 is ongoing and all civil work is expected to be complete by March 2018. Shelters are expected to be installed by August 2018. Construction contract for the Stelling Road bus stop improvements project was awarded in June 2017 and construction will be completed in February 2018. The DeAnza Transit Center project is inactive/on hold at this time. The Stelling Road bus stop improvements meets VTA's current needs and any additional study of an on-campus transit center would only be undertaken within the context of a larger BRT or transit corridor study on Stevens Creek.

Develop New Light Rail Corridor

- In June 2016, VTA Board approved funding to advance final design and right of way acquisition for the Vasona Light Rail Extension/Double Track project. A Request for Proposal (RFP) was issued in August 2017 for conceptual design services. Contract is expected to be awarded at the May 2018 VTA Board meeting.
- The SR 85 Major Transit Investment Study will analyze implementation of a Light Rail System (LRT) on SR 85 from San Jose to Mountain View along with other transit guideway alternatives such as Bus Rapid Transit (BRT). RFP was issued in December 2016 and awarded at the May 2017 VTA Board meeting. Transit Market Analysis will be completed by June 2018. Further transit planning including concept development is dependent on securing funding.

B. PROJECT COSTS

Figure 1.1, on page 1-7, shows the incurred costs for each of the 14 transit projects/program areas as identified in the 2000 Measure A sales tax.

2000 Measure A Programwide

Programwide costs are incurred when activities are performed that provide either an indirect benefit to multiple projects or provide benefit to the overall 2000 Measure A Program. There are five programwide cost components to the 2000 Measure A Program:

- Capitalized Interest and Bond Costs
- Non-Capitalized Interest and Bond Costs
- Programwide Expenses
- VTA Operating Assistance
- Miscellaneous Operating Expenses

Interest and Bond Costs

Interest and Bond Costs represent interest and other bond charges (net of interest earned on bond proceeds) related to 2000 Measure A Sales Tax Revenue Bonds. Other bond charges include periodic fees related to variable rate bonds, including liquidity, remarketing, trustee and rating fees.

Capitalized interest/bond charges need to be associated with the assets that were funded by the bond proceeds. In accordance with Financial Accounting Standards Board (FASB) 62, capitalized interest related to restricted assets should be net of the interest income earned by the reinvested bond proceeds. Costs are allocated directly to specific projects based on the prorata share of bond proceeds used to fund expenditures on a quarterly basis. These costs will continue to be allocated directly to project expenditures until the bonds are repaid in full or until such projects are completed, whichever comes first.

Non-Capitalized interest/bond charges represent the bond costs allocated to projects that have been completed as well as the costs associated with Taxable Build America Bonds proceeds that have not yet been drawn down.

Bonds were initially issued beginning in 2003, prior to the start of the 2000 Measure A Sales Tax, in order to advance the SVRT, Commuter Rail, and Light Rail programs prior to sales tax revenue collections. Currently there are approximately \$878.1 million in 2000 Measure A Sales Tax Revenue Bonds outstanding.

Programwide Expenses

Programwide expenses include preparation of progress and cost reports and other general project related tasks that are not attributable to individual projects. On a quarterly basis, the programwide expenses are allocated to individual projects based on the incremental costs of the projects during the quarter. The allocation is necessary to associate the costs to the individual projects that were benefited by the incurrence of the programwide costs.

VTA Operating Assistance

20.75% of the Measure A Sales Tax revenue is used in support of VTA operations. Through December 31, 2017, a cumulative total of \$379.5 million has been expended for this purpose.

Miscellaneous Operating Expenses

Miscellaneous Operating Expenses represent expenditures related to the ongoing costs of administering the overall Measure A program. These expenses include financial forecasting, investment consultants, annual financial audit preparation, election fees, publication of annual financial audits and public hearings conducted by the 2000 Measure A Citizen's Watchdog Committee, and other general tasks.

Figure 1.1 – Incurred Cost

\$ in millions

Project	Incurred Cost Through Jun 2017 A	Incurred Cost Through Dec 2017 B	Incurred Cost This Period C = A-B
1-Extend BART from Fremont through Milpitas to Downtown San Jose and the Santa Clara Caltrain Station			
1-1 BART SV Program Development, Implementation & Warm Springs	\$ 409.6	\$ 415.1	\$ 5.5
1-2 BART SV Corridor Establishment and Maintenance (CEM)	\$ 438.6	\$ 442.0	\$ 3.4
1-3 BART Silicon Valley Berryessa Extension	\$ 1,816.2	\$ 1,881.9	\$ 65.7
1-4 BART Silicon Valley Santa Clara Extension	\$ 177.4	\$ 180.8	\$ 3.4
1-5 BART Core System Modifications (BCS)	\$ 145.7	\$ 153.1	\$ 7.4
1-6 BART Other Supporting Projects	\$ 88.9	\$ 90.2	\$ 1.3
Total	\$ 3,076.5	\$ 3,163.1	\$ 86.7
2 - Provide Connections from Mineta San Jose International Airport to BART, Caltrain and VTA Light Rail			
Mineta San Jose Airport People Mover (APM)	\$ 2.1	\$ 2.1	\$ 0.0
3- Extend Light Rail From Downtown San Jose to the East Valley			
DTEV Planning & Conceptual Engg/DTEV Environmental & 90% CELR	\$ 65.6	\$ 66.2	\$ 0.6
CELR Phase I - Pedestrian Improvements	\$ 19.0	\$ 19.0	\$ (0.0)
CELR Phase I - Eastridge Transit Center	\$ 58.6	\$ 59.5	\$ 0.9
Eastridge to BART Regional Connector Project	\$ 0.5	\$ 1.4	\$ 0.8
Total	\$ 143.8	\$ 146.0	\$ 2.2
4 - Purchase Low-Floor Light Rail Vehicles			
70 Low-Floor Light Rail Vehicles	\$ 200.6	\$ 200.6	\$ 0.0
5 - Improve Caltrain: Double Track to Gilroy and Electrify from Palo Alto to Gilroy			
Caltrain South County Capacity Improvements	\$ 17.2	\$ 17.2	\$ -
Caltrain Electrification (VTA Share)	\$ 60.2	\$ 61.4	\$ 1.2
Total	\$ 77.4	\$ 78.6	\$ 1.2
6- Increase Caltrain Service			
Caltrain Improvement Plan/Caltrain Service Upgrades	\$ 16.5	\$ 16.7	\$ 0.2
Caltrain Mountain View Parking Structure	\$ 0.3	\$ 0.3	\$ -
Blossom Hill Pedestrian Grade Separation	\$ 11.2	\$ 11.2	\$ -
Caltrain Safety Enhancements	\$ 15.7	\$ 15.7	\$ (0.0)
Santa Clara Station Pedestrian Underpass Extension	\$ 9.4	\$ 10.2	\$ 0.7
Santa Clara and San Jose Diridon Station Upgrade	\$ 12.2	\$ 12.2	\$ -
Bike Sharing Pilot Project	\$ 0.8	\$ 0.8	\$ -
Total	\$ 66.3	\$ 67.2	\$ 0.9
7 - Construct a New Palo Alto Intermodal Transit Center			
Palo Alto Intermodal Transit Center	\$ 0.2	\$ 0.2	\$ 0.0
8 - Improve Bus Service in Major Bus Corridors			
BRT Alternative Analysis/ BRT Strategic Plan	\$ 2.2	\$ 2.2	\$ -
Alum Rock - Santa Clara Bus Rapid Transit	\$ 128.8	\$ 136.5	\$ 7.7
Stevens Creek Bus Rapid Transit	\$ 3.6	\$ 3.6	\$ 0.0
El Camino Real Bus Rapid Transit	\$ 10.5	\$ 10.5	\$ 0.0
Procurement of BRT Articulated Buses	\$ 32.5	\$ 32.5	\$ -
Modifications to Chaboya and North Division for BRT Buses	\$ 2.2	\$ 2.2	\$ 0.0
Money Counting Facility Replacement	\$ 0.1	\$ 0.1	\$ -
De Anza College Transit Center Improvement	\$ 0.3	\$ 0.3	\$ 0.0
Rapid 523 Bus Stop Improvements	\$ 0.6	\$ 2.1	\$ 1.6
Stelling Road Bus Stop Improvement	\$ 0.2	\$ 1.3	\$ 1.1
Total	\$ 181.0	\$ 191.4	\$ 10.4
9 - Upgrade Altamont Commuter Express (ACE)			
Included in Santa Clara and San Jose Diridon Station Upgrade	\$ -	\$ -	\$ -
10 - Improve Highway 17 Express Bus Service			
Highway 17 Bus Service Improvements	\$ 2.5	\$ 2.5	\$ 0.0
11 - Connect Caltrain with Dumbarton Rail Corridor			
Dumbarton Rail Corridor	\$ 2.3	\$ 2.3	\$ 0.0
12 - Purchase Zero-Emission Buses and Construct Service Facilities			
3 Zero Emission Buses (Pilot Program)	\$ 14.7	\$ 14.7	\$ 0.0
Zero Emission Buses Facility Improvements	\$ 4.8	\$ 4.8	\$ 0.0
Total	\$ 19.4	\$ 19.4	\$ 0.0
13 - Develop New Light Rail Corridors			
New Rail Corridors Study	\$ 1.1	\$ 1.2	\$ 0.1
Light Rail Systems Analysis	\$ 1.7	\$ 1.7	\$ -
Southern Light Rail Express	\$ 1.1	\$ 1.1	\$ -
LRT Extension to Vasona Junction	\$ 0.9	\$ 1.0	\$ 0.1
Winchester LR Double Track & Platform Extension	\$ 0.0	\$ 0.1	\$ 0.1
SR 85 Major Transit Investment Study	\$ 0.1	\$ 0.3	\$ 0.2
Total	\$ 5.0	\$ 5.4	\$ 0.4
14 - Fund Operating and Maintenance Cost for Increased Bus, Rail and Paratransit Service			
Fund Operating and Maintenance Costs	\$ 356.9	\$ 379.5	\$ 22.7
Other Expenditures			
Debt Service on Current Bonds (incl principal, interest & other bond costs)	\$ 321.6	\$ 327.8	\$ 6.2
Fund Exchange Payments	\$ 103.7	\$ 107.4	\$ 3.7
Miscellaneous Operating Expenses	\$ 9.9	\$ 10.3	\$ 0.4
Total	\$ 435.2	\$ 445.5	\$ 10.3
GRAND TOTAL	\$ 4,569.1	\$ 4,703.9	\$ 134.8

C. MEASURE A FUND EXCHANGE

State law guarantees Santa Clara County a formula share of the State Transportation Improvement Program (STIP) over a six-year period. State law and regional policy make the VTA Board of Directors responsible for determining which eligible transportation projects will receive those funds.

The VTA Board of Directors, at its June 7, 2007, and December 13, 2007 meetings approved the exchange of STIP grant funds for Measure A funds and programmed STIP funds to Measure A projects in exchange for an equivalent amount of 2000 Measure A Sales Tax funds. The exchange of funds creates the Local Program Reserve (LPR) which allows the Board of Directors to use those funds to program to other transportation projects. The Board approved the fund exchange because it:

- *Accelerates Project Delivery and Reduces Administrative Costs* - STIP funds come with substantial state requirements that impact schedule and cost of project delivery. The exchange of funds allows the Board to free the projects from costly administrative burdens.
- *Enables the VTA Board to Manage Valley Transportation Plan (VTP) Expenditures* - By exchanging STIP funds, the VTA Board eliminates the need for Metropolitan Transportation Commission (MTC) and the California Transportation Commission (CTC) to approve all STIP programming decisions after they are approved by the VTA Board. Further, it eliminates the CTC's approval of all subsequent STIP fund allocations for all STIP funded projects.

A portion of the exchange funds will be used to pay interest to the Measure A Program for fund advances. The initial amount is paid back when the CTC allocates STIP funds to the Measure A projects and VTA draws the cash from the State. The interest will be calculated, and paid from the LPR account when (1) all STIP funds are drawn by the project and (2) all associated LPR funds are actually paid to projects. Interest will be calculated at that time as well, based on VTA's rates of return on its pooled investment accounts at the time the advances occurred.

Of note, the first three projects in the "Local Program Reserve Projects" table (Appendix B) qualified for CMIA funds only because we were able to use exchange funds to advance these projects. These CMIA projects are under project closeout phase.

These and other VTP Highway projects that utilize Measure A exchange funds are the subject of the VTP Highway Semi-Annual Report that goes as an information item to the VTA Board in twice each year.

D. FUNDING

Funding is a key issue for many of the 2000 Measure A projects. As a consequence, in this report we refer to several terms associated with a project's funding level. These terms, arranged in order of increasing certainty of funding availability, are as follows:

1. Estimated Cost – An estimate of the total cost of a project given the currently known scope and configuration of the project. In the case of projects where there is little or no scope definition, “TBD” (To be Determined) is shown. As the project is better defined, estimated cost figures will be included for these projects. In the individual project information sheets, we have included the “Estimate Class” in order to give an idea of the level of uncertainty associated with the estimated cost. A more detailed discussion of this topic is included in Appendix A.
2. Secured Funding – Funding that has been committed by funding agencies and is now available to VTA for project expenditures. In many cases, secured funding is at a lower level than the appropriation in the Adopted Budget. For these projects, it is anticipated that additional funding may be secured during the FY18/FY19 period. It is important to note that, regardless of the level of appropriation, actual expenditures will not exceed secured funding at any time.

SECTION 2

PROJECT SUMMARY REPORTS

1-1 BART SV Program Development & Warm Springs

Estimated Cost: \$416.6 million**

Secured Funding: \$416.6 million**

Year of Completion: TBD

Project Description:

Project Development Through FY09:

When work began on VTA's Silicon Valley Rapid Transit (SVRT) extension, environmental clearance and preliminary engineering was performed for the entire 16-mile extension. However, in 2009 this approach was changed to focus on the first 10 miles of the extension (SVBX), leading to the execution of a Full Funding Grant Agreement in 2012.

Initial project development costs not transferred to the SVBX project as well as costs associated with previously allocated Measure A program-wide and bond costs still reside in this account.

Project Development after FY09: SVRT program management, early Measure A program-wide allocations, and ongoing bond cost allocations are included here.

Warm Springs Extension: VTA has assigned \$8 million in State Local Partnership Program (SLPP) funds and \$111.4 million in TCRP funds directly to BART for the project, and has provided an additional \$8 million of Measure A funds to match the SLPP grant as well as \$1.6 million of financing costs.



Project Status:

Measure A matching funds attributable to the Warm Springs Extension have been paid. At this point, SVRT program management and allocations of Measure A bond costs are the only ongoing efforts.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
BART SV Program Dev. and Implementation	\$ 287.6	\$ 124.5	\$ 163.1	\$ -	\$ 124.4	\$ 161.7	\$ 286.1	Ongoing
Warm Springs Extension (WSX) (VTA Share)	\$ 129.0	\$ 119.4	\$ 9.6	\$ -	\$ 119.4	\$ 9.6	\$ 129.0	Completed
Total	\$ 416.6	\$ 243.9	\$ 172.7	\$ -	\$ 243.8	\$ 171.3	\$ 415.1	

Project Schedule:

Activity	Start	End	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Proj Dev. Through FY09	Early 2003	Mid 2009														
Proj Dev. After FY09	Mid 2009	TBD														
Warm Springs Extension	Mid 2009	Early 2017														

*P-0501 (portion) P-0502, P-0509 (portion), P-3101, P-0732

**Warm Springs Extension cost includes \$8M in SLPP and \$111.4M in TCRP grant funds designated directly to BART.

1-2 BART SV Corridor Establishment and Maintenance

Estimated Cost: \$470.5 million

Secured Funding: \$470.5 million

Year of Completion: 2018

Project Description:

- Relocate freight railroad from VTA-purchased right-of-way to existing UPRR right-of-way, between Warm Springs Yard and Calaveras Blvd.
- Build a new railroad overcrossing structure at Mission Boulevard and a new roadway underpass at Warren Avenue and Kato Road, and sever shipper freight service south of Montague Expressway.
- Construct flood control improvements at Berryessa Creek, Wrigley Creek, Scott Creek, Line B, and Agua Caliente.
- Widen Montague Expressway and construct flood control improvements near the intersection of South Milpitas Blvd.
- Environmental clearance and final design of a pedestrian overcrossing (POC) that spans Montague Expressway and connects to the new Milpitas BART Station.
- Construct a shared-use trail, a new traffic signal, and intersection improvements to connect to the Upper Penitencia Creek Trail.
- Install a solar photovoltaic system on the roof of the Berryessa Station parking garage, adjacent to the future BART station.

Project Status:

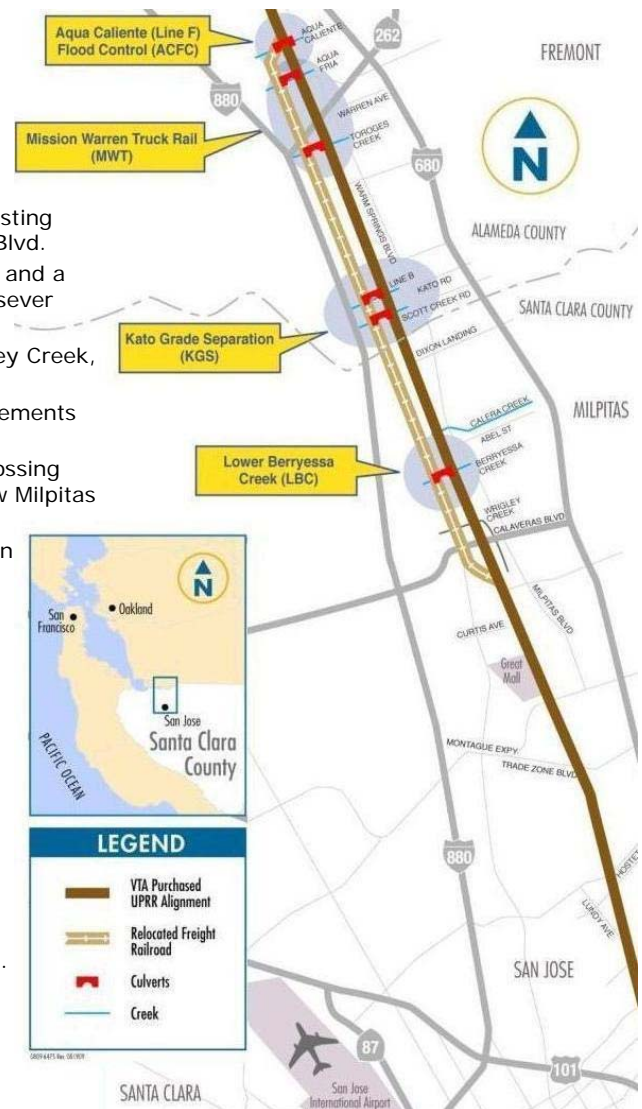
- The Chevron petroleum pipelines relocation, SFPP/Kinder-Morgan petroleum pipeline relocation, and Verizon/MCI fiber optic relocation have been completed.
- The Berryessa Creek crossing, Abel Street Seismic Retrofit, and Railroad Relocation contract has been completed.
- On the Mission Boulevard/Warren Avenue/Union Pacific Railroad Relocation Construction contract, Warren Avenue was opened to traffic in August 2014. Mission Boulevard was fully opened to traffic in Spring 2015. Creek work was completed in 2011/2012.
- The Kato Grade Separation was opened to traffic in April 2013.
- The Montague Expressway Reconstruction Project is underway with Montague Expressway (south lanes) underground utility installation/roadway construction underway as well as roadway construction at the new South Milpitas Boulevard extension. Berryessa Creek Bridge construction is ongoing.
- The Montague POC design contract is in the design stage. Cost sharing arrangements have been finalized with the City of Milpitas.
- Major construction elements of the Upper Penitencia Creek Trail have been completed, with only final punch list items remaining.
- The Berryessa Station photo-voltaic (solar) power system has been installed.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
BART SV Corridor Establishment and Maintenance	\$ 470.5	\$ 159.3	\$ 311.2	\$ -	\$ 146.6	\$ 295.4	\$ 442.0	Ongoing
Total	\$ 470.5	\$ 159.3	\$ 311.2	\$ -	\$ 146.6	\$ 295.4	\$ 442.0	

Project Schedule:

Activity	Start	End	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Design	Early 2008	Early 2018											
Utility Relocations	Mid 2008	Mid 2017											
Construction	Early 2009	Mid 2018											



1-3 Berryessa Extension Project SVBX – Phase 1

Estimated Cost: \$2,421.3 million

Secured Funding: \$2,421.3 million

Year of Completion: 2018

Project Description:

The first phase of VTA's 16.1-mile Silicon Valley Rapid Transit (SVRT) extension of BART, the Berryessa Extension (SVBX) is an approximately ten-mile extension of BART service.

SVBX extends from the Warm Springs Station in the City of Fremont, proceeds on the former Union Pacific Railroad (UPRR) right-of-way, and ends near Las Plumas Avenue in the City of San Jose.

The SVBX Project includes one station in retained-cut (Milpitas Station) and one above-grade station (Berryessa Station).

The project also includes facility additions to BART's existing Hayward Yard (located in the City of Hayward, approximately 14 miles north of Santa Clara County) to provide fleet management operations for the revenue vehicles procured by BART for the extension, as well as the purchase of 40 BART vehicles.

Project Status:

Guideway and Trackwork:

Guideway punch list items are all that remain. Final road reconstruction at Capitol Avenue was completed, as well as the Dixon Landing Road intersection median.

Stations:

Mechanical, electrical, and plumbing systems were largely completed, and testing is underway at both the Milpitas and Berryessa stations.

Closeout work continued on the parking structures. Landscaping was completed at Berryessa station, and irrigation installation began at Milpitas station. The Toroges Creek Headwall modification was completed.

Systems:

Static train control testing necessary to allow start of Pre-Automatic Train Operation (ATO) was completed.

The software to convert the Warm Springs Project (WSX) from a terminus to a pass-thru station was permanently loaded in November. Static train control testing of the WSX to SVBX interface was completed, and dynamic train control testing is in progress. SSH continued communications systems installation and testing throughout the wayside facilities.

BART Revenue Vehicles:

The first production car was delivered in November 2017. BART had all ten pilot cars and eight production cars onsite at the end of December. Qualification testing of the pilot vehicles continued on the Mainline during both revenue hours and non-revenue hours.

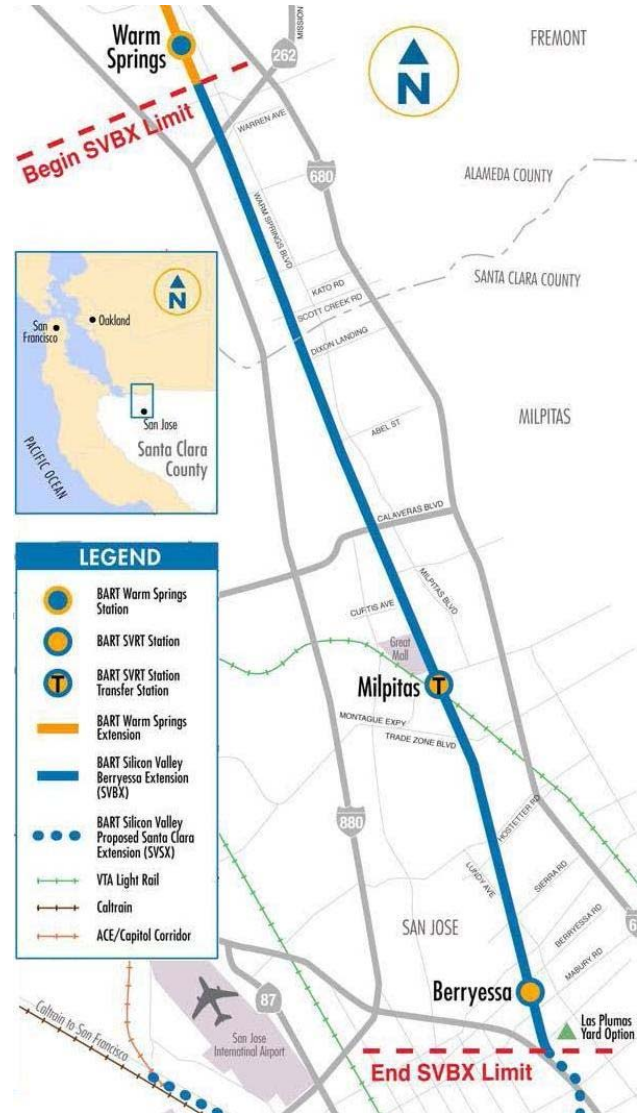
Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Berryessa Extension Project (SVBX - Ph I)	\$ 2,421.3	\$ 1,343.6	\$ 1,077.7	\$ -	\$ 1,066.0	\$ 815.9	\$ 1,881.9	Construction
Total	\$ 2,421.3	\$ 1,343.6	\$ 1,077.7	\$ -	\$ 1,066.0	\$ 815.9	\$ 1,881.9	

Project Schedule:

Activity	Start	End	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Environmental	Early 2004	Early 2011											
Design	Early 2004	Mid 2015											
Right-of-Way	Mid 2007	Mid 2015											
Construction	Mid 2012	Mid 2018											
Testing and Commissioning	Mid 2017	Late 2018											
Revenue Service	Late 2018	N/A											
Closeout	2019	TBD											

**P-0728



1-4 Future Extension to Santa Clara – Phase II and NMF

Estimated Cost: \$4,779.9 million

Secured Funding: \$441.2 million

Year of Completion: 2026

Project Description:

The second phase of VTA's 16.1-mile Silicon Valley Rapid Transit (SVRT) extension of BART, the Santa Clara Extension is an approximately six-mile extension of BART service.

Phase II of the project will include four stations and will extend from the Phase I terminus for approximately six miles, with a five-mile-long subway tunnel through downtown San Jose. The extension will end at-grade in Santa Clara, near the Caltrain Station.

The project also includes the construction of a maintenance facility at the current Newhall Yard, the Newhall Maintenance Facility (NMF), as well as the purchase of 48 BART vehicles.



Project Status:

At the December 2017 Board of Directors meeting, the findings of the Phase II Tunnel Technology Methodology Peer Agency Review were shared, stating that the panel opined that, with some adjustments to address BART's operational safety concerns, a single-bore tunnel could be operated safely as an extension of the BART system. However, due to timing constraints related to the federal funding schedule, and BART's strong preference for operating what it is familiar with, the panel advised that twin-bore tunnels would be a preferred option for Phase II of VTA's BART Silicon Valley Extension.

After considering the rationale for the panel's conclusions, VTA has formally requested an extension of time from the Federal Transit Administration (FTA) to complete the Project Development Phase of the New Starts Funding Program. This request is intended to provide time to refine the single-bore configuration to satisfy BART's operational safety concerns in addition to further exploring construction impact mitigation strategies for the Downtown San Jose stations.

The Board of Directors will be asked to approve a project description in April 2018, with a Record of Decision anticipated in June 2018.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Future Extension to Santa Clara (BSV Ph II)	\$ 4,391.6	\$ 135.1	\$ 1,424.5	\$ 2,832.0	\$ 135.1	\$ 19.8	\$ 154.9	Under Development
Newhall Maintenance Facility (NMF)	\$ 388.3	\$ 25.4	\$ 0.5	\$ 362.4	\$ 25.4	\$ 0.5	\$ 25.9	Under Development
Total	\$ 4,779.9	\$ 160.5	\$ 1,425.0	\$ 3,194.4	\$ 160.5	\$ 20.3	\$ 180.8	

Project Schedule:

Activity	Start	End	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Environmental	Early 2015	Mid 2018											
Design	Late 2018	Mid 2020											
Right-of-Way	Mid 2018	Late 2021											
Construction	Mid 2019	Early 2026											
Testing and Commissioning	Mid 2025	Late 2026											
Revenue Service	Late 2026	N/A											
Closeout	2027	TBD											

** P-0501 (portion), P-0503 through P-0507, P-0509 (portion)

1-5 BART Core Systems Modifications (BCS)

Estimated Cost: \$264.6 million

Secured Funding: \$264.6 million

Year of Completion: 2022

Project Description:

Some modifications to the BART **Hayward Maintenance Complex (HMC)** are required due to greater demands arising from the Berryessa Extension. This project includes property acquisition and construction of several shop buildings.

60 BART rail cars are required for SVBX. 40 of these vehicles are included in SVBX. This project covers the purchase of the additional **20 railcars** required to integrate into BART.

Under the Comprehensive Agreement between VTA and BART covering the extension to Santa Clara County, VTA committed to pay a proportional share of BART Core System capital investments made by BART that are used by the SVRT extension. A key element of this effort is the new **BART Operations Control Center (OCC)**, to which VTA is contributing funds.



New BART Vehicle



Hayward Maintenance Complex (HMC) Site Plan

Project Status:

On the **Hayward Maintenance Complex (HMC)**, for the new Component Repair Shop (CRS), the contractor continued with mechanical, electrical and plumbing work, service canopy, and equipment/crane installation. The Hayward Main Shop and the North Yard area work continues. Three new Lifts in the Hayward main shop area were put into service on October 2, 2017, and this marked substantial completion of Milestone No. 1 for BART Contract No. 01RQ-110.

On the **20 Non-New Starts BART Vehicles**, BART has received all ten pilot vehicles and eight production vehicles. Qualification testing and train operator training is being carried out.

VTA and BART have finalized an agreement for a new **BART Operations Control Center (OCC)**. VTA and BART will execute the agreement after BART completes the environmental review for OCC project.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
BART Core System Modifications (BCS)	\$ 264.6	\$ 69.7	\$ 194.9	\$ -	\$ 57.6	\$ 95.5	\$ 153.1	Construction
Total	\$ 264.6	\$ 69.7	\$ 194.9	\$ -	\$ 57.6	\$ 95.5	\$ 153.1	

Project Schedule:

Activity	Start	End	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<u>Hayward Maintenance Complex (HMC)</u>												
Design	Mid 2011	Late 2014										
Right-of-Way	Mid 2013	Mid 2015										
Construction	Early 2015	Late 2018										
<u>20 Non-New Starts BART Vehicles</u>												
Design	Mid 2012	Late 2014										
Pilot Vehicle Delivery	Early 2016	Late 2016										
Production Vehicle Delivery	Late 2017	Mid 2022										
<u>BART Core Systems Mod's Incl OCC</u>												
Schedule TBD	TBD	TBD										

** P-0800, P-0801, P-0861

Extend BART from Fremont through Milpitas to Downtown San Jose and the Santa Clara Caltrain Station

1-6 Other Supporting Projects

Estimated Cost: \$97.4 million

Secured Funding: \$104.0 million

Year of Completion: 2019

Project Description:

The **Santa Clara Pocket Track** project installed additional track and supporting infrastructure so one track can be used as a pocket track to store additional cars on Tasman, near Old Ironsides Station, in the City of Santa Clara.

Northern Light Rail Express

implemented a series of improvements including double-tracking in Mountain View to establish a new line from Mountain View to Alum Rock to connect with Caltrain and the new Milpitas BART Station, commensurate with the opening of the BART Silicon Valley Berryessa extension.

The **N. First St. Improvement & Tasman Modification project** will construct improvements to increase Light Rail Transit (LRT) speeds along the North First Street corridor, improve transit signal priority, and on-time performance.

Project Status:

The **Santa Clara Pocket Track** construction started in February 2014 and was completed in early 2015. Phase 1 interlocking from Reamwood Station to Old Ironsides Station will be completed in March 2018.

The two construction contracts under the **Northern Light Rail Express** project was completed in December 2015. Project closeout is ongoing.

VTA local bus network service plan for BART Extension is complete. Express Bus Service Plan will be developed in 2019 under the **BART Transit Integration Analysis** project.

Project team is currently reviewing alternatives, and developing conceptual plans and estimates for the **N. First St. Improvement & Tasman Modification** project.

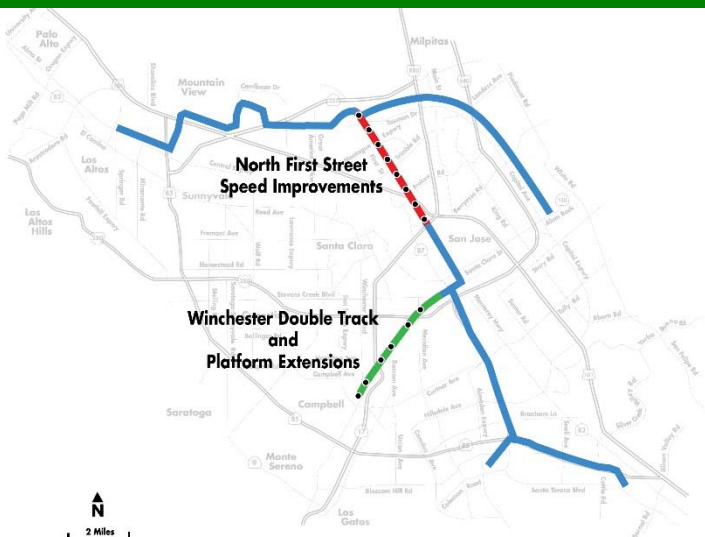
Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
King Road BRT	\$ 3.0	\$ -	\$ 3.0	\$ -	\$ -	\$ 0.4	\$ 0.4	Ongoing
Northern Light Rail Express	\$ 59.5	\$ 8.0	\$ 51.5	\$ -	\$ 8.0	\$ 50.7	\$ 58.7	Closeout
Santa Clara Pocket Track	\$ 32.0	\$ -	\$ 32.0	\$ -	\$ -	\$ 30.4	\$ 30.4	Ongoing
BART Transit Integration Plan	\$ 0.8	\$ -	\$ 0.8	\$ -	\$ -	\$ 0.6	\$ 0.6	Ongoing
N.1st Speed Imp & 1st/Tasman Mods	\$ 2.0	\$ 1.1	\$ 0.9	\$ -	\$ -	\$ 0.0	\$ 0.0	Ongoing
Total	\$ 97.4	\$ 9.1	\$ 88.3	\$ -	\$ 8.0	\$ 82.2	\$ 90.2	

Project Schedule:

Activity	Start	End	2012	2013	2014	2015	2016	2017	2018	2019
Santa Clara Pocket Track	Late 2012	Early 2018						Interlocking		
Mountain View Phase I	Early 2013	End 2015								
Mountain View Phase II	Mid 2013	End 2015								
N First St Improvements & Tasman Mods	Late 2015	Mid 2019								

Environmental Design/Build Construction



Mineta San Jose Airport

December 2017

2 Mineta San Jose Airport People Mover

Estimated Cost: \$800 million

Secured Funding: \$5.0 million

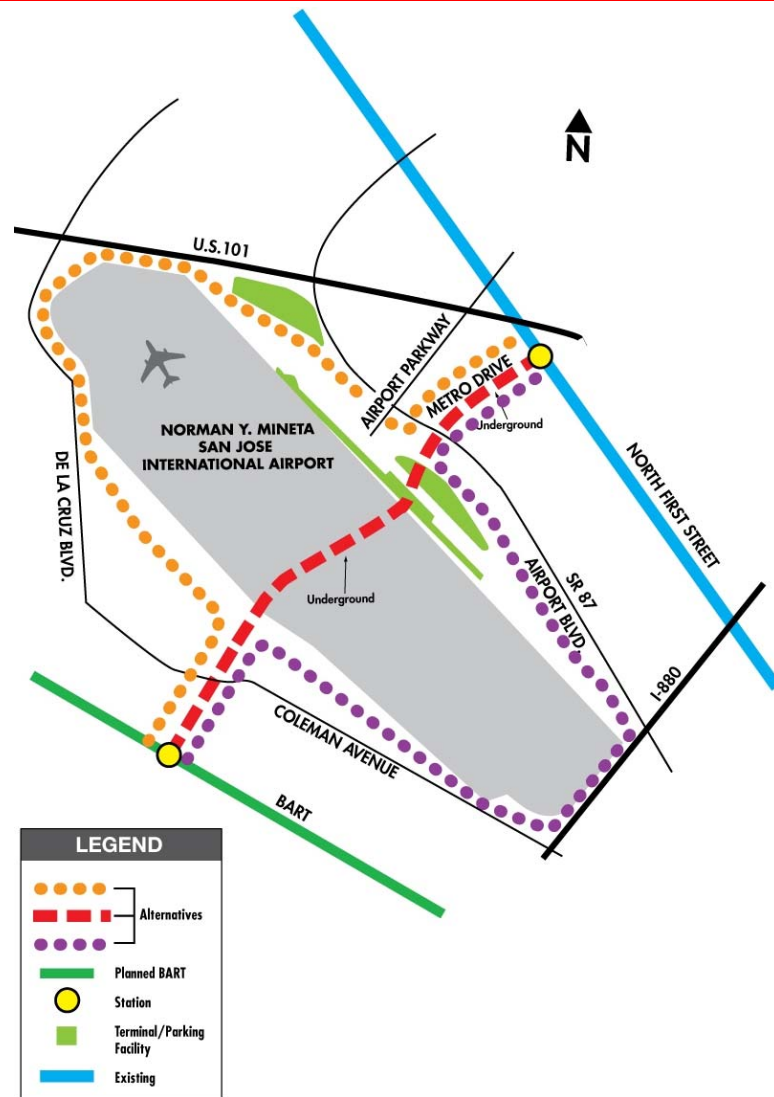
Year of Completion: TBD

Project Description:

The Airport People Mover Project will provide a guideway connection from the San Jose International Airport to the Caltrain, Bus Rapid Transit (BRT), and future BART stations at the Santa Clara Transit Center, and the VTA Light Rail on North First Street.

Project Status:

The Airport People Mover project has completed a conceptual vehicle technology level analysis. June 2016 VTA Board approved additional funds for Conceptual Alternatives Analysis phase in order to further define the route options, type of vehicle technology and to develop a funding/ business plan. The Conceptual Alternative Analysis would also include evaluation of a link between Diridon Station and airport facilities. Staff believes that this project will require a partnership between several



agencies including the City of San Jose, City of Santa Clara, San Jose Airport, High Speed Rail and likely the private sector in order to develop and fund a fixed rail connection to the airport.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Mineta San Jose Airport People Mover	\$ 800.0	\$ -	\$ 5.0	\$ 795.0	\$ -	\$ 2.1	\$ 2.1	Ongoing
Total	\$ 800.0	\$ -	\$ 5.0	\$ 795.0	\$ -	\$ 2.1	\$ 2.1	

Project cost is very preliminary and can be better defined once scope is established.

Project Schedule:

This project is being reviewed in light of the development of the Diridon Intermodal Station Plan and how to connect this area with the airport. Next steps include development of conceptual alternatives and a review of potential capital and operating costs.

December 2017

3 Capitol Expressway Light Rail to Eastridge

Estimated Cost: \$598.1 million*

Secured Funding: \$323.4 million

Year of Completion: Phase 1: 2015, Phase 2: 2024

Project Description:

This project will transform Capitol Expressway into a multi-modal boulevard offering bus and light rail transit, and safe pedestrian pathways with connections to the regional trail system.

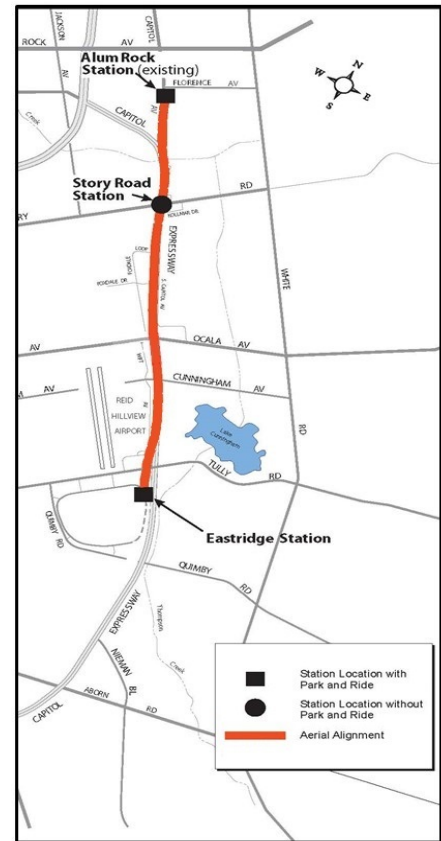
Phase I includes pedestrian and bus improvements along Capitol Expressway to improve pedestrian access by adding sidewalks, street lights, and landscaping from Capitol Avenue to Quimby Road. This phase also includes reconstruction of the Eastridge Transit Center.

Phase II will extend light rail from Alum Rock Station to the Eastridge Transit Center with elevated structures at Capitol Avenue, Story Road, and Tully Road. The Eastridge extension will include LRT station at Story Road (aerial) and Eastridge (at-grade).

Project Status:

Phase I - The pedestrian improvements were completed in the spring of 2013. Eastridge Transit Center was completed in May 2015.

Phase II - In June 2016, VTA Board of Directors approved funding to complete design, acquire right of way and relocate utilities. Design contract was awarded to BKF Engineers in May 2017. An updated CEQA (California Environmental Quality Act) document is expected to be approved by the VTA Board in summer 2018. Final design and utility coordination is ongoing. Right of Way Acquisition and Utility Relocation is expected to be completed by mid-2019. Construction is expected to begin in early 2020. Construction phase is dependent on securing funding.



Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
DTEV Planning & Conceptual Engg	\$ 11.1	\$ 5.7	\$ 5.3	\$ -	\$ 5.7	\$ 5.3	\$ 11.1	Completed
DTEV Environmental & 90% CELR	\$ 55.1	\$ 0.2	\$ 54.9	\$ -	\$ 0.2	\$ 54.9	\$ 55.1	Completed
CELR Phase I - Pedestrian Improvements	\$ 19.0	\$ 16.0	\$ 3.0	\$ -	\$ 16.0	\$ 3.0	\$ 19.0	Completed
CELR Phase I - Eastridge Transit Center	\$ 60.0	\$ 26.9	\$ 33.1	\$ -	\$ 26.9	\$ 32.6	\$ 59.5	Closeout
Eastridge to BART Regional Connector Project	\$ 453.0	\$ 139.4	\$ 247.0	\$ 66.6	\$ -	\$ 1.4	\$ 1.4	Ongoing
Total	\$ 598.1	\$ 188.2	\$ 343.3	\$ 66.6	\$ 48.8	\$ 97.2	\$ 146.0	

Project Schedule:

Activity	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Environmental															
Env. Impact Stmt.															
Sidewalk and Landscaping															
Eastridge Transit Center (Phase I)															
CELR LR Extn (Phase II)															

Environmental RFP/Design/Bid ROW Construction Closeout

4 Low Floor Light Rail Vehicles

Estimated Cost: \$200.6 million*

Secured Funding: \$200.6 million

Year of Completion: 2004

Project Description: VTA purchased 70 low floor light rail vehicles to serve the entire VTA Light Rail system. Low floor vehicles provide enhanced ADA accessibility and improved service by minimizing boarding and exit times for all riders. Low floor light rail vehicles eliminate the need for wheelchair lifts and enhance access for all VTA riders, as well as providing additional space for bicycles.

Project Status: Project was completed and closed.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
70 Low-Floor Light Rail Vehicles	\$ 200.6	\$ 200.6	\$ -	\$ -	\$ 200.6	\$ -	\$ 200.6	Completed
Total	\$ 200.6	\$ 200.6	\$ -	\$ -	\$ 200.6	\$ -	\$ 200.6	

Project funded through a Board approved fund exchange between Santa Clara County, VTA and Measure A. Measure A costs incurred for this item reflected as a portion of Debt Service.

5 Caltrain – Capacity Improvements & Electrification

Estimated Cost: \$1.5 billion (Total)

\$125.3 million (VTA)*

Secured Funding: \$125.3 million ** (VTA)

Year of Completion: 2022

Project Description:

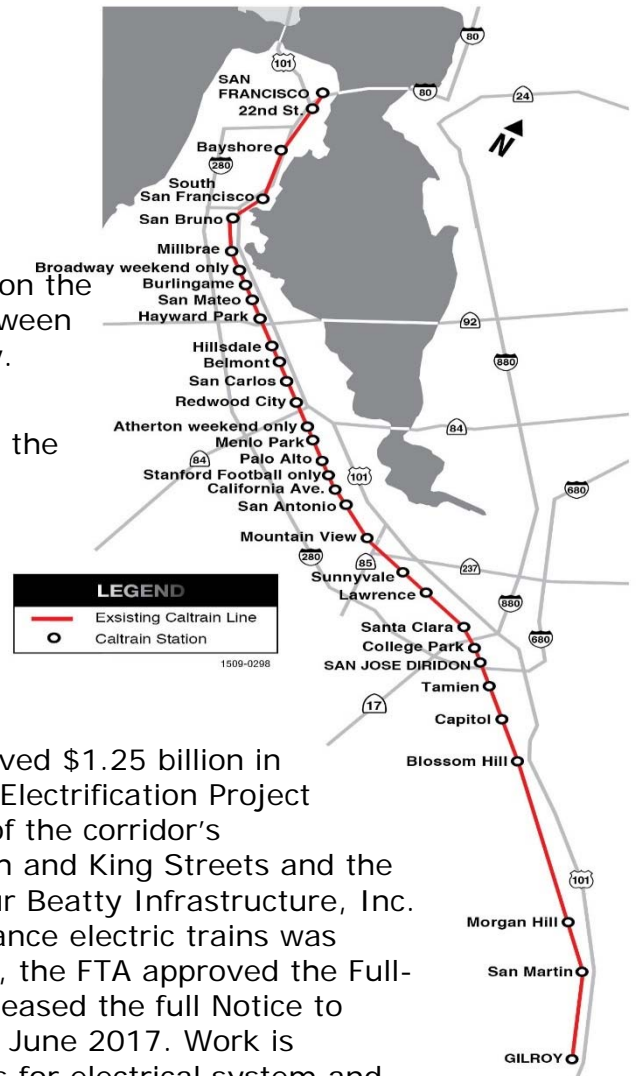
Original scope included 8 miles of double tracking on the existing Union Pacific Railroad (UPRR) corridor between San Jose and Gilroy to increase **Caltrain capacity**.

Caltrain from San Jose to San Francisco will be upgraded to an electric system in conjunction with the California High Speed Rail (CHSRA) Project.

Project Status:

Fiber optic cable relocation of the northern segment (\$5.3 miles) required for double tracking was completed. Remaining scope is pending Cal Mod to San Jose and High Speed Rail project.

On July 7, 2016, Caltrain Board of Directors approved \$1.25 billion in contracts to begin work on the Peninsula Corridor Electrification Project (PCEP). The contract for design and construction of the corridor's electrification between San Francisco station at 4th and King Streets and the Tamien Station in San Jose was awarded to Balfour Beatty Infrastructure, Inc. The contract for the manufacture of high-performance electric trains was awarded to Stadler US, Inc. After months of delay, the FTA approved the Full-Funding Grant Agreement (FFGA) and Caltrain released the full Notice to Proceed to Balfour Beatty and Stadler US, Inc. in June 2017. Work is proceeding, Balfour Beatty is installing foundations for electrical system and working on final cost estimates. Stadler is producing vehicle mock-ups, and proceeding with construction of their US production facility in Utah. VTA continues to reimburse Caltrain for project related cost.



Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Caltrain South County Capacity Improvements	\$ 17.2	\$ 14.9	\$ 2.3	\$ -	\$ 14.9	\$ 2.3	\$ 17.2	Inactive
Caltrain Electrification/ HS Rail	\$ 1.3	\$ -	\$ 1.3	\$ -	\$ -	\$ 0.6	\$ 0.6	Ongoing
Caltrain Electrification Early Investment Program	\$ 106.7	\$ 26.4	\$ 80.3	\$ -	\$ 26.4	\$ 34.4	\$ 60.8	Ongoing
Total	\$ 125.3	\$ 41.3	\$ 84.0	\$ -	\$ 41.3	\$ 37.3	\$ 78.6	

Project Schedule:

Activity	2014	2015	2016	2017	2018	2019	2020	2021	2022
Environmental	■								
Design		■	■	■	■				
Construction				■	■	■	■	■	
Testing & Commissioning						■	■	■	■
Revenue Service									◆

*P-0550, P-0595, P-0829

**Caltrain Electrification includes \$26.4M in Prop 1A CTC grant funds designated directly to Caltrain

December 2017

6 Caltrain Service Upgrades

Estimated Cost: \$69.8 million

Secured Funding: \$88.4 million

Year of Completion: 2018

Project Description:

Capital improvement projects to the Caltrain system with the goals of improving service, ridership and passenger accessibility.

Project Status:

- **Caltrain Service Upgrades** project is currently studying rescheduling the service to Gilroy and possible addition of fourth train.
- **Mountain View Parking** – Project is inactive until right-of-way needs of High Speed Rail project are known, and the plan for future Caltrain capital and operating improvements is determined.
- **Blossom Hill Pedestrian Grade Separation** – The bridge was opened to the public in September 2012.
- **Safety Enhancements** Construction along the JPB segment is completed and design for approximately 15 crossings along the UPRR segment started in January 2012. Design for the next phase is complete, construction is pending High Speed Rail project. Modifications to pedestrian access at the Mountain View Caltrain station using funds from this project is expected to be completed in 2018.
- **Santa Clara Caltrain Station Pedestrian Underpass Extension** - This project provides an extended pedestrian tunnel under the UPRR tracks to Brokaw Road at the Santa Clara Station. Construction contract was awarded to Shimmick Construction in June 2016 and was completed in June 2017. The underpass was opened to the public on June 30, 2017. Project closeout is ongoing.
- **Santa Clara and Diridon Station Upgrades** was administered by Caltrain and is now complete..
- **The Bike Share Pilot Program** opened on August 29, 2013 with 280 bicycles and 28 bike share stations at Caltrain stations and downtown areas in the cities of San Jose, Mountain View, and Palo Alto. The grant-funded pilot concluded in June 2016. Post-pilot expansion will occur in select cities, including San Jose, and will be funded by a private company.



Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Caltrain Service Upgrades	\$ 17.5	\$ -	\$ 17.5	\$ -	\$ -	\$ 16.4	\$ 16.4	Ongoing
Caltrain Improvement Plan	\$ 0.3	\$ -	\$ 0.3	\$ -	\$ -	\$ 0.3	\$ 0.3	Completed
Caltrain Mountain View Parking Structure	\$ 0.3	\$ 0.1	\$ 0.2	\$ -	\$ 0.1	\$ 0.2	\$ 0.3	Inactive; on hold
Blossom Hill Pedestrian Grade Separation	\$ 11.2	\$ 10.0	\$ 1.2	\$ -	\$ 10.0	\$ 1.2	\$ 11.2	Completed
Caltrain Safety Enhancements	\$ 16.0	\$ 0.1	\$ 16.0	\$ -	\$ 0.1	\$ 15.7	\$ 15.7	Pending CA High Speed Rail (CAHSR)
Santa Clara Station Pedestrian Underpass Extension	\$ 11.3	\$ 10.5	\$ 0.7	\$ -	\$ 9.5	\$ 0.7	\$ 10.2	Closeout
Santa Clara and San Jose Diridon Station Upgrade	\$ 12.2	\$ -	\$ 12.2	\$ -	\$ -	\$ 12.2	\$ 12.2	Completed
Bike Sharing Pilot Project	\$ 0.8	\$ 0.6	\$ 0.2	\$ -	\$ 0.6	\$ 0.2	\$ 0.8	Closeout
Total	\$ 69.8	\$ 21.4	\$ 48.4	\$ -	\$ 20.3	\$ 46.9	\$ 67.2	

Project Schedule:

Activity	Start	End	2010	2011	2012	2013	2014	2015	2016	2017	2018
Santa Clara Station Ped UC Design/Bid/Award	Mid 2010	Mid 2016									
Santa Clara Station Ped UC Construction/Closeout	Mid 2016	Early 2018									

7 Palo Alto Intermodal Transit Center

Estimated Cost: \$TBD*

Secured Funding: \$0.2 million

Year of Completion: TBD; Studies completed: 2004

Project Description: This project will create an intermodal facility for trains, buses, bicycles, autos and pedestrians, and act as a gateway to both Downtown Palo Alto and Stanford University. This project is inactive, as significant issues related to the High Speed Rail project will need to be resolved before further planning work can proceed for this project.

Project Status: Project is inactive/ on hold.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)		
		Others	Measure A	TBD	Others	Measure A	Total
Palo Alto Intermodal Transit Center	\$ 0.2	\$ 0.2	\$ 0.0	\$ -	\$ 0.2	\$ 0.0	\$ 0.2
Total	\$ 0.2	\$ 0.2	\$ 0.0	\$ -	\$ 0.2	\$ 0.0	\$ 0.2

Project on hold. Completed project studies.

Project Schedule: Project on hold

8 Bus Rapid Transit

Estimated Cost: \$399.9 million

Secured Funding: \$264.4 million*

Year of Completion: TBD

Project Description:

Bus Rapid Transit (BRT) is an enhanced bus transit service that offers many of the same service attributes as rail transit, such as specialized vehicles, large stations, real-time information, and more frequent and reliable operations.

Project Status:

Alum Rock Santa Clara Bus Rapid

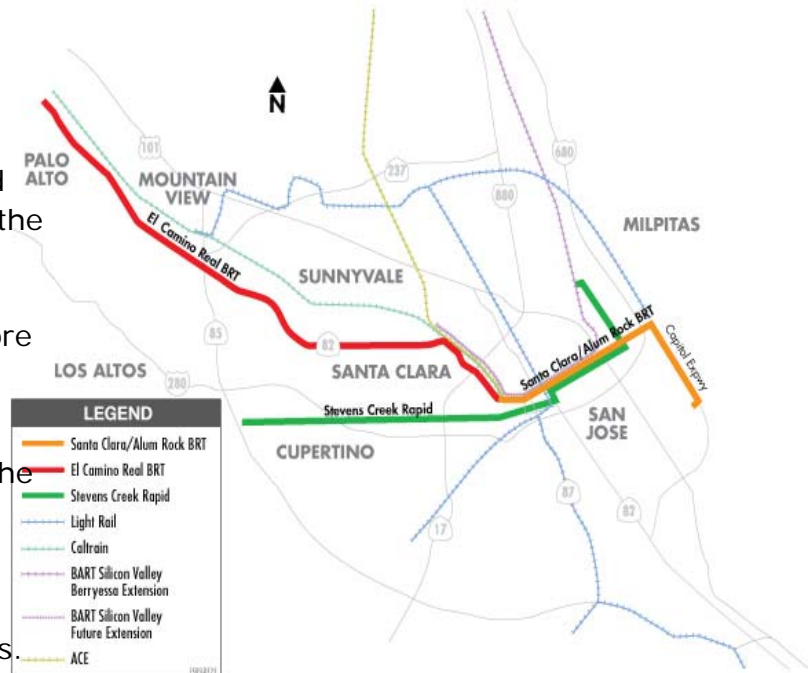
Transit (BRT) revenue service along the corridor commenced in May 2017. CSJ electrical punchlist work is in progress and will be completed April 2018. Administrative closeout of contracts and agreements is in progress.

The **El Camino Real Rapid Transit** Policy Advisory Board decided not to pursue BRT dedicated lane options. They recommended that VTA pursue transit speed and passenger amenity improvements in the corridor. This is currently being scoped.

Civil construction for new shelters, seating, lighting and associated bus stop improvements for the **Stevens Creek Rapid 523** is planned for completion by April 2018. Installation of shelters will be completed by August 2018. The Stelling Road bus stop improvements to speed up travel time and accommodate increased transportation needs in the De Anza College area that will effectively result from implementation of the Rapid 523 line will be completed by February 2018. The DeAnza Transit Center project is inactive/on hold at this time. A dozen potential designs for a transit center on the DeAnza campus have been prepared and presented to the college administration over many meetings with no acceptance of the project. The Stelling Road Bus Stop Improvements meets VTA's current needs and any additional study of an on-campus transit center would only be undertaken within the context of a larger BRT or transit corridor study on Stevens Creek.

Modifications at Chaboya/North Divisions Phase I (North Yard) were completed in March 2015. RFP for design services for Phase II involving modifications to the Chaboya Yard is planned for summer 2018 after completion of a needs study in June. **Articulated Buses** (29 units) have been accepted by VTA and are operational. An option for 20 additional buses to operate on the Stevens Creek corridor is also available and is being considered.

Project Cost:



Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
BRT Strategic Plan	\$ 1.3	\$ -	\$ 1.3	\$ -	\$ -	\$ 1.3	\$ 1.3	Completed
Highway-Based BRT Alternative Analysis	\$ 0.9	\$ 0.7	\$ 0.2	\$ -	\$ 0.7	\$ 0.2	\$ 0.9	Completed
Alum Rock - Santa Clara Bus Rapid Transit	\$ 144.2	\$ 94.2	\$ 50.0	\$ -	\$ 94.2	\$ 42.3	\$ 136.5	Closeout
Stevens Creek Bus Rapid Transit	\$ 151.0	\$ 0.7	\$ 3.7	\$ 146.6	\$ 0.5	\$ 3.1	\$ 3.6	Ongoing
El Camino Real Bus Rapid Transit	\$ 24.1	\$ -	\$ 24.1	\$ -	\$ -	\$ 10.5	\$ 10.5	Ongoing
Procurement of BRT Articulated Buses	\$ 57.7	\$ 19.5	\$ 38.1	\$ -	\$ 19.2	\$ 13.3	\$ 32.5	Ongoing
Modifications to Chaboya and North Division for BRT Buses	\$ 14.4	\$ -	\$ 14.4	\$ -	\$ -	\$ 2.2	\$ 2.2	Ongoing
Money Counting Facility Replacement	\$ 0.1	\$ -	\$ 0.1	\$ -	\$ -	\$ 0.1	\$ 0.1	Closed
De Anza College Transit Center Improvement	\$ 0.3	\$ -	\$ 0.3	\$ -	\$ -	\$ 0.3	\$ 0.3	Ongoing
Rapid 523 Bus Stop Improvements	\$ 3.9	\$ 0.7	\$ 3.2	\$ -	\$ 0.1	\$ 2.0	\$ 2.1	Ongoing
Stelling Road Bus Stop Improvement	\$ 1.9	\$ 0.1	\$ 1.8	\$ -	\$ 0.1	\$ 1.2	\$ 1.3	Ongoing
Total	\$ 399.9	\$ 116.0	\$ 137.2	\$ 146.6	\$ 114.8	\$ 76.6	\$ 191.4	

* P-0551, P-0725, P-0475, P-0715, P-0717, P-0719, P-0785, P-0786, P-0967, P-0998, P-1008

9 Upgrade Altamont Commuter Express (ACE)

Estimated Cost: \$10.0 million*

Secured Funding: \$0.0 million

Year of Completion: 2013

Project Description: ACE provides weekday commute service between Stockton and San Jose to three stations in Santa Clara County: Great America, Santa Clara, and Downtown San Jose. Work was completed in 2012.

Project Status: Closed.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Upgrade ACE - Incl. in Santa Clara/ San Jose Diridon St Upgrade	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	Included in SC/SJ Station Upgrade
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	

* A \$10 million Measure A contribution to the \$26 million Santa Clara Station project was approved and included in the Caltrain Service Upgrades project for improvements to the Santa Clara Station to allow ACE trains to stop at the station.

Project Schedule: Project completed in 2013.

10 Highway 17 Bus Service Improvements

Estimated Cost: \$2.5 million*

Secured Funding: \$2.5 million

Year of Completion: 2011

Project Description: VTA reimbursed Santa Cruz Metro \$2.5 million for the procurement of five buses necessary to operate service between Santa Cruz, Scott Valley, and Downtown San Jose. These buses replaced existing buses that are 20 years old, with an average of 950,000 miles each. The five buses went into service in March/April 2011.

Project Status: Project closed.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Highway 17 Bus Service Improvements	\$ 2.5	\$ -	\$ 2.5	\$ -	\$ -	\$ 2.5	\$ 2.5	Completed
Total	\$ 2.5	\$ -	\$ 2.5	\$ -	\$ -	\$ 2.5	\$ 2.5	

Project Schedule: Project completed in 2011.

Commuter Rail Program

December 2017

11 Dumbarton Rail Corridor

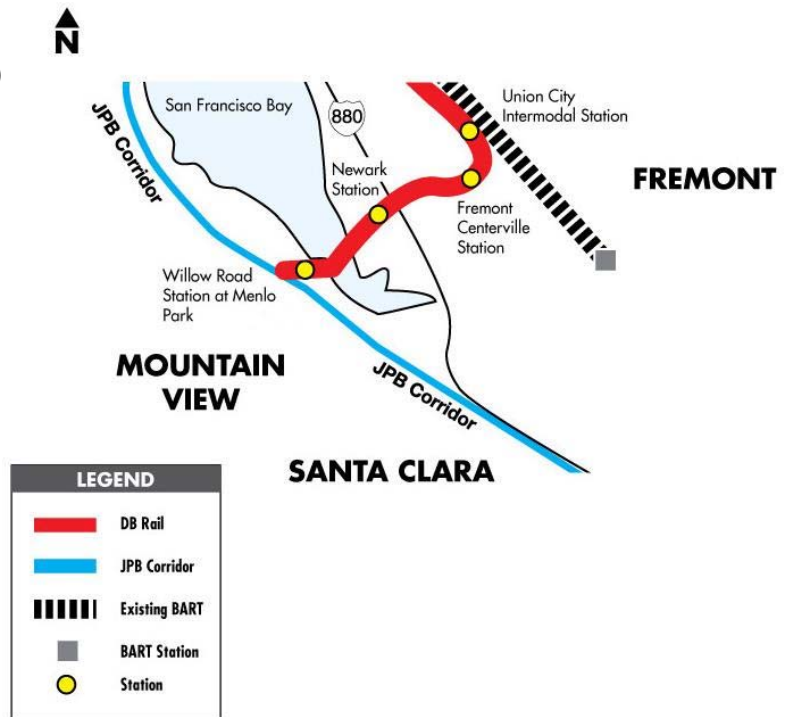
Estimated Cost: TBD

Secured Funding: \$2.3 million (VTA)

Year of Completion: TBD

Project Description:

The original project was established to rehabilitate rail bridges and tracks that span the bay between Redwood City and Newark and make improvements to existing tracks in Union City and Fremont and involved the construction of two new rail stations at Menlo Park and Newark, as well as upgrades to the Fremont Centerville Station and a new intermodal station at the Union City BART station. The project was on hold due to funding constraints until recently when Facebook-funded \$1.2 million for a SamTrans-led feasibility study.



Project Status:

Environmental information was prepared in 2013 but due to funding constraints, an Environmental Impact Report (EIR) was not completed.

VTA is currently participating in a feasibility study being led by SamTrans to evaluate short- and long-term strategies to improve mobility across the Dumbarton corridor. Strategies will include options for transit service across the Dumbarton Bridge as well as rehabilitation and repurposing of the rail bridge.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
Dumbarton Rail Corridor	\$ 2.3	\$ -	\$ 2.3	\$ -	\$ -	\$ 2.3	\$ 2.3	Inactive; on hold
Total	\$ 2.3	\$ -	\$ 2.3	\$ -	\$ -	\$ 2.3	\$ 2.3	

Project Schedule:

Activity	Start	End	2006	2007	2008	2009	2010	2011	2012	2013
Environmental	Late 2006	Mid 2013								
			Project development will proceed based recommendations adopted from the feasibility study							

12 ZEB Demonstration and Facility Improvements

Estimated Cost: \$19.5 million*

Secured Funding: \$19.5 million

Year of Completion: 2005

Project Description: VTA procured three 40-foot low-floor zero-emission fuel-cell bus (ZEB) to comply with California Air Resources Board's (CARB) regulation to reduce nitrogen oxide and particulate matter emitted by public transit buses. Facilities were modified, a hydrogen fueling station was installed, and training was provided for staff, emergency responders, and others. The three ZEBs started revenue service in February 2005. Project is closed.

Project Status: Closed.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
3 Zero Emission Buses (Pilot Program)	\$ 14.7	\$ 11.5	\$ 3.2	\$ -	\$ 11.4	\$ 3.2	\$ 14.7	Completed
Zero Emission Buses Facility Improvements	\$ 4.8	\$ 2.4	\$ 2.4	\$ -	\$ 2.4	\$ 2.4	\$ 4.8	Completed
Total	\$ 19.5	\$ 13.9	\$ 5.6	\$ -	\$ 13.9	\$ 5.6	\$ 19.4	

Project Schedule: Project completed in 2005

Light Rail Program

December 2017

13 Develop New Light Rail Corridors

Estimated Cost: \$354.7 million*

Secured Funding: \$49.3 million

Year of Completion: Varies

Description:

The VTA Board adopted the **Light Rail Systems Analysis** in May 2010. The Systems Analysis provides an evaluation of infrastructure and operational shortcomings of the existing light rail system along with a three-phase improvement plan for immediate action.



Southern Light Rail Express project developed alternatives for more efficient operation of the light rail system.

The **Vasona LRT Extension** project will provide a 1.6 mile extension from existing Winchester Station to a new Vasona Junction Station in Los Gatos.

The **Winchester Light Rail Double Track & Platform Extension** will extend six platforms to accommodate three car trains and double track the segments of the existing single tracks.

The **SR 85 Major Transit Investment Study** will analyze implementation of a Light Rail System (LRT) on SR 85 from San Jose to Mountain View and other transit guideway alternatives such as Bus Rapid Transit (BRT) that would be a precursor to eventual implementation of LRT.

Status:

The **Light Rail Systems Analysis** was adopted by the VTA Board in May 2010. The initial projects recommended from the Systems Analysis began planning, design and construction in Fall 2011.

Southern Light Rail Express project has been closed out. Findings from this study will be used for future operating plan analysis. This study did not result in a capital construction project.

In June 2016, VTA Board of Directors approved funding to complete design, acquire right of way and relocate utilities for **Vasona LRT extension/ Winchester Light Rail Double Track & Platform Extension**. A Request for Proposal (RFP) was issued in August 2017. Contract is expected to be awarded at the May 2018 VTA Board meeting.

RFP for the **SR 85 Major Transit Investment Study** was issued in December 2016 and awarded at the May 2017 VTA Board meeting. Transit Market Analysis will be completed by June 2018. Further transit planning including concept development is dependent on securing funding.

Project Cost:

Project	Total Estimate	Total Estimated Cost (in \$M)			Incurred through Dec 2017 (in \$M)			Status
		Others	Measure A	TBD	Others	Measure A	Total	
New Rail Corridors Study	\$ 3.0	\$ -	\$ 3.0	\$ -	\$ -	\$ 1.2	\$ 1.2	Ongoing
Light Rail Systems Analysis	\$ 1.7	\$ -	\$ 1.7	\$ -	\$ -	\$ 1.7	\$ 1.7	Completed
Southern Light Rail Express	\$ 1.1	\$ -	\$ 1.1	\$ -	\$ -	\$ 1.1	\$ 1.1	Completed
LRT Extension to Vasona Junction	\$ 174.1	\$ -	\$ 20.9	\$ 153.2	\$ -	\$ 1.0	\$ 1.0	Ongoing
Winchester LR Double Track & Platform Extn	\$ 172.8	\$ -	\$ 22.0	\$ 150.8	\$ -	\$ 0.1	\$ 0.1	Ongoing
SR 85 Major Transit Investment Study	\$ 2.0	\$ 1.4	\$ 0.6	\$ -	\$ -	\$ 0.3	\$ 0.3	Ongoing
Total	\$ 354.7	\$ 1.4	\$ 49.3	\$ 304.0	\$ -	\$ 5.4	\$ 5.4	

Project Schedule:

Activity	Start	End	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vasona LRT Extn	Late 2009	TBD											
Winchester LR Double Track & Platform Extension	Late 2016	TBD											

Construction schedule dependent on funding

Environmental Design/Plan Construction

* P-0552, P-0660, P-0799, P-0587, P-0968, P-1003

OFFICIAL BALLOT
COUNTY OF SANTA CLARA

GENERAL ELECTION
November 7, 2000

DISTRICT
SANTA CLARA VALLY TRANSPORTATION AUTHORITY

A ½ CENT TRANSIT SALES TAX

To:

- Connect BART to Milpitas, San Jose, Santa Clara;
- Build rail connection from San Jose International Airport to BART, Caltrain, light rail;
- Purchase vehicles for disabled access, senior safety, clean air buses;
- Provide light rail throughout Santa Clara County;
- Expand, electrify Caltrain;
- Increase rail, bus service.

Shall Santa Clara Valley Transportation Authority enact a ½ cent sales tax for 30 years beginning 4/1/06 when current tax expires, with annual audits published in local newspapers and an independent citizens watchdog committee?

COMPLETE TEXT OF MEASURE A

Shall the Board of Directors of the Santa Clara Valley Transportation Authority (VTA) be authorized to enact a retail transactions and use tax ordinance imposing (a) a tax for the privilege of selling tangible personal property at retail upon every retailer in Santa Clara County, the territory of VTA; such tax to be at the rate of one-half of one percent of the gross receipts of the retailer from the sale of all tangible personal property sold by him at retail in the territory of VTA, and (b) a complimentary tax upon the storage, use, or other consumption in Santa Clara County, the territory of VTA; such tax to be at the rate of one-half of one percent of the sales price of the property whose storage, use, or other consumption is subject to the tax, such taxes to be imposed for a period not to exceed 30 years, and to take effect only upon the expiration of the current County of Santa Clara 1996 Measure B ½ cent sales tax in April, 2006, and to be used only to:

- **Extend BART from Fremont through Milpitas to Downtown San Jose and the Santa Clara Caltrain Station, specifically,**

To build a BART Extension from Fremont to Milpitas, San Jose and Santa Clara with a major connection to the Tasman Light Rail line at the Milpitas BART Station. In San Jose to include a BART subway section with stations at San Jose State University, the new San Jose City Hall, Downtown San Jose at Market Street, San Jose Arena and the Diridon Multimodal Station connecting to Caltrain, ACE, Amtrak, the Vasona Light Rail line and VTA bus service. In Santa Clara, to serve Santa Clara University, and the Caltrain Station with a

people mover connection to San Jose International Airport.

- **Provide Connections from San Jose International Airport to BART, Caltrain and the VTA Light Rail, specifically,**

To build a people mover rail line connecting the airport passenger terminals directly with BART, Caltrain and the VTA Light Rail line.

- **Extend Light Rail from Downtown San Jose to the East Valley by**

Building a Downtown/East Valley Light Rail line from downtown San Jose serving the new San Jose City Hall and San Jose State University, out Santa Clara Street to Capitol Avenue to join the Capitol Light Rail line then south to Eastridge Shopping Center.

- **Purchase Low Floor Light Rail Vehicles, specifically**

To better serve disabled, seniors and others; purchase an additional 20 low floor light rail vehicles to join the 30 low floor vehicles now being constructed for the new Tasman, Capitol and Vasona Light Rail lines and 50 new low floor vehicles to replace VTA's existing 50 light rail vehicles.

- **Improve Caltrain: Double Track to Gilroy and Electrify from Palo Alto to Gilroy**

Extend the Caltrain double track from the San Jose Tamien Station through Morgan Hill to Gilroy. Provide VTA's funds for the partnership with San Francisco and San Mateo counties to electrify Caltrain from San Francisco to Gilroy.

- **Increase Caltrain Service, specifically**

Purchase new locomotive train sets for increased Caltrain service in Santa Clara County from Gilroy to Palo Alto and provide additional facilities to support the increased service.

- **Construct a New Palo Alto Intermodal Transit Center**

In partnership with the City of Palo Alto and Stanford University, design and construct a new parkway and underpass for University Avenue from the campus to downtown Palo Alto to improve bicycle, pedestrian and transit access to the campus, Palo Alto Caltrain station and downtown Palo Alto. Upgrade passenger facilities at the historic Palo Alto Caltrain station, upgrade transit facilities for VTA, SAMTRANS, Dumbarton Express and the Stanford Marguerita and Palo Alto shuttle services.

- **Improve Bus Service in Major Bus Corridors**

For VTA Line 22 (Palo Alto to Eastridge Center) and the Stevens Creek Boulevard Corridor, purchase new low floor articulated buses. Improve bus stops and major passenger transfer points and provide bus queue jumping lanes at intersections to permit buses quick access along the corridors.

- **Upgrade Altamont Commuter Express (ACE)**

Provide VTA's matching funds for additional train sets, passenger facilities and service upgrades for the ACE Commuter Service from San Joaquin and Alameda Counties.

- **Improve Highway 17 Express Bus Service**

Provide VTA's share of funds for the partnership with the Santa Cruz County Transit District for additional buses and service upgrades for the Highway 17 Express Bus Service.

- **Connect Caltrain with Dumbarton Rail Corridor**

Provide VTA's share of matching funds for a partnership with Alameda and San Mateo counties for the rebuilding of the Dumbarton Rail Corridor to connect to Caltrain and train sets for this new service conditioned on Alameda and San Mateo County's funding.

- **Purchase Zero Emission Buses and Construct Service Facilities**

Provide funds to supplement federal funds to expand and replace existing VTA diesel bus fleet from current size of just over 500 vehicles to 750 vehicles with the new zero emission buses and to provide maintenance facilities for this new, clean vehicle propulsion system. All new buses to be low floor for easier boarding by seniors and the disabled.

- **Develop New Light Rail Corridors**

Provide capital funds for at least two new future light rail corridors to be determined by Major Investment Studies (MIS). Potential corridors include: Sunnyvale/Cupertino; Santa Teresa/Coyote Valley; Downtown/East Valley Connection to Guadalupe Line; Stevens Creek Boulevard; North County/Palo Alto; Winchester/Vasona Junction; and, initial study of BART connection from Santa Clara through Palo Alto to San Mateo County.

- **Fund Operating and Maintenance Costs for Increased Bus, Rail and Paratransit Service**

Provide revenue to ensure funding, to at least 2014, and possibly longer, of the following: the new Tasman East, Capitol and Vasona Light Rail lines, the commuter rail connection to BART, expanded paratransit services, expanded bus fleet of 750 vehicles, the Downtown/East Valley Light Rail line operations, which can commence in 2008, and the BART extension to San Jose which can commence operations by 2010;

All subject to the following mandatory requirements:

- The Tax Must Expire 30 Years After Implementation.

If approved by the voters, this half-cent sales tax must expire 30 years after implementation. The tax will be imposed for the period commencing April 1, 2006 when current tax expires and terminate on March 31, 2036. The length of this tax cannot be extended without a vote – and the approval – of the residents of Santa Clara County.

- An Independent Citizen's Watchdog Committee Must Review all Expenditures.

The Independent Citizen's Watchdog Committee will consist of private citizens, not elected officials, who comprise the VTA's Citizen's Advisory Committee. Responsibilities of the Citizen's Watchdog Committee are:

- Public Hearings and Reports: The Committee will hold public hearings and issue reports on at least an annual basis to inform Santa Clara County residents how the

funds are being spent. The hearings will be held in full compliance with the Brown Act, California's open meeting law with information announcing the hearings well-publicized and posted in advance.

- Annual Independent Audits: An annual audit conducted by an independent Auditor will be done each fiscal year to ensure tax dollars are being spent in accordance with the intent of this measure.
- Publish results of Audits and Annual Reports: The Committee must publish the results of the Independent Auditor and the Annual Report in local newspapers. In addition, copies of these documents must be made available to the public at large.

such authorization being pursuant to the provisions of Sections 100250 et seq. of the public Utilities Code and Sections 7251 et seq. of the Revenue and Taxation Code.

APPENDIX B – 2000 MEASURE A FUND SWAPS

Figure 1.2
Funds Outgoing From Measure A:
Local Program Reserve Projects Receiving Measure A Funds

Sponsor	Project	Total LPR Allocated to by Board (000s)	Expended as of Dec 2017	Status Phase
VTA	I-880 HOV Widening: SR-237 to US-101	\$17,935	\$17,864	<i>Closed</i>
VTA	VTP PW	\$100	\$0	<i>Closed</i>
VTA	US 101 Improvements (280/680 to Yerba Buena)	\$5,688	\$5,633	<i>Closed</i>
VTA	US 101/Capitol Expwy and Yerba Buena Int. Imp.	\$5,488	\$5,041	<i>Completed</i>
VTA	US 101 Improvements (85 to Embarcadero)	\$15,144	\$15,137	<i>Completed</i>
VTA	I-880/I-280/Stevens Creek Interchange	\$1,556	\$1,033	<i>Completed</i>
VTA	US 101/SR-25 Interchange	\$4,900	\$4,900	<i>Env./PA/ED</i>
VTA/ACCMA	I-680 Sunol Grade HOV/HOT Lane	\$8,000	\$8,000	<i>Completed</i>
VTA	SR-87 HOV North & South - Cost Increase	\$2,500	\$2,497	<i>Completed</i>
VTA	SR-152/SR-156 Interchange - Cost Increase	\$405	\$400	<i>Completed</i>
Gilroy	Gilroy/Arroyo Circle/Arroyo Camino Improvements	\$6,725	\$6,725	<i>Completed</i>
Morgan Hill	Butterfield Blvd Extension Project	\$2,510	\$2,510	<i>Completed</i>
San Jose	Julian/St. James Downtown Couplet Conversion	\$5,076	\$5,076	<i>Completed</i>
Saratoga	Citywide Signal Upgrade Project Phase 2	\$400	\$0	<i>Not initiated yet</i>
SCCounty	ITS Enhancements on Bascom Ave	\$450	\$335	<i>Completed</i>
SCCounty	Santa Teresa/Fitzgerald Ave Intersection Signals	\$275	\$268	<i>Completed</i>
SCCounty	Alum Rock School District Area Traffic Calming	\$315	\$315	<i>Completed</i>
Sunnyvale	Mathilda Ave Caltrain Bridge Construction	\$524	\$524	<i>PE Completed</i>
Sunnyvale	Mary Ave Extn PS&E; moved to MB	\$0	\$0	<i>Completed</i>
Sunnyvale	US101/Mathilda Ave/SR237 IC	\$2,000	\$1,934	<i>Final Design</i>
VTA	SR 237 Express Lanes-Phase II Extension	\$9,405	\$6,597	<i>Construction</i>
VTA	Route 85 Express Lanes - Environmental	\$972	\$972	<i>Environmental Completed</i>
VTA	US 101 Express Lanes - Environmental	\$7,878	\$7,878	<i>Environmental Completed</i>
VTA/SBCOG	SR-152 New Alignment	\$5,000	\$3,997	<i>Pre-PA/ED</i>
Milpitas	Tasman East LRT Landscaping	\$1,800	\$1,600	<i>Construction</i>
VTA	Caltrans PID Work - US 101/De La Cruz/Trimble	\$54	\$44	<i>Final Design</i>
VTA	Caltrans PID Work - El Camino Real/SR237	\$46	\$46	<i>Completed</i>
VTA	SR87 South Landscaping	\$55	\$27	<i>Completed</i>
VTA	US 101 SB Off-Ramp to SR-87	\$200	\$0	<i>Pre-PA/ED</i>
VTA	I-280/Foothill Expressway Ramp Impr.	\$700	\$700	<i>Final Design</i>
Palo Alto	California Ave Transit Hub	\$1,175	\$1,175	<i>Completed</i>
VTA/Caltrans	Combined Landscape Maintenance	\$2,175	\$1,869	<i>PEP</i>
VTA	I-680 Corridor Study (Calaveras to US 101)	\$250	\$250	<i>Study Completed</i>
VTA	I-280 Corridor Study (US101/I680 IC to Page Mill)	\$250	\$248	<i>Study</i>
VTA	I-280/Winchester Off Ramp Environmental Phase	\$250	\$213	<i>Env./PA/ED</i>
VTA	SV Express Lanes - US101/SR85 - PH 3	\$5,100	\$2,985	<i>Final Design</i>
VTA	SV Express Lanes - US101/SR85 - PH 4	\$2,855	\$133	<i>Final Design</i>
VTA	SV Express Lanes - Electronic Toll System (ETS)	\$3,728	\$859	<i>Final Design</i>
VTA	Noise Reduction Program on SR85	\$285	\$284	<i>Study</i>
VTA	Innovative Transportation Technology Program	\$85	\$76	<i>Study</i>
VTA	SR87 Corridor Study	\$150	\$0	<i>Study</i>
N/A	Unprogrammed LPR - TBD	(\$6)	\$0	<i>Unprogrammed</i>
		\$82	\$0	
		\$0	\$0	
TOTALS		\$122,480	\$108,144	

APPENDIX B – 2000 MEASURE A FUND SWAPS

Figure 1.3
Funds Incoming to Measure A: Projects Receiving STIP Funds

Sponsor	Programmed by Board (000s)	Received to Date (000s)	Project	Status Phase
VTA	\$57,540	\$24,340	Capitol Expressway LRT Extension	Phase 1 completed
VTA	\$50,440	\$50,440	BART Hayward Maintenance Complex	Construction
VTA	\$14,500	\$0	VTA BART to Silicon Valley - Santa Clara Extension	PA/ED
TOTAL	\$122,480	\$74,780		

2000 MEASURE A TRANSIT IMPROVEMENT PROGRAM

Expenditures December 31, 2017

9.b

Project	Total Estimate ¹	Planned Funding (in \$M)			Incurred through Dec 2017 (in \$M)		
		Others	Measure A	TBD	Others	Measure A	Total
1 - Extend BART from Fremont through Milpitas to Downtown San Jose and the Santa Clara Caltrain Station							
1-1 BART SV Program Development, Implementation & Warm Springs	\$ 416.6	\$ 243.9 ²	\$ 172.7	\$ -	\$ 243.8 ²	\$ 171.3	\$ 415.1
1-2 BART SV Corridor Establishment and Maintenance (CEM)	\$ 470.5	\$ 159.3	\$ 311.2	\$ -	\$ 146.6	\$ 295.4	\$ 442.0
1-3 BART Silicon Valley Berryessa Extension	\$ 2,421.3	\$ 1,343.6	\$ 1,077.7	\$ -	\$ 1,066.0	\$ 815.9	\$ 1,881.9
1-4 BART Silicon Valley Santa Clara Extension ³	\$ 4,779.9	\$ 160.5	\$ 1,425.0 ⁴	\$ 3,194.4	\$ 160.5	\$ 20.3	\$ 180.8
1-5 BART Core System Modifications (BCS)	\$ 264.6	\$ 69.7	\$ 194.9	\$ -	\$ 57.6	\$ 95.5	\$ 153.1
1-6 BART Other Supporting Projects	\$ 97.4	\$ 9.1	\$ 88.3	\$ -	\$ 8.0	\$ 82.2	\$ 90.2
Total	\$ 8,450.3	\$ 1,986.2	\$ 3,269.8	\$ 3,194.4	\$ 1,682.5	\$ 1,480.6	\$ 3,163.1
2 - Provide Connections from Mineta San Jose International Airport to BART, Caltrain and VTA Light Rail							
Mineta San Jose Airport People Mover (APM) ⁵	\$ 800.0	\$ -	\$ 5.0	\$ 795.0	\$ -	\$ 2.1	\$ 2.1
3 - Extend Light Rail From Downtown San Jose to the East Valley							
Capitol Exp. Way Eastridge Light Rail Extn (CELR) Environmental/Eng	\$ 66.1	\$ 5.9	\$ 60.2	\$ -	\$ 5.9	\$ 60.3	\$ 66.2
CELR Phase I - Pedestrian Improvements	\$ 19.0	\$ 16.0	\$ 3.0	\$ -	\$ 16.0	\$ 3.0	\$ 19.0
CELR Phase I - Eastridge Transit Center	\$ 60.0	\$ 26.9	\$ 33.1	\$ -	\$ 26.9	\$ 32.6	\$ 59.5
Eastridge to BART Regional Connector Project ⁶	\$ 453.0	\$ 139.4	\$ 247.0	\$ 66.6	\$ -	\$ 1.4	\$ 1.4
Total	\$ 598.1	\$ 188.2	\$ 343.3	\$ 66.6	\$ 48.8	\$ 97.2	\$ 146.0
4 - Purchase Low-Floor Light Rail Vehicles							
70 Low-Floor Light Rail Vehicles	\$ 200.6	\$ 200.6	\$ - ⁷	\$ -	\$ 200.6	\$ - ⁷	\$ 200.6
5 - Improve Caltrain: Double Track to Gilroy and Electrify from Palo Alto to Gilroy							
Caltrain South County Capacity Improvements ⁸	\$ 17.2	\$ 14.9	\$ 2.3	\$ -	\$ 14.9	\$ 2.3	\$ 17.2
Caltrain Electrification (VTA Share)	\$ 108.0	\$ 26.4 ⁹	\$ 81.6	\$ -	\$ 26.4 ⁹	\$ 35.0	\$ 61.4
Total	\$ 125.3	\$ 41.3	\$ 84.0	\$ -	\$ 41.3	\$ 37.3	\$ 78.6
6 - Increase Caltrain Service							
Caltrain Service Upgrades/Caltrain Improvement Plan	\$ 17.8	\$ -	\$ 17.8	\$ -	\$ -	\$ 16.7	\$ 16.7
Caltrain Mountain View Parking Structure ¹⁰	\$ 0.3	\$ 0.1	\$ 0.2	\$ -	\$ 0.1	\$ 0.2	\$ 0.3
Blossom Hill Pedestrian Grade Separation	\$ 11.2	\$ 10.0	\$ 1.2	\$ -	\$ 10.0	\$ 1.2	\$ 11.2
Caltrain Safety Enhancements	\$ 16.0	\$ 0.1	\$ 16.0	\$ -	\$ 0.1	\$ 15.7	\$ 15.7
Santa Clara Station Pedestrian Underpass Extension	\$ 11.3	\$ 10.5	\$ 0.7	\$ -	\$ 9.5	\$ 0.7	\$ 10.2
Santa Clara and San Jose Diridon Station Upgrade	\$ 12.2	\$ -	\$ 12.2	\$ -	\$ -	\$ 12.2	\$ 12.2
Bike Sharing Pilot Project	\$ 0.8	\$ 0.6	\$ 0.2	\$ -	\$ 0.6	\$ 0.2	\$ 0.8
Total	\$ 69.8	\$ 21.4	\$ 48.4	\$ -	\$ 20.3	\$ 46.9	\$ 67.2
7 - Construct a New Palo Alto Intermodal Transit Center							
Palo Alto Intermodal Transit Center ¹¹	\$ 0.2	\$ 0.2	\$ 0.0	\$ -	\$ 0.2	\$ 0.0	\$ 0.2
8 - Improve Bus Service in Major Bus Corridors							
BRT Alternative Analysis/ BRT Strategic Plan	\$ 2.2	\$ 0.7	\$ 1.5	\$ -	\$ 0.7	\$ 1.5	\$ 2.2
Alum Rock - Santa Clara Bus Rapid Transit	\$ 144.2	\$ 94.2	\$ 50.0	\$ -	\$ 94.2	\$ 42.3	\$ 136.5
Stevens Creek Bus Rapid Transit	\$ 151.0	\$ 0.7	\$ 3.7	\$ 146.6	\$ 0.5	\$ 3.1	\$ 3.6
El Camino Real Bus Rapid Transit ¹²	\$ 24.1	\$ -	\$ 24.1	\$ -	\$ -	\$ 10.5	\$ 10.5
Procurement of BRT Articulated Buses	\$ 57.7	\$ 19.5	\$ 38.1	\$ -	\$ 19.2	\$ 13.3	\$ 32.5
Modifications to Chaboya and North Division for BRT Buses	\$ 14.4	\$ -	\$ 14.4	\$ -	\$ -	\$ 2.2	\$ 2.2
Money Counting Facility Replacement	\$ 0.1	\$ -	\$ 0.1	\$ -	\$ -	\$ 0.1	\$ 0.1
De Anza College Transit Center Improvement	\$ 0.3	\$ -	\$ 0.3	\$ -	\$ -	\$ 0.3	\$ 0.3
Rapid 523 Bus Stop Improvements	\$ 3.9	\$ 0.7	\$ 3.2	\$ -	\$ 0.1	\$ 2.0	\$ 2.1
Stelling Road Bus Stop Improvement	\$ 1.9	\$ 0.1	\$ 1.8	\$ -	\$ 0.1	\$ 1.2	\$ 1.3
Total	\$ 399.9	\$ 116.0	\$ 137.2	\$ 146.6	\$ 114.8	\$ 76.6	\$ 191.4
9 - Upgrade Altamont Commuter Express (ACE)							
Upgrade ACE - Incl. in Santa Clara/ San Jose Diridon St Upgrade	\$ -	\$ -	\$ - ¹³	\$ -	\$ -	\$ - ¹³	\$ -
10 - Improve Highway 17 Express Bus Service							
Highway 17 Bus Service Improvements	\$ 2.5	\$ -	\$ 2.5	\$ -	\$ -	\$ 2.5	\$ 2.5
11 - Connect Caltrain with Dumbarton Rail Corridor							
Dumbarton Rail Corridor ¹⁴	\$ 2.3	\$ -	\$ 2.3	\$ -	\$ -	\$ 2.3	\$ 2.3
12 - Purchase Zero-Emission Buses and Construct Service Facilities							
3 Zero Emission Buses (Pilot Program)	\$ 14.7	\$ 11.5	\$ 3.2	\$ -	\$ 11.4	\$ 3.2	\$ 14.7
Zero Emission Buses Facility Improvements	\$ 4.8	\$ 2.4	\$ 2.4	\$ -	\$ 2.4	\$ 2.4	\$ 4.8
Total	\$ 19.5	\$ 13.9	\$ 5.6	\$ -	\$ 13.9	\$ 5.6	\$ 19.4
13 - Develop New Light Rail Corridors							
New Rail Corridors Study	\$ 3.0	\$ -	\$ 3.0	\$ -	\$ -	\$ 1.2	\$ 1.2
Light Rail Systems Analysis	\$ 1.7	\$ -	\$ 1.7	\$ -	\$ -	\$ 1.7	\$ 1.7
Southern Light Rail Express	\$ 1.1	\$ -	\$ 1.1	\$ -	\$ -	\$ 1.1	\$ 1.1
LRT Extension to Vasona Junction	\$ 174.1	\$ -	\$ 20.9	\$ 153.2	\$ -	\$ 1.0	\$ 1.0
Winchester LR Double Track & Platform Extn	\$ 172.8	\$ -	\$ 22.0	\$ 150.8	\$ -	\$ 0.1	\$ 0.1
SR 85 Major Transit Investment Study	\$ 2.0	\$ 1.4	\$ 0.6	\$ -	\$ -	\$ 0.3	\$ 0.3
Total	\$ 354.7	\$ 1.4	\$ 49.3	\$ 304.0	\$ -	\$ 5.4	\$ 5.4
14 - Fund Operating and Maintenance Cost for Increased Bus, Rail and Paratransit Service							
Fund Operating and Maintenance Costs	\$ 1,465.8	\$ -	\$ 1,465.8	\$ -	\$ -	\$ 379.5	\$ 379.5
Other Expenditures							
Debt Service on Current Bonds (includes principal, interest & other bond costs)	\$ 1,859.5	\$ -	\$ 1,859.5	\$ -	\$ -	\$ 327.8	\$ 327.8
Fund Exchange Payments ¹⁵	\$ 122.5	\$ -	\$ 122.5	\$ -	\$ -	\$ 107.4	\$ 107.4
Miscellaneous Operating Expenses	\$ 34.5	\$ -	\$ 34.5	\$ -	\$ -	\$ 10.3	\$ 10.3
Total	\$ 2,016.5	\$ -	\$ 2,016.5	\$ -	\$ -	\$ 445.5	\$ 445.5
GRAND TOTAL	\$ 14,505.4	\$ 2,569.2	\$ 7,429.7	\$ 4,506.5	\$ 2,122.4	\$ 2,581.5	\$ 4,703.9

¹ Current estimate as of Dec 2017.

² Includes \$8M in State-Local Partnership Program (SLPP) and \$111.4M in Traffic Congestion Relief Program (TCRP) grant funds designated directly to BART.

³ Estimated costs includes a 4-station, 6 mile project.

⁴ Includes \$1.0B of projected debt issuance.

⁵ Completed studies of Automated Transit Guideway system.

⁶ Construction Phase Cost Estimate.

⁷ Project funded through a Board approved fund exchange between Santa Clara County, VTA and Measure A. Measure A costs incurred for this item reflected as a portion of Debt Service.

⁸ Completed fiber optic cable relocation of the northern segment (5.3 miles).

⁹ Includes \$26.4M in Prop 1A CTC grant funds designated directly to Caltrain.

¹⁰ Completed conceptual design.

¹¹ Completed project studies.

¹² Planned funding reflects current project definition and scope which is subject to policy decisions.

¹³ Included in Santa Clara and San Jose Diridon Station Upgrade.

¹⁴ Completed preliminary design, ridership studies and conceptual estimates.

¹⁵ Payments related to exchange of State Transportation Improvement Program (STIP) and Measure A funding approved by the Board in June 2007, December 2007 and November 2013.

2000 MEASURE A TRANSIT IMPROVEMENT PROGRAM

STATUS

Extend BART from Fremont through Milpitas to Downtown San Jose and the Santa Clara Caltrain Station

BART - Silicon Valley Program Development & Implementation

<div><div></div>BART - Silicon Valley Program Development & Implementation</div>	Ongoing
<div><div></div>Warm Springs Extension (WSX) - VTA Share</div>	Completed

BART - Silicon Valley Corridor Establishment and Maintenance

<div><div></div>Silicon Valley Corridor Establishment and Maintenance</div>	Ongoing
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BART - Silicon Valley Extension

<div><div></div>Berryessa Extension Project (SVBX Phase I)</div>	Construction
<div><div></div>Future Extension to Santa Clara (SVSX Phase II)</div>	Under Development -Awaiting Funding
<div><div></div>Newhall Maintenance Facility</div>	Under Development
<div><div></div>BART Core Systems Modifications</div>	Construction

BART - Other Supporting Projects

<div><div></div>King Road Bus Rapid Transit</div>	Ongoing
<div><div></div>Northern Light Rail Express</div>	Completed
<div><div></div>Santa Clara Pocket Track</div>	Ongoing
<div><div></div>BART Transit Integration Analysis & Improvements</div>	Ongoing
<div><div></div>N. First St. Speed Improvements & First St./Tasman Ave. Modifications</div>	Ongoing

Provide Connection from Mineta San Jose International Airport to BART, Caltrain and VTA Light Rail

<div><div></div>Mineta San Jose Airport People Mover</div>	Ongoing
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Extend Light Rail from Downtown San Jose to The East Valley

<div><div></div>Downtown East Valley Planning & Conceptual Engineering</div>	Completed
<div><div></div>Downtown East Valley Environmental & 90% CELR</div>	Ongoing
<div><div></div>Capitol Expressway Light Rail - Pedestrian Improvements</div>	Completed
<div><div></div>Capitol Expressway Light Rail - Eastridge Transit Center</div>	Completed
<div><div></div>Capitol Expressway Light Rail Phase II: Light Rail to Eastridge</div>	Ongoing

Low Floor Light Rail Vehicles

<div><div></div>Low Floor Light Rail Vehicles</div>	Completed
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Improve Caltrain: Double Track to Gilroy & Electrify from Palo Alto to Gilroy

<div><div></div>Caltrain South County Capacity Improvements</div>	Pending CA High Speed Rail (CAHSR)
<div><div></div>Caltrain Electrification/High Speed Rail</div>	Ongoing
<div><div></div>Caltrain Electrification Early Investment Program (VTA Share)</div>	Ongoing

Caltrain Service Upgrades

<div><div></div>Caltrain Service Upgrades</div>	Ongoing
<div><div></div>Caltrain Improvement Plan</div>	Completed
<div><div></div>Bike Sharing Pilot Project</div>	Completed
<div><div></div>Caltrain Mountain View Parking Structure</div>	Pending CAHSR
<div><div></div>Caltrain/Union Pacific Blossom Hill Pedestrian Grade Separation</div>	Completed
<div><div></div>Caltrain Safety Enhancements</div>	Design Complete; Pending CAHSR
<div><div></div>Santa Clara Station Pedestrian Underpass Extension</div>	Completed
<div><div></div>Santa Clara & San Jose Diridon Station Upgrades</div>	Completed

Palo Alto Intermodal Transit Center

<div><div></div>Palo Alto Intermodal Transit Center</div>	Pending CA High Speed Rail
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Improve Bus Service in Major Corridors

<div><div></div>Bus Rapid Transit Strategic Plan</div>	Ongoing
<div><div></div>Highway-Based Bus Rapid Transit Alternatives Analysis</div>	Completed
<div><div></div>Alum Rock/Santa Clara Bus Rapid Transit</div>	Completed; Closeout Ongoing
<div><div></div>Stevens Creek Bus Rapid Transit</div>	Planning - Awaiting Funding
<div><div></div>El Camino Real Bus Rapid Transit</div>	Ongoing
<div><div></div>Procurement of 40 Bus Rapid Transit Buses</div>	Ongoing
<div><div></div>Bus Rapid Transit Modifications - Chaboya & North Divisions</div>	Ongoing
<div><div></div>Money Counting Facility Replacement</div>	Closed - Not needed
<div><div></div>DeAnza College Transit Center Improvements</div>	Inactive
<div><div></div>Rapid 523 Bus Stop Improvements</div>	Ongoing
<div><div></div>Stelling Road Bus Stop Improvement</div>	Ongoing

Upgrade Altamont Commuter Express (ACE)

<div><div></div>Included in Santa Clara and San Jose Diridon Station Upgrade</div>	Completed
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Improve Highway 17 Express Bus Service

<div><div></div>Improve Highway 17 Express Bus Service</div>	Completed
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Connect Caltrain with Dumbarton Rail Corridor

<div><div></div>Dumbarton Rail Corridor</div>	Inactive
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2000 MEASURE A TRANSIT IMPROVEMENT PROGRAM

STATUS

Purchase Zero-Emission Buses & Construct Service Facilities

✓ 3 Zero-Emission Bus Procurement	Completed
✓ Zero-Emission Bus Facility Improvements	Completed

Develop New LR Corridors

● New Rail Corridors Study	Ongoing
✓ Light Rail System Analysis	Completed
✓ Southern Light Rail Express	Completed
● Light Rail Transit Extension to Vasona Junction	Ongoing
● Winchester Light Rail Double Track & Platform Extension	Ongoing
● SR 85 Major Transit Investment Study	Ongoing

Fund Operating & Maintenance Costs for Increased Bus, Rail & Paratransit Service - Ongoing



Date: April 3, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: Google North Bayshore Transportation Access Study - Draft Report

FOR INFORMATION ONLY

BACKGROUND:

The North Bayshore Transportation Access Study was conducted as a partnership between the Valley Transportation Authority (VTA) and Google (Alphabet, Inc.). It was designed to evaluate the feasibility and efficiency of transit connection with the VTA Bayshore/NASA Light Rail Transit (LRT) Station, and thereby establishing a new transportation / mass transit corridor to into the North Bayshore area. Attachment A provides the full draft report.

The purpose of this study was to identify two to three potential high-capacity transportation concepts to be carried forward and studied in more detail. The North Bayshore area has seen significant employment growth over the past 15 years, and additional employment and residential growth is planned for the future. Currently, there is no high-capacity public transit serving the North Bayshore area and many employers provide employees with premium private shuttle service.

While the initial focus of the study was to gauge the feasibility of providing an LRT extension, the study scope was expanded to evaluate a broad range of other potential transportation technologies including streetcar, bus, Bus Rapid Transit (BRT), aerial guideway technologies, and Autonomous Driving Systems (ADS) / Connected Vehicle (CV) technologies. Note: for the purpose of this memo Autonomous Driving Systems (ADS) / Connected Vehicle (CV) technologies will be referred to as Autonomous Vehicles (AVs).

After initiation of this study, the City of Mountain View announced its intention to conduct an Automated Guideway Transit (AGT) Study to look at connecting the North Bay Shore area with the Downtown Mountain View Transit Center. This study was informed by and aligned with that study.

DISCUSSION:

This study scope was divided into a four-step evaluation process: 1) Technology Screening; 2) Alignment Screening; 3) Preliminary Alternatives Screening, and 4) Final Alternatives Evaluation. Using a process of successive evaluations and consultation with project stakeholders, the study team eliminated options that were either infeasible or performed poorly in terms of meeting the study goals. The study goals include:

- Maximize ridership potential by serving existing and proposed development.
- Provide a cost-effective transportation solution.
- Minimize or avoid environmental impacts, and specifically impacts to Stevens Creek and burrowing owl habitats.
- Avoid impacts to critical NASA facilities and Army Reserve Areas.
- Provide flexibility to expand any new transportation connection to serve future travel demands and optimally integrate with complimentary projects.
- Evaluate new and emerging technologies and creative strategies to improve traditional transportation modes (such as bus and rail), and implement new forms of transportation.
- Develop phased implementation strategies that can deliver benefits near-term while defining and developing long-term improvements.

Study Steps

Step One - Technology Screening evaluated a broad range of transportation technologies, and assessed their suitability for meeting the study goals. Over 30 technologies in total were evaluated on how well they met the study criteria which included factors such as carrying capacity, scalability, reliability, and environmental factors. Out of the studied technologies, only three met all of the study criteria: LRT/Streetcars, Bus/BRT, and AV Technologies.

Step Two - Alignment Screening evaluated a wide range of potential alignments that could provide a new connection from the existing VTA LRT station at Bayshore/NASA to North Bayshore. These alignments were evaluated on a number of criteria including constructability, cost, land use impacts, and environmental impacts. After this analysis, four alignments were carried forward; two based on an RT Jones Road alignment and two based on an alignment Highway 101. A map of these alignments is provided as Attachment B.

Step Three - Preliminary Alternatives Screening combined the three technologies from step one and the four alignments from step Two into a set of twelve alternatives. These alternatives were evaluated on additional criteria including cost effectiveness, estimated right-of-way acquisition, potential speed and frequency, and sensitive receptor impacts. Of these 12 alternatives only 4 were found to warrant further analysis, AV's on the Highway 101/North Bayshore Alignment, and AV's, LRT, and Bus/BRT on the RT Jones Road Alignment.

Step Four - Final Alternatives Evaluation took the four alternatives identified in Step Three and developed more specific capital cost estimates, operating parameters, and recommended phasing plans for improvements. All of the alternatives considered in Step Four had already been screened for initial feasibility as part of Step Three, therefore the Step Four alternatives were evaluated more generally based on how well they could potentially meet the following primary evaluation criteria:

- Cost Effectiveness and Feasibility
- Enhance Mobility and Access
- Minimize Impacts and Support Community Goals

In the end, three potential alternatives (i.e., transportation technology plus alignment) are recommended for further study.

In the near term, this study recommends a hybrid option of Buses and AVs on the RT Jones Alignment. Beginning with traditional bus technologies would allow for a mass transportation service to be implemented in the near term, and then AVs (both public and private) could gradually be phased in while the initial buses serving this corridor would be gradually phased out. This study acknowledges that AV technology is not currently ready to allow for a fully autonomous, no human intervention required, AV network for mass transportation. However, AV technology, and the necessary supporting policy frameworks, is advancing very rapidly, and AV technologies could offer significant safety and efficiency even without fully autonomous operations.

In the long term, this study recommends AVs along the RT Jones alignment, or LRT if the demand warrants the need for higher capacity vehicles. However, it should be noted that an LRT option may result in slower operating speeds, higher ongoing operating and maintenance costs, and more restrictive operating flexibility and scalability, than the phased implementation strategies offered by a bus / AV option.

In the long term, AVs could also offer a number of operational and infrastructure related benefits to the North Bayshore area. Guideways or corridors built specifically for AV operations could allow for narrower travel lanes, less intrusive lighting, and other potential changes which could maximize operational efficiency, offer a highly competitive alternative to single occupant vehicles, and reduce environmental impacts to sensitive habitats. Further study of the AV alternative serving the Highway 101 adjacent alignment is also recommended. As the land use and travel needs of this area change additional mass transportation technologies and alignments may be needed to serve this area.

The study also recognizes that increasing demand over time, potential changes in rail operations (such as automation), and possibly other changes to VTA's LRT network, may ultimately warrant the high capital and operating costs of a new LRT line. Additional study of rail options could better estimate the need for and value of extending LRT into the North Bayshore Area.

Additionally, a series of infrastructure improvements are recommended to serve the future needs of the Project area. Infrastructure improvements include: A bridge crossing of Stevens Creek

connecting Charleston Road and Allen Road, and transit centers at the Bayshore/NASA LRT station and Moffett Boulevard Interchange.

At the committee meeting, staff will provide a presentation of the study process and findings. While the report is presented for information, comments and feedback are welcomed.

Next Steps

Google will review the study findings and recommendations and will determine how to move forward with additional design and engineering.

Prepared By: Chris Augenstein
Memo No. 6137



North Bayshore Transportation Access Study

Final Draft Report, December 2017

Prepared by the Valley Transportation Authority (VTA), in conjunction with the City of Mountain View

Sponsored by Google, Inc.

Contents

1.	Introduction	4
1.1.	Study Purpose and Need	5
1.2.	Study Goals and Process	5
1.3.	Study Area	6
1.4.	Project partners/stakeholders.....	8
2.	North Bayshore Existing Conditions	9
2.1.	Geographical Setting	9
2.2.	Transportation Network	9
2.3.	Local Land Use and Transportation Plans	10
2.4.	NASA/Ames Research Center Site Visit	10
3.	Alternatives EVALUATION & Screening Process	12
4.	Step 1 Evaluation: Technology Screening	13
4.1.	Step 1 screening results.....	13
5.	Step 2 Evaluation: Alignment Screening.....	18
5.1.	Alignments Considered.....	18
5.2.	Evaluation Criteria	18
5.3.	Step 2 Evaluation Screening Results.....	27
6.	Step 3 Screening: Alternatives Screening	32
6.1.	Alternatives Considered	32
6.2.	Evaluation Criteria	33

6.3.	Step 3 Evaluation & Screening Results	35
7.	Step 4: Final Alternative evaluation.....	41
7.1.	Automated Vehicle Assumptions	42
7.2.	Alternatives Evaluated.....	44
7.3.	Step 4 Evaluation Screening Results.....	56
8.	Recommendations	63
8.1.	Near-Term Recommendation: Automated Vehicle and Bus Hybrid Option, RT Jones Alignment.....	63
8.2.	Long-Term Recommendation: Automated Vehicles, Highway 101 alignment	64
8.3.	Long-Term Recommendation: Light Rail, RT Jones Alignment	64
8.4.	Infrastructure Improvement Recommendations	65
8.5.	Next Steps	65

1. INTRODUCTION

The North Bayshore study area is located in northern Santa Clara County, primarily within the jurisdiction of the City of Mountain View. It is characterized by an intense concentration of high-tech jobs, and is the home of Google, LinkedIn, Inuit, and other high-tech companies. It is a rapidly growing and geographically isolated area with limited transportation access, and serving this area with traditional fixed-route public transit is especially challenging. Due to substantial and rapid job growth over the last ten years, this area experiences a high level of traffic congestion, both getting into the area and circulating within the area. With the ongoing job growth and potential addition of thousands of new housing units, transportation will continue to be a major concern if new travel options are not identified and implemented.

This study was initially designed to evaluate the feasibility and efficiency of bringing Light Rail Transit (LRT) into the North Bayshore area through a connection with the VTA Bayshore/NASA Light Rail Station and the North Bayshore area, with a terminus focus on the intersection of Charleston Road and North Shoreline Boulevard. However, in the event that Light Rail was found to be infeasible, or impractical, a broad range of other potential transportation technologies were evaluated including streetcar, bus, Bus Rapid Transit (BRT), aerial, and autonomous/connected vehicle (AV) technologies. This report explains the process and outcomes of the evaluation undertaken as for this study, and provides recommendations for concepts that should be considered and studied further.

Traditional mass transit such as LRT, BRT, and Personal Rapid Transit (PRT) systems require some form of exclusive, dedicated guideway, and all PRT systems require a completely separate system (i.e., they can't operate on traditional road or rail lines) and special vehicles to traverse that guideway. Because of these limitations of traditional technologies, it became clear early in the study process that using AVs as a mass transportation solution should be evaluated in the study.

The evaluation of AVs in this study is based on the assumptions that AVs can 1) be implemented gradually; 2) operate on a traditional street network or on dedicated guideways; 3) transport passengers directly to their ultimate destinations, and 4) operate in groups or "consists"¹ that would provide operating efficiencies and benefit from some form of exclusive/dedicated operating environment.

¹ The rolling stock of a railroad, exclusive of the locomotive, making up a train

Moreover, for the purposes of this study AVs are assumed to be “smart” vehicles which are capable of recognizing, communicating and linking (to share operational and other information) with other nearby vehicles in common corridors. This study assumes that ultimately AVs will be capable of communicating key data with other vehicles such as speeds, upcoming hazards, and proximity to other vehicles and surroundings, and other capabilities needed for safer and more efficient operations. In addition, these vehicles could also operate as an on-demand service where vehicles could be requested at specific times and locations for pick up and drop off service. This would allow shared operations with other modes, seamless integration with smart parking systems, and other advanced operating features.

1.1. Study Purpose and Need

The purpose of this study was to identify two or three potential high-capacity transportation concepts that would connect North Bayshore (the intersection of Charleston Road and North Shoreline Boulevard) and the Bayshore/NASA VTA Light Rail Station. Should VTA and its partners decide to further pursue transportation improvements in this area, the outcomes of this study will form the basis for further, more detailed studies and analyses that could result in project development, construction, and operations.

The North Bayshore area has seen significant employment growth over the past 15 years, and additional employment and residential growth is planned for the future. Currently, there is no high-capacity public transit serving the North Bayshore area. Employers provide employees with private shuttles and there is limited local public bus and shuttle service. Given the limited public transit options currently available in the North Bayshore area, the continuing growth in North Bayshore, and the future LRT connection to BART in Milpitas, the time is right to consider options for high-capacity transportation improvements between North Bayshore and areas to the south and east.

1.2. Study Goals and Process

The primary goals for a new, high-capacity transportation improvement connecting North Bayshore with the Bayshore/NASA VTA light rail station were defined as follows:

- Maximize ridership potential by serving existing and proposed development.
- Provide a cost-effective transportation solution.

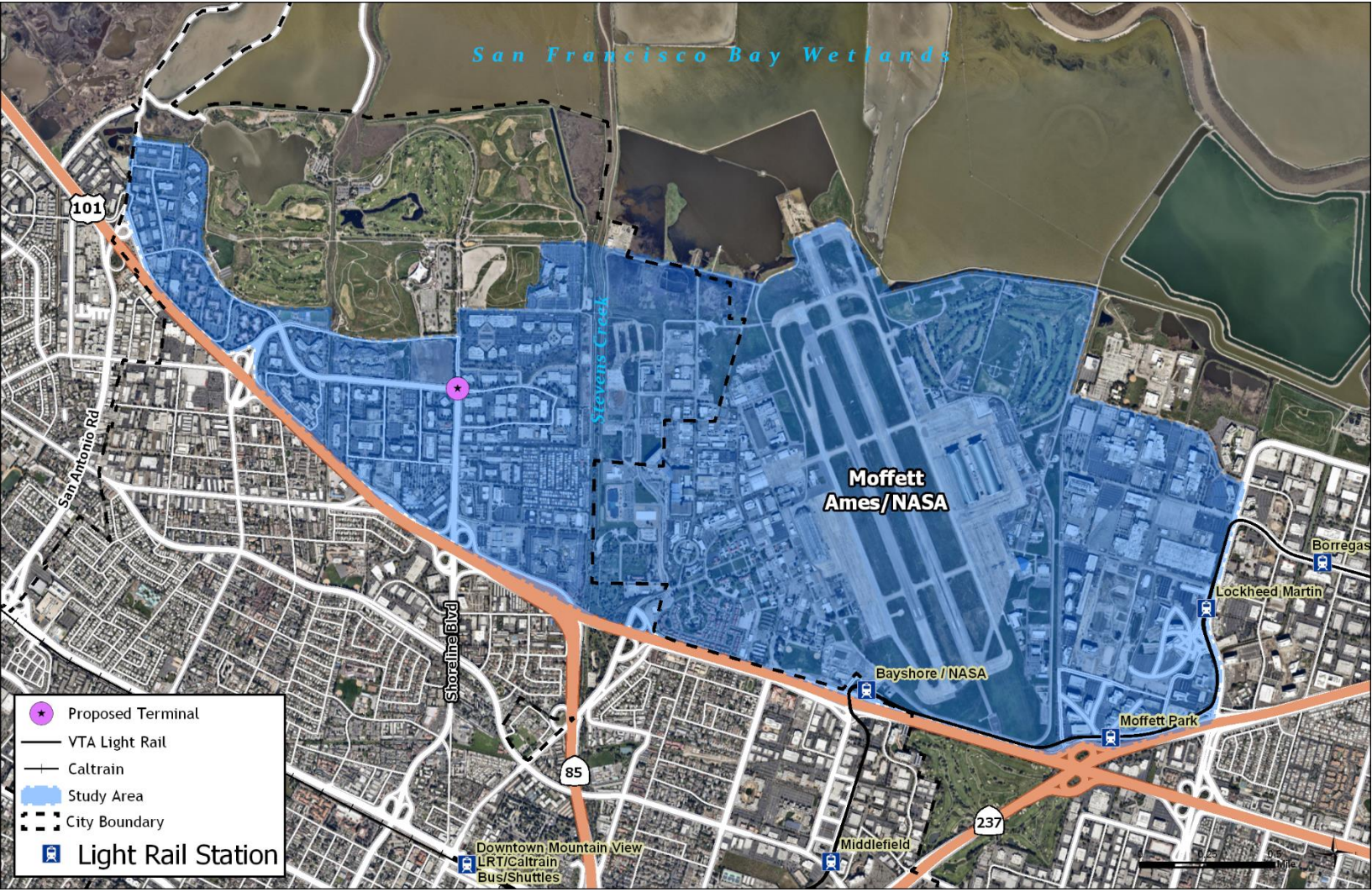
- Minimize or avoid environmental impacts, and specifically impacts to Stevens Creek.
- Avoid impacts to critical NASA facilities and Army Reserve Areas.
- Provide flexibility to expand any new transportation connection to serve demands that may arise in the future and optimally integrate with complementary projects.
- Evaluate new and emerging technologies and creative strategies, to modify / improve traditional transportation modes (such as bus and rail), implement new forms of transportation - such as partially and fully automated cars and buses, and personal transport vehicles such as peddle and powered bicycles.
- Develop phased implementation strategies that can deliver benefits near-term while defining and developing more long-term improvements.

1.3. Study Area

The main focus of the study was on potential high-capacity transportation connections between the Bayshore/NASA VTA Light Rail Station and the intersection of Charleston Road and North Shoreline Boulevard. However, early in the process the study area was broadened to include the North Bayshore Precise Plan Area, the NASA/Ames Research Center (including Moffett Airfield), bordered by Stevens Creek, US 101, and Enterprise Way. Figure 1.1 shows the study area.

This study also considered expanding the scope to include the Moffett Park vicinity and the Downtown Mountain View Transit Center. However, it was decided that the study area should remain as originally defined with one exception; that an alignment via Java Drive / Lockheed Martin Way traversing north of the Moffett Field runway be included in the initial alignment conceptual analysis.

Figure 1.1 – Study Area



1.4. Project partners/stakeholders

Project stakeholders include VTA, the City of Mountain View, Google, Microsoft, LinkedIn, and Intuit. In addition, a Technical Working Group was formed to provide project input during various phases of the study. The Working Group consisted of the stakeholders listed above and added the Audubon Society, and NASA/AMES. The Working Group met three times during the course of this study, and conducted field studies of the study area.

Project Partners and Stakeholders

- Valley Transportation Authority (VTA)
- City of Mountain View
- Google (Alphabet, Inc.)
- Microsoft
- Intuit
- NASA
- Silicon Valley Audubon Society
- Fehr & Peers

Stakeholder Meeting Dates

- November 3
- November 18
- December 20

2. NORTH BAYSHORE EXISTING CONDITIONS

2.1. Geographical Setting

The study area's geographical limits include a northern boundary of park and wetland, an eastern boundary of Federal lands and the NASA/AMES Research Facilities / Moffett Federal Airfield, and to the south and east the Highway 101 corridor. Due to the combination of these geographical constraints, difficult street configuration, limited access points, and distance from core transit services (Caltrain commuter rail, VTA light rail, and core bus lines), this area has historically been difficult to serve with traditional fixed-route public transit. Also of note is the presence of the Shoreline Amphitheatre and Shoreline Golf Links to the north. The latter were not addressed in this study due to the generally intermittent and off-peak nature of trip demand for these facilities.

2.2. Transportation Network

VTA Light Rail and Caltrain stations are located in Downtown Mountain View, about two miles south of the center of the study area at Charleston Road and North Shoreline Boulevard. The Bayshore/NASA Light Rail station is located in the southeastern section of the project area, at approximately the same distance as the Mountain View Transit Center.

Bike and Pedestrian access to the area is available via the Stevens Creek and Permanente Creek Trails. There are also planned Bike/Pedestrian improvements to North Shoreline Blvd., as identified in the City of Mountain Shoreline Boulevard Corridor Study (2014) and the North Bayshore Precise Plan (2014).

The street network design complicates roadway access options, and there are few vehicular access points into the North Bayshore area. Generally the freeway access includes the Highway 101/North Shoreline Boulevard Interchange, Highway 101/Rengstorff Avenue Interchange, and Highway 101/San Antonio Road Interchange; all three are heavily congested during commute periods. Vehicles can access the North Bayshore area via Shoreline Boulevard, Rengstorff Avenue, and San Antonio Road. Shoreline Boulevard is the primary access road connecting North Bayshore to the Downtown Mountain View Transit Center, and is extremely congested during commute periods.

2.3. Local Land Use and Transportation Plans

Several local land use and transportation plans were assessed and information from those were entered into the project Geographic Information System (GIS) database for analysis in the study.

Key plans evaluated include:

- North Bayshore Precise Plan (2014)
- NASA/Ames Development Plans (2002)
- The Shoreline Transportation Study (2013)
- The Shoreline Boulevard Corridor Study(2014)
- Mountain View Pedestrian Master Plan (2014)
- Mountain View Bicycle Transportation Plan Update (2015)

Key development plans from local employers were also considered, including the proposed Google site at Bayview. The Google Bayview site is located east of Stevens Creek, northwest of the NASA/Ames facility. RT Jones Road, the only road accessing the site, was widened to 2 lanes in each direction in 2016/17.

Lastly, in early 2017, the City of Mountain View began a study of an Automated Guideway Transit (AGT) connection between the Downtown Mountain View Transit Center and North Bayshore area. A study session was held in May 2017, and another in October 2017. The AGT study corridor is generally along North Shoreline Boulevard with a terminus at Charleston Road. The AGT study has been coordinated with this study to the extent possible, and is a consideration in future studies recommended in this report.

2.4. NASA/Ames Research Center Site Visit

As initial conceptual alignments were being studied, the project team recognized that to fully understand local opportunities and constraints, direct input from NASA/Ames staff was required. A site visit of the facility, led by NASA/Ames staff, was held on June 21st, 2016, and included staff participation from Google, the City of Mountain View, and VTA. Key findings from this site tour include:

- Significant Wetlands are located within the site including the Stevens Creek Shoreline Nature Study Area.

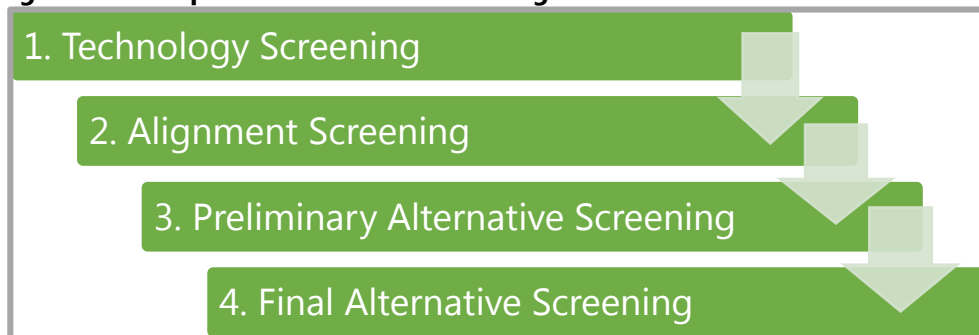
- A very high water table exists throughout the NASA/Ames site, especially in the northern section of the site bordering the wetlands / nature preserve areas.
- Significant areas of the site include protected habitats, specifically Burrowing Owl nesting and habitat areas.
- Several Superfund Site/Contaminated Soils areas are located within the site, and have different responsible parties including NASA, the Navy, and others.
- A Historic District located is located within the site, and includes multiple buildings listed on the national historic registry.
- A Runway Protection Area within the takeoff and landing approaches (generally north and south of the runway) prohibits permanent structures above ground level, including the poles, lines, and trackway structures that would be associated with light rail.
- The NASA/Ames research facility includes many buildings that house equipment sensitive to noise and vibration impacts.
- The NASA/Ames Development Plan includes the identification of areas for future development, including areas identified for future housing.
- NASA/Ames has strict security protocols requiring security checks at gates by visually checking identification. These protocols limit the potential and value of stops/stations within the site – and therefore the alignment options through the site - because they would increase travel time since riders entering the property would need to go through a similar screening process.
- The widening of RT Jones Road, from two lanes to four lanes, makes it more suitable for use as a mass transportation corridor. In addition, it may be possible to expand the usable space in this corridor by eliminating the center median and/or widening the roadway to the west. This type of question would be addressed in further, more detailed, planning and engineering studies.

3. ALTERNATIVES EVALUATION & SCREENING PROCESS

To develop a final set of alternatives, the study was organized into four evaluation steps, as shown in Figure 3.1. below. First, a wide range of potential transportation technologies and alignments were identified and assessed. More than 30 types of transportation technologies and more than ten alignment options were evaluated and screened over the four study phases. Using a process of successive evaluations and consultation with project stakeholders, the study team eliminated options that were either infeasible or performed poorly in terms of meeting the study goals.

The Step 1 Evaluation screened potential technologies, and Step 2 screened potential alignments. The results of the Step 1 and Step 2 Evaluations were then combined into a set of preliminary alternatives that were further screened in Step 3. Finally, the Step 4 Evaluation screened a final set of alternatives with the purpose of identifying two to three potential alternatives that were viable and warranted further study through more detailed planning, design, engineering, and environmental review efforts.

Figure 3.1 – Steps in Evaluation & Screening Process



4. STEP 1 EVALUATION: TECHNOLOGY SCREENING

The Step 1 Evaluation Technology Screening included an examination of a broad range of technologies to determine what could be both viable and reasonable for connecting a large number of passengers from the Bayshore/NASA Light Rail station to the North Bayshore Area. This evaluation focused on three categories of technologies:

- Primary technologies (Table 4.1) which included traditional transportation technologies such as bus and rail;
- Secondary technologies (Table 4.2) which included smaller sized technologies which traditionally have been associated more with personal transportation such as bikes, electric bikes, motorcycles, skateboards, and Segway's, and;
- Tertiary Technologies (Table 4.3) which included modes which do not fall into either the primary or secondary technology definitions listed above, such as personal and high-capacity aircraft.

Each technology was evaluated based on how well they met six criteria: Carrying Capacity, Travel Time, Scalability, Reliability, Technology Readiness, and Environmental Factors. Each Technology was scored for each criterion based on whether they met, possibly met, or does not meet the needs of each criterion. In some instances with the Tertiary technologies there was not enough information to determine an accurate score for some criteria. In addition, the practical reality of the cost to operate and maintain a particular technology, such as bus or light rail, was factored into the analysis.

4.1. Step 1 screening results

Out of the Primary technologies, the highest scoring alternatives, Interlined Light Rail (and Streetcars), BRT (and traditional bus) in general purpose and dedicated lanes, and AVs in general purpose and dedicated guideways were moved forward into the Step 2 screening.

All Secondary technologies were dropped from consideration because they do not adequately provide a fast and reliable mass transportation connection for the number of people expected to be served in this area. These technologies could help serve as a first/last mile connection and could be used in conjunction with any final technologies recommended by this study, and walking and biking options should be explored in conjunction with the further study and implementation of a Primary technology.

While the tertiary technologies may prove to be viable mass transportation technologies in the near-to-mid future, they have not been developed to a point where the scope of this study could evaluate them with a high level of credibility. For this reason, the Tertiary technologies were dropped from further consideration in this study. However, given the rapid growth of technological innovation, these technologies should be periodically reassessed for feasibility within this, or any other study area.

Table 4.1 - Primary Technologies

	Mode / Mechanism	Potential Carrying Capacity	Competitive Travel Time	Expandability/ Scalability	Reliability	Technology/ Mode Readiness	Environmental Factors
Primary	Light Rail	See light rail types below					
	Interlined with existing LRT line						
	Shuttle requiring transfer at Bayshore/NASA LRT						
	Streetcars in mixed traffic						
	Bus	See bus types below					
	Shuttles in mixed flow						
	BRT in dedicated lanes						
	Driverless / AVs	See driverless / autonomous types below					
	vehicles in mixed flow						
	vehicles in dedicated guideway						
	Commuter Rail (e.g. Caltrain)	See commuter rail types below					
	Bus connector shuttles						
	Spur line						
	Hovercraft						
	Monorail						
	Aerial Tramway						

Green=High, Yellow=Medium, Orange=Low, Red=Very Low, Grey=Not Enough Information

Table 4.2 - Secondary Technologies

	Mode / Mechanism	Potential Carrying Capacity	Competitive Travel Time	Expandability/ Scalability	Reliability	Technology/ Mode Readiness	Environmental Factors
Secondary	Bike pedal	Red	Red	Red	Green	Green	Green
	Bike motorized	Red	Red	Red	Green	Green	Green
	Motorcycles	Red	Yellow	Red	Green	Green	Yellow
	Motorcycles with sidecars	Red	Yellow	Red	Green	Green	Yellow
	Trikes	Red	Red	Red	Green	Green	Green
	Scooters (various designs)	Red	Red	Red	Green	Green	Green
	Walking	Red	Red	Red	Green	Green	Green
	Moving / High-Speed Walkway	Red	Red	Red	Green	Green	Green
	Electric Skateboard	Red	Red	Red	Green	Green	Green
	Segway	Red	Red	Red	Green	Green	Green
	Mini-Segway	Red	Red	Red	Green	Green	Green
	Self-balancing scooters	Red	Red	Red	Green	Green	Green

Green=High, Yellow=Medium, Orange=Low, Red=Very Low, Grey=Not Enough Information

North Bayshore Transportation Access Study

Table 4.3 - Tertiary Technologies

	Mode / Mechanism	Potential Carrying Capacity	Competitive Travel Time	Expandability/ Scalability	Reliability	Technology/ Mode Readiness	Environmental Factors
Tertiary	Aircraft						
	Helicopter						
	Dirigible / Blimp						
	Personal aircraft						
	Other Aircraft						
	Automated drones						
	Hovering craft						
	Hover Bikes						
	Moller Skycar						
	Flying cars						
	Flying motorcycles						

Green=High, Yellow=Medium, Orange=Low, Red=Very Low, Grey=Not Enough Information

5. STEP 2 EVALUATION: ALIGNMENT SCREENING

A wide range of alignment options were considered that could potentially provide a new connection from VTA's existing light rail service at the Bayshore/NASA LRT station to the interior focal point within the North Bayshore area; the intersection of Charleston Road and North Shoreline Boulevard. After identifying a number of possible alignment options, each alignment was evaluated based on potential construction-related issues, consistency with previously completed environmental studies, and potential impacts to existing and planned land use. Alignments eliminated from consideration include those that would likely be infeasible, have significant negative impacts, or would be less desirable due to very high construction costs.

In addition to reviewing existing plans and studies, meetings were also held with representatives from NASA, the Audubon Society, the City of Mountain View, and employers and landowners within the study area. These meetings were invaluable for understanding potential issues and concerns regarding the potential alignment options.

5.1. Alignments Considered

Six initial alignment options were evaluated in the alignment screening analysis, as shown in Figure 5.1. Alignments were evaluated based on the criteria described in the following section. Although the alignments vary in location and length, they all connect the existing Bayshore/NASA LRT Station with the North Bayshore focus area. Ultimately, four alignments were carried forward to the next step of the evaluation and screening process, which combined the final alignments and technologies into an initial set of conceptual project alternatives. It should also be noted that later phases of study revealed opportunities that were not considered as part of the original scope; for example, the possibility of utilizing Moffett Boulevard as another key node in the study area. Consequently, this and other opportunities receive additional discussion in later parts of this report.

5.2. Evaluation Criteria

The study used constructability, cost, and environmental impacts to complete a fatal flaw analysis of the proposed alignments, eliminating those that were potentially infeasible, did not address project goals, or had a relatively low cost-benefit ratio compared to other options.

Figure 5.1 - Initial Alignments



5.2.1. Constructability

Alignments were evaluated based on potential physical and environmental constraints affecting the construction of new transportation infrastructure along the given alignment. For example, some alignments were deemed infeasible due to high groundwater levels, impacts to the NASA/Ames runway protection zone, potential habitat intrusions, or a combination of these and other constraints.

5.2.2. Cost

Alignments were evaluated based on potential costs associated with implementing new transportation infrastructure on a given alignment. Some alignments had higher potential construction costs than others due to the location of existing infrastructure and land uses. For example, an alignment located within a spatially constrained built environment had higher costs due to the need for possible grade separations and right-of-way acquisitions.

5.2.3. Environmental and Land Use Impacts

The following environmental impacts along each alignment were considered:

- **Historic Zone:** The area in the NASA/Ames campus bounded by Cummins Avenue to the east, Bushnell Road to the north and Wescoat Road to the south is considered historically significant, and therefore presents limitations for new transit infrastructure in that area. (See Figure 5.2)
- **Burrowing Owl Habitat:** The NASA/Ames campus has significant existing owl nesting habitat for Burrowing Owls, as shown in Figure 5.3. Several locations throughout the area are designated burrowing owl preserves in which development is prohibited. Others are designated owl habitats in which development is restricted. Alignments were evaluated according to their proximity to burrowing owl preserves and habitats.
- **Floodplain:** The water table in the project area is high, with a range of 0-10 feet to first groundwater, as shown in Figure 5.4. Therefore, alternatives that required tunneling were evaluated negatively due to the related cost implications.
- **Vapor Intrusion/Superfund Sites:** All alternatives travel through an area requiring soil remediation if the soil is disturbed. (See Figure 5.5)
- **Runway Protection Zone (RPZ):** The Moffett Federal Airfield is a military airport located east of the North Bayshore area. As shown in Figure 5.6, the areas north and south of the

airfield are RPZs, and the areas at each end of the runway also have restrictions. As defined by the Federal Aviation Administration, “Runway Protection Zones are a trapezoidal area ‘off the end of the runway end that serves to enhance the protection of people and property on the ground’ in the event an aircraft lands or crashes beyond the runway end. Runway Protection Zones underlie a portion of the approach closest to the airport.”² Land uses within RPZs are generally restricted to uses that do not involve congregations of people or construction of buildings or other improvements that may be obstructions.

- **Stakeholder Support and Site Security:** Several property owners in the project area restrict access to their sites for security purposes, including NASA/Ames, Google, Inc. (Alphabet, Inc.), and the Army/Army Reserve. Key considerations for evaluating alignments for stakeholder support were the alignments’ location within or outside of an existing secured perimeter.
- **Noise and Vibration:** There are a number of uses within the project area that are sensitive to noise and vibration impacts related to large infrastructure construction, and possible rail operations.
- **Impacts to Existing Transportation Facilities:** Each alignment was evaluated for potential impact to existing transportation infrastructure. Specifically, alignments located on or near an already congested street network or those that would intersect with many existing intersections scored poorly.

² <https://portal.hud.gov/hudportal/documents/huddoc?id=airportdivision.pdf>

Figure 5.2 - Historic Zone

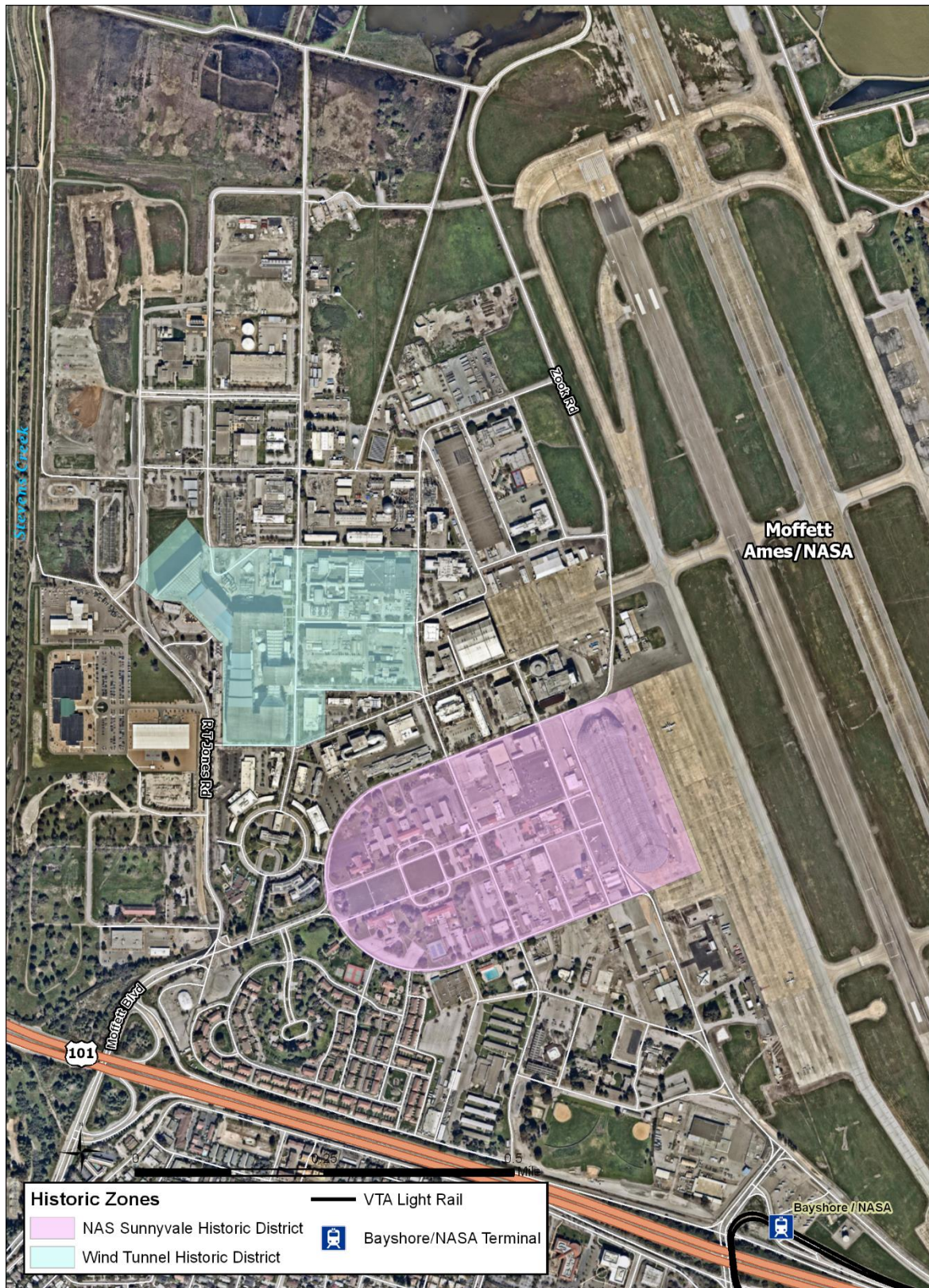


Figure 5.3 - Burrowing Owl Habitat



Figure 5.4 - Floodplain

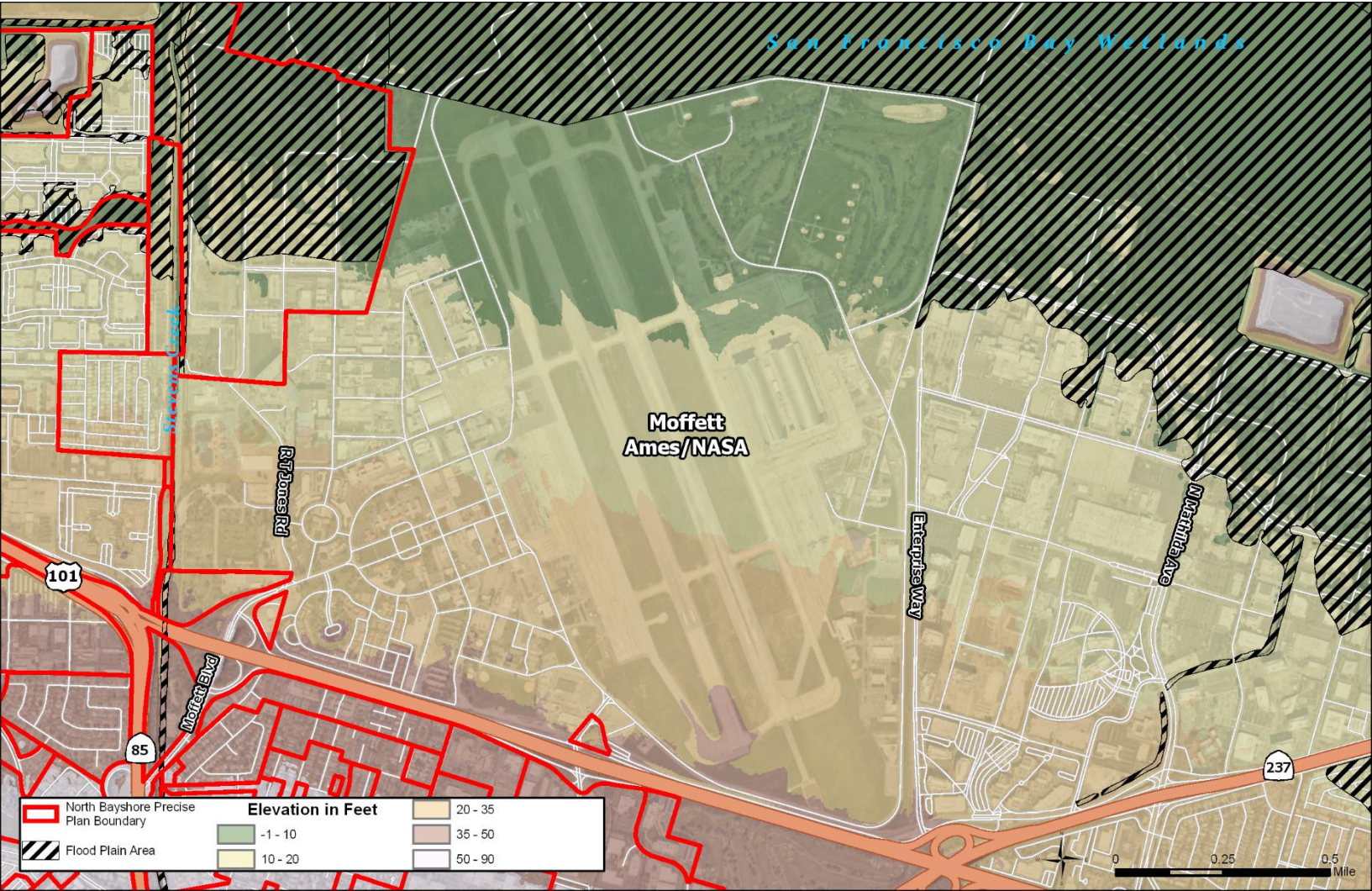


Figure 5.5 - Vapor Intrusion Area

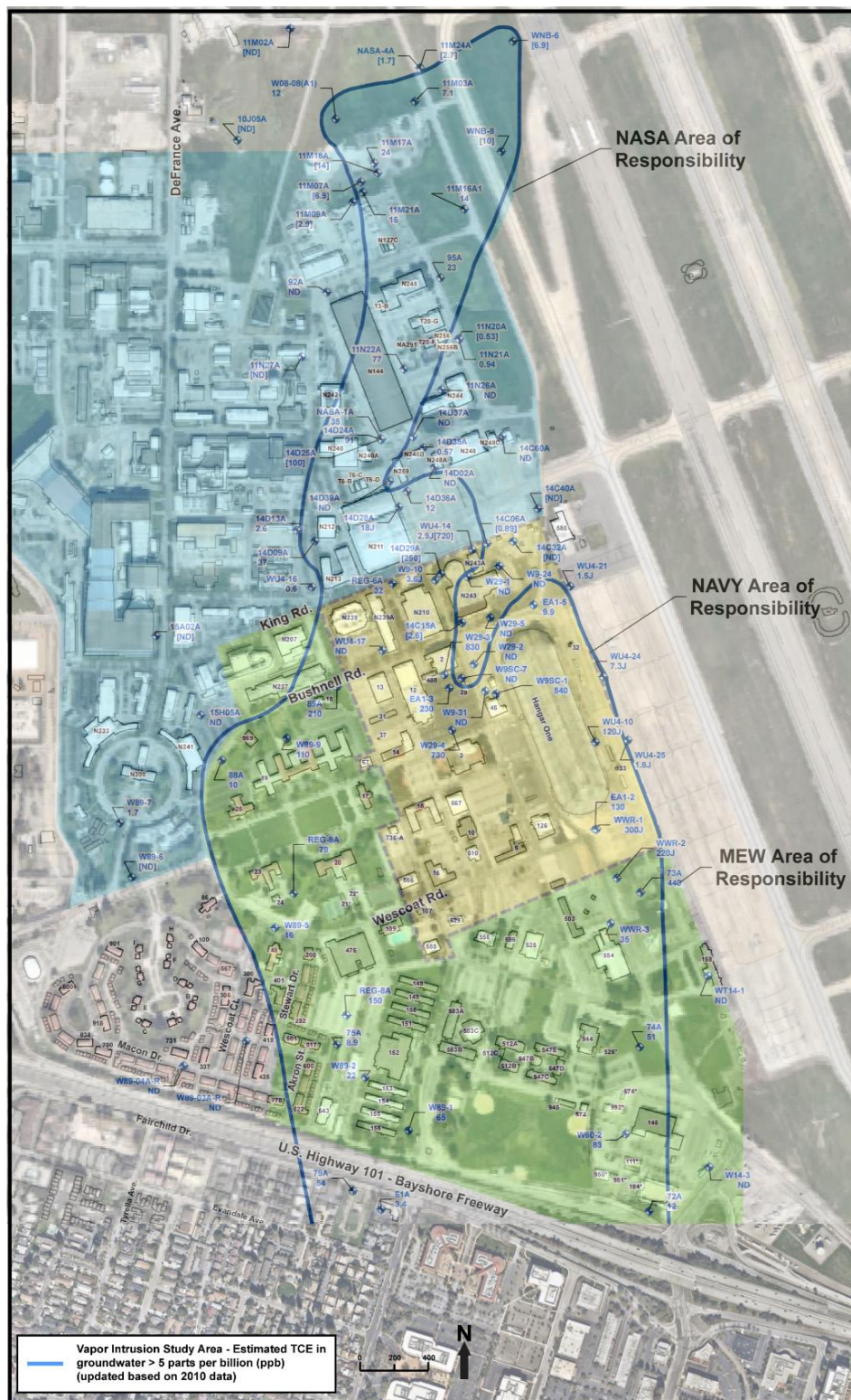


Figure 5.6 - Runway Protection Zone



5.3. Step 2 Evaluation Screening Results

Out of the six alignments evaluated, three were eliminated, and three were retained / modified and carried forward into the Step 3 Evaluation Screening which combined both the top-ranked alignments and top-ranked technologies.

5.3.1. Alignments Eliminated

The three alignments, shown in Figure 5.7. (Page 30), were eliminated from further consideration. The key factors leading to elimination are summarized below.

- **Alignment C:** shown in light blue, was proposed as a tunnel underneath the NASA property. It was eliminated due to the high cost and technical difficulties associated with tunneling under NASA's property near the historic district, wind tunnel, and other vibration-sensitive facilities, as well as the potential impacts tunneling would have during construction.
- **Alignment E:** shown in red, is located in the floodplains and on an already raised roadway. Furthermore, the location of this alignment would likely obstruct access between the runway, hangars, and other maintenance facilities, and have unacceptable construction impacts. For these reasons this alignment was eliminated.
- **Alignment F:** shown in dark blue, was eliminated due to its location within the floodplains, its circuitous route, and NASA's preference for other alignments. It is also within the Runway Protection Zone.

5.3.2. Alignments Retained / Modified

The three remaining alignments were retained and modified in order to address particular issues that were identified during the evaluation process. As a result, the four alignments described below and illustrated in Figure 5.8 were carried forward into the Step 3 Evaluation Screening.

- **Alignment 1: US 101/North Bayshore:** This alignment was modified from the Step 2 Alignment A, which traveled along North Shoreline Boulevard. This alignment would travel along a new roadway adjacent to US 101 from the Bayshore/NASA LRT station to Inigo Way. To avoid conflicts with the Highway 85 interchange and the US 101 ramps at North Shoreline Boulevard, the portion of the roadway between Moffett Boulevard and Inigo Way would likely need to be grade separated. Since the alignment could potentially introduce additional traffic to already congested North Shoreline Boulevard, it was modified so that the new alignment - Alignment 1 - would travel along new roadways that have been proposed between Inigo Way and Charleston Road as part of the City of Mountain View's North Bayshore Precise Plan. These new roadways would

essentially parallel North Shoreline Boulevard, but would have several turns along the way in order to avoid existing buildings and/or development sites.

- **Alignment 2: US 101/RT Jones:** Alignment B was modified so that two different alignment options were created between RT Jones and the Bayshore/NASA VTA LRT Station. Alignment 2 would travel along a new roadway adjacent to US 101 from the Bayshore/NASA VTA LRT station to RT Jones Road. It would then travel north along RT Jones Road and Wright Avenue to Charleston Road. Charleston Road would need to be extended east over Stevens Creek via a bridge to intersect with Wright Avenue. The alignment would then follow Charleston Road west to its intersection with North Shoreline Boulevard.
- **Alignment 3: NASA Core/RT Jones:** Alignment 3 is a modification of Alignment B, and would travel north from the Bayshore/NASA LRT station along the western edge of Moffett Field to North Akron Road. From there it goes through the NASA/Ames campus, including the historic district, to RT Jones Road, where it then follows the same path as Alignment 2.
- **Alignment 4: Moffett Field/Allen Road:** Alignment 4 is a slightly modified Alignment D. Like Alignment 3, this alignment would travel from the Bayshore/NASA LRT station along the western edge of Moffett Field continuing north along Zook Road to Pollack Road. It then travels west to Charleston Road, requiring a new roadway connection with Allen Road and Pollack Road, and Charleston Road to Allen Road over Stevens Creek. It would follow the same path as Alignments 2 and 3 from the northwest corner of the NASA campus to the terminus at Charleston Road and North Bayshore Boulevard.

Table 5.1 provides a summary of the transitions from Step 1 to Step 4

Table 5.1 – Step 2 Alignments

Step 2 Evaluation		Renumbering	Step 3 Evaluation			Step 4 Final Score	
Alignment A	Modified and Carried Forward	Alignment A > Alignment 1	Alignment 1	1A.1: Light Rail	Eliminated		
				1A.2: Light Rail	Carried Forward	Alternative 1A	55
				1B: BRT	Carried Forward	Alternative 1D	70
				1C: Avs	Carried Forward	Alternative 1B (At-Grade)	75
						Alternative 1C (Exclusive)	57
Alignment B	Modified and Carried Forward	Alignment A > Alignment 2 and Alignment 3	Alignment 2	2A.1: Light Rail	Eliminated		
				2A.2: Light Rail	Eliminated		
				2B: BRT	Eliminated		
				2C: Avs	Carried Forward	Alternative 2A (At-Grade)	75
			Alignment 3			Alternative 2B (Exclusive)	66
				3A.1: Light Rail	Eliminated		
				3A.2: Light Rail	Eliminated		
				3B: BRT	Eliminated		
				3C: Avs	Eliminated		
Alignment C	Eliminated						
Alignment D	Modified and Carried Forward	Alignment D > Alignment 4	Alignment 4	4A.1: Light Rail	Eliminated		
				4A.2: Light Rail	Eliminated		
				4B: BRT	Eliminated		
				4C: Avs	Eliminated		
Alignment E	Eliminated						
Alignment F	Eliminated						

Figure 5.7 - Alignments Eliminated

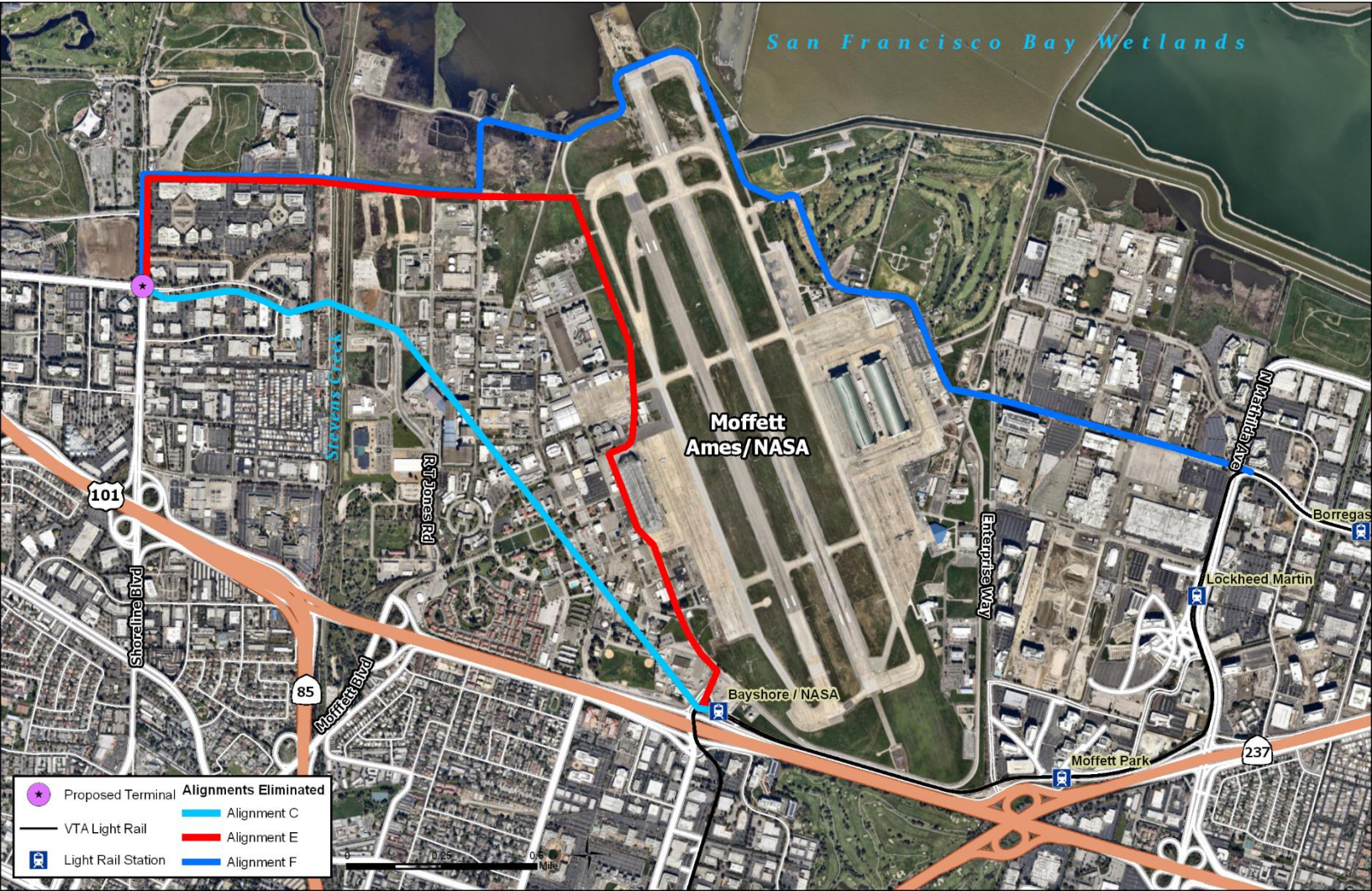
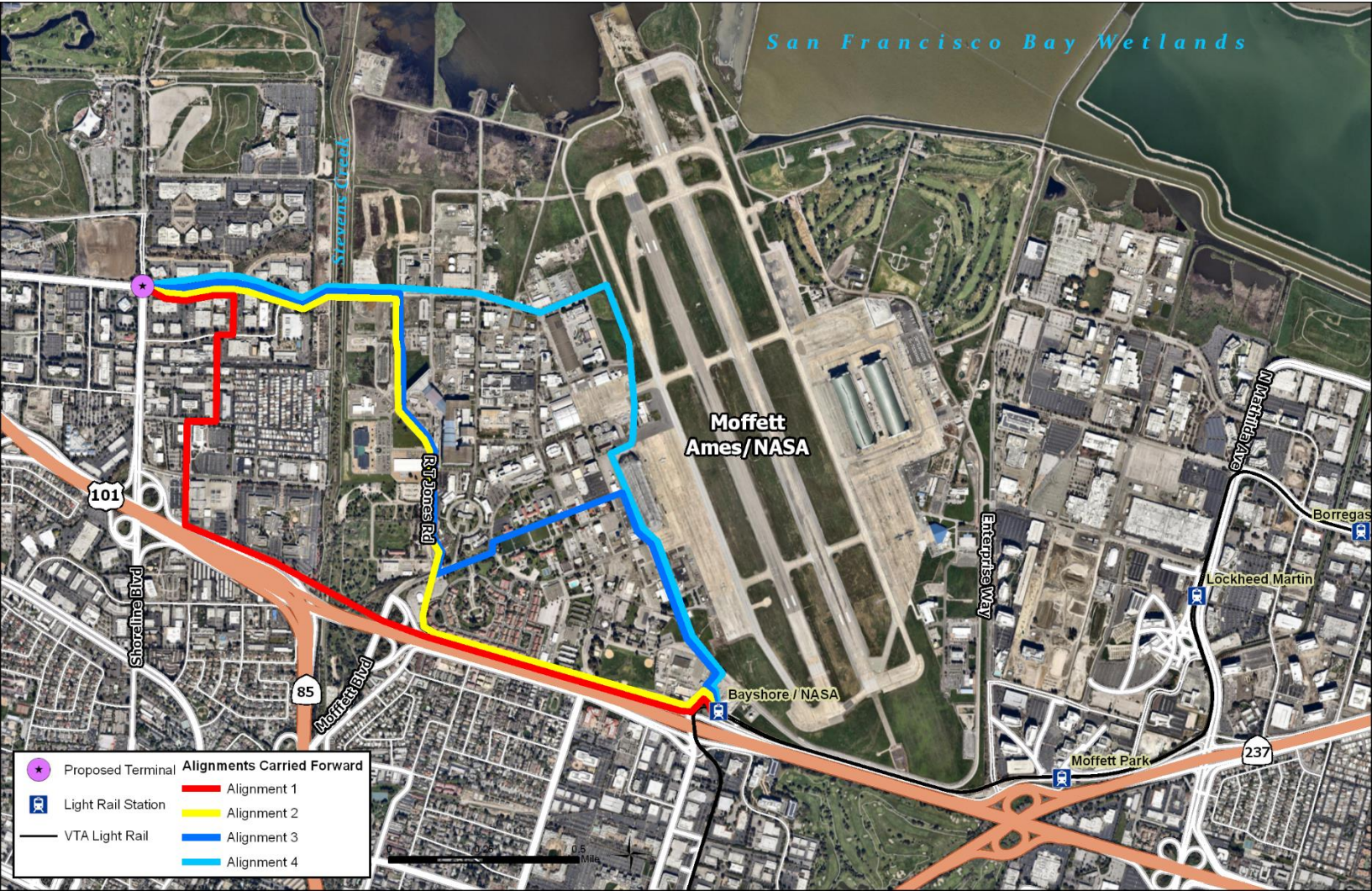


Figure 5.8 - Alignments Carried Forward



6. STEP 3 SCREENING: ALTERNATIVES SCREENING

The Step 3 Screening process evaluated a combination of technologies and alignments selected from Steps 1 and 2 to develop recommended project alternatives for further study and analysis. The Step 3 Screening evaluated four alignments combined with the highest scoring modal technologies: LRT, BRT, and Autonomous Vehicles (AV) for a total of 12 potential Alternatives. For evaluation purposes, LRT includes all track-based types of technologies including Light Rail and Street Car, and BRT includes all over the road vehicles including full size buses and BRT Vehicles.

The following sections describe each alignment and modal technology, the list of alternatives evaluated, the evaluation criteria, and the screening results.

6.1. Alternatives Considered

The Step 3 Screening process evaluated 12 total alternatives (three primary technologies and four alignments). Additionally, each LRT alternative was also evaluated as both an extension (through service) and connection (requiring a transfer) service. The alternative that combined LRT and Alignment 2 (Alternative 2A) was eliminated from further consideration prior to the screening due the number of tight turns required on this alignment; the tight turns would significantly reduce operational speed and efficiency. LRT vehicles require a larger turning radius and larger guideway than either buses or AVs. A standard light rail vehicle has a centerline turn radius of 82 feet. By comparison, buses require a 20 to 30 foot centerline turn radius depending on the vehicle length.

As a result, 11 alternatives were subsequently evaluated in the Step 3 Screening process. These alternatives are described below.

- Alignment 1 US 101/RT Jones Alternatives:
 - Alternative 1A.1: LRT Connection (transfer from existing service at Basyhore/NASA Station)
 - Alternative 1A.2 : LRT Extension (Interlined with existing service)
 - Alternative 1B: BRT
 - Alternative 1C: AVs
- Alignment 2 US 101/North Bayshore Alternatives:

- Alternative 2A: LRT – Eliminated prior to evaluation
- Alternative 2B: BRT
- Alternative 2C: AVs
- Alignment 3 NASA Core/RT Jones Alternatives:
 - Alternative 3A.1: LRT Connection (transfer from existing service at Basyhore/NASA Station)
 - Alternative 3A.2 : LRT Extension (Interlined with existing service)
 - Alternative 3B: BRT
 - Alternative 3C: AVs
- Alignment 4 Moffett Field/Allen Road Alternatives:
 - Alternative 4A.1: LRT Connection (transfer from existing service at Basyhore/NASA Station)
 - Alternative 4A.2 : Extension (Interlined with existing service)
 - Alternative 4B: BRT
 - Alternative 4C: AVs

6.2. Evaluation Criteria

Each alternative was evaluated based on how well they met the study purpose and goals. Each evaluation criterion is described below. Scoring for each alternative was based on concept-level information for the alignments and modal technologies. This general approach was used to select the alternatives that would undergo a more specific technical evaluation and analysis as part of the Step 4 Screening; the final step in the screening and evaluation process.

6.2.1. Cost Effectiveness and Feasibility

This measure evaluated the general capital and operating costs of each alternative. Specific criterion included the following:

- **Alignment Capital Cost:** Alignments involving higher capital costs due to grade separations or new roadway construction received lower scores relative to those alternatives utilizing existing roadways and requiring fewer roadway modifications.
- **Technology Capital Cost:** Technologies with lower costs (e.g., BRT) received higher scores compared to technologies with higher capital costs, such as LRT. AVs were assumed to have relatively high capital costs due to the potential need to grade separate the AV operations at intersections and the potential need to acquire additional right-of-way to enable vehicles to pass one another. Capital costs AVs operating in general purpose lanes without dedicated facilities would be considerably lower.

- **Operating Cost:** Modal technologies with lower operating costs received a higher score. Operating cost was calculated primarily as a function of labor costs; thus, AVs (which have no operators) were assumed to have the lowest operating costs.
- **Right-of-Way Acquisition:** Those alternatives that required right-of-way acquisition, due to either the nature of the alignment or the modal technology, received lower scores.

6.2.2. Enhance Mobility and Access

This measure evaluated the level of mobility, in terms of overall travel time, frequency, and directness of access to employment destinations in the North Bayshore area. Specific criterion included the following:

- **Frequency:** Vehicle frequency for a particular modal technology was based on the carrying capacity of individual transit vehicles. LRT vehicles which have a much higher passenger load were assumed to be lower frequency, and thus received the lowest score for this criterion. AVs were assumed to be the most frequent.
- **Speed:** Alternatives where the modal technology and alignment characteristics were likely to result in higher average vehicle speeds scored higher.
- **Transfer/Wait Time:** Alternatives with modal technologies that had greater potential for higher frequency service and/or no transfer (e.g., LRT Extension) scored higher.
- **Direct Access Potential for Technologies:** Alternatives with modal technologies that could accommodate a greater number of stops or on-demand stops scored higher.
- **Direct Access Potential for Alignments:** Alignments that provided direct access (within 1,000 feet) to existing and planned developments scored higher.

6.2.3. Minimize Environmental Impacts and Support Community Goals

This measure evaluated the impacts each alternative would have on specific environmental concerns. Specific criteria included:

- **Environmental Impacts: Stevens Creek** – Alignments that cross Stevens Creek at new locations were given lower scores due to the potential environmental impacts of building an additional creek crossing.
- **Environmental Impacts: Burrowing Owl Habitat** – Alignments that have the potential to disrupt identified Burrowing Owl habitats scored lower.

- **Aesthetic and Visual Impacts** – Alternatives with grade separations necessitated either by the alignment or modal technology scored lower due to potential noise and aesthetic impacts.

6.3. Step 3 Evaluation & Screening Results

Table 6.1 summarizes the results of the Step 3 Evaluation and Screening process. If an alternative scored “high” for any particular criterion, it either had greater potential benefit in terms of improving mobility and access, greater cost effectiveness and feasibility, and/or few, if any, potential negative impacts when compared to other alternatives. Table 6.2 presents a summary of the overall scoring for each alternative.

Four of the 11 alternatives were determined to score high enough to be considered further. These alternatives were advanced to the Step 4 Evaluation Screening and are shown in Figure 6.1.

6.3.1. Alignments Eliminated

- **Alternative 1A.1:** Alternative 1A.1 scored relatively low compared to other alternatives because the required transfer would reduce travel speeds and significantly increase wait times for passengers.
- **Alternative 2A:** Was eliminated prior to evaluation
- **Alternative 2B:** Alternative 2B scored relatively low compared to other alternatives because the high potential Right-of-way acquisition costs as well as low potential operating speeds on the US 101/North Bayshore Alignment.
- **Alternative 3A, 3B, and 3C:** All alternatives on Alignment 3, NASA Core/RT Jones. Alignment 3, travels through an existing owl preserve and traverses the NASA Historic District and NASA security perimeter. For these reasons, all of the alternatives considered on Alignment 3 would have greater environmental impacts, and transit access would be more limited due to security and other restrictions.
- **Alternative 4A, 4B, and 4C:** All Alternatives on Alignment 4, Moffett Field/Allen Road were eliminated Alignment 4 travels through the same owl preserve as Alignment 3, and is adjacent to another preserve located north of the NASA Historic District. Alignment 4 also travels through the NASA security perimeter and results in the same limitations to transit access as the Alignment 3 alternatives. In addition, the routing of Alignment 4 along the western edge of the Moffett Field runways may impede access between the runways and hangars located to the west of the runways.

6.3.2. Alignments Retained / Modified

- **Alternative 1A.2, 1B, and 1C:** Alternatives 1A.2, 1B, and 1C were all carried forward to the Step 4 analysis. These three alternatives had minimal environmental impacts to this area compared to the other alternatives and had relatively high assumed travel speeds.
- **Alternative 2C:** Alternative 2C was carried forward to the Step 4 analysis. While the step 3 analysis assumed that the Alternative 2 corridor would be slow and difficult to operate for LRT and BRT, AVs would be able to better navigate the potential corridor. This alignment would also allow for better access to more of the destinations in the North Bayshore area.

Table 6.1 - Evaluation Screening Summary

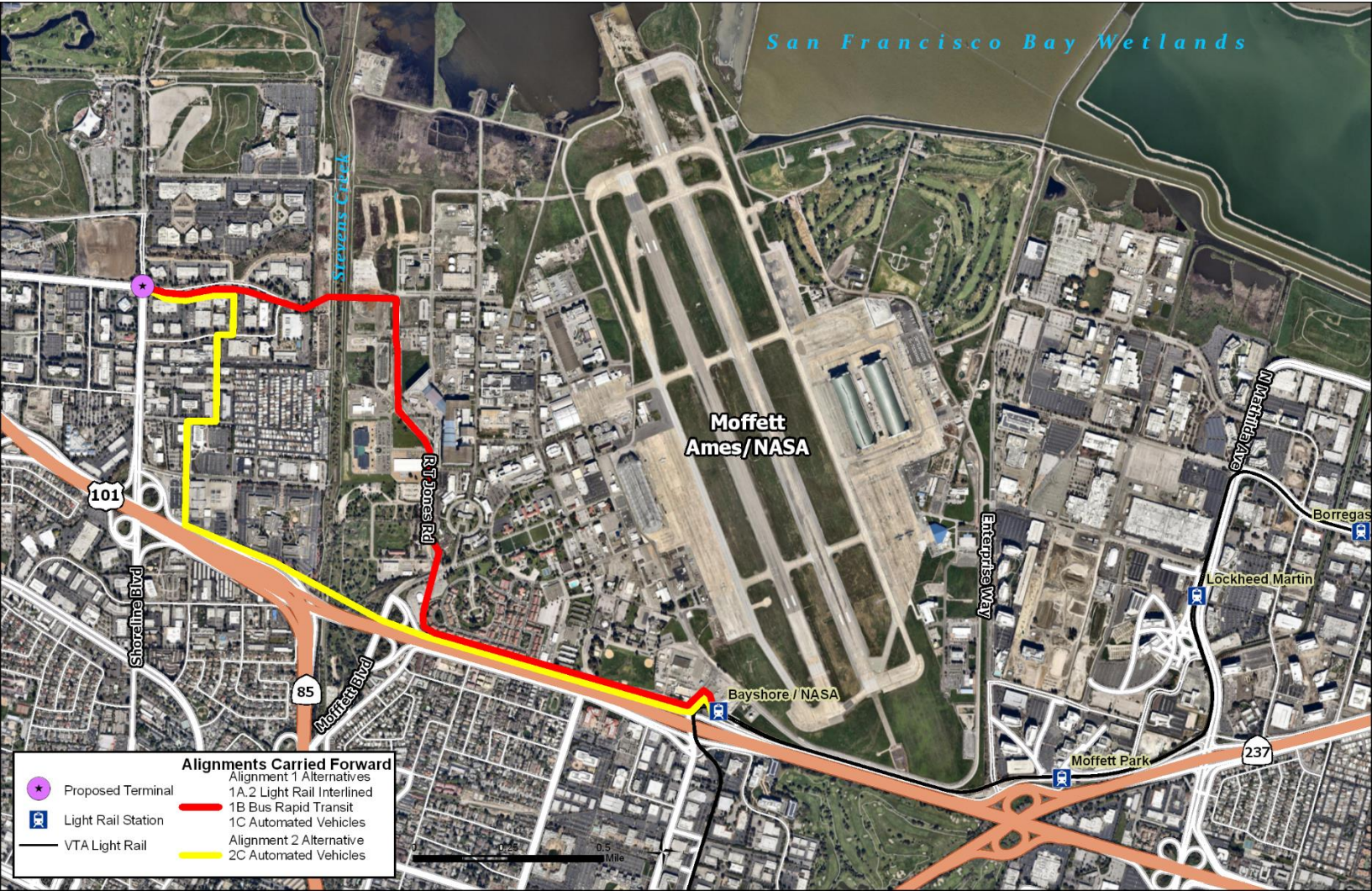
Alternatives		Cost Effectiveness and Feasibility (30%)				Enhance Mobility and Access (40%)					Minimize Impacts and Support Community Goals (30%)			Overall
		Capital Cost: Alignment	Capital Cost: Technology	Operating Cost	ROW Acquisition	Frequency	Speed	Transfer/ Wait Time	Access: Technology	Access: Alignment	Creek	Owl Habitat	Aesthetic/ Visual Impacts	
Alternative 1C	US 101/RT Jones AVs	Low	Low	High	Low	High	Low	High	High	Med	High	High	Med	High
Alternative 1A.2	US 101/RT Jones LRT Interlined	Med	Low	Med	Med	Low	High	High	Low	Med	High	High	High	High
Alternative 1B	US 101/RT Jones BRT	Med	High	Low	Med	Med	Med	Med	Med	Med	High	High	High	High
Alternative 2C	US 101/North Bayshore AVs	Low	Low	High	Low	High	Low	High	High	High	Low	High	Low	High
Alternative 4C	Moffett Field/Allen Road AVs	High	Low	High	Low	High	Low	High	High	Low	High	Low	Med	High
Alternative 3C	NASA Core/RT Jones AVs	Med	Low	High	Low	High	Low	High	High	Med	High	Low	Low	Med
Alternative 1A.1	US 101/RT Jones LRT Shuttle	Med	Low	Med	Med	Low	Med	Low	Low	Med	High	High	High	Med
Alternative 4A.2	Moffett Field/Allen Road LRT Interlined	High	Low	Med	Med	Low	Med	High	Low	Low	High	Low	Med	Med
Alternative 3A.2	NASA Core/RT Jones LRT Interlined	Med	Low	Med	Low	Low	Med	High	Low	Med	High	Low	Low	Med
Alternative 4B	Moffett Field/Allen Road BRT	High	High	Low	Med	Med	Med	Med	Med	Low	High	Low	Med	Med
Alternative 2B	US 101/North Bayshore BRT	Low	High	Low	Low	Med	Med	Med	Med	High	Low	High	Low	Low
Alternative 4A.1	Moffett Field/Allen Road LRT Shuttle	High	Low	Med	Med	Low	Med	Low	Low	Low	High	Low	Med	Low
Alternative 3B	NASA Core/RT Jones BRT	Med	High	Low	Low	Med	Low	Med	Med	Med	High	Low	Low	Low
Alternative 3A.1	NASA Core/RT Jones LRT Shuttle	Med	Low	Med	Low	Low	Med	Low	Low	Med	High	Low	Low	Low

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Table 6.2 – Step 3 Alignments

Step 2 Evaluation		Renumbering	Step 3 Evaluation		Step 4 Final Score	
Alignment A	Modified and Carried Forward	Alignment A > Alignment 1	Alignment 1	1A.1: Light Rail	Eliminated	
				1A.2: Light Rail	Carried Forward	Alternative 1A
				1B: BRT	Carried Forward	Alternative 1D
				1C: Avs	Carried Forward	Alternative 1B (At-Grade)
						Alternative 1C (Exclusive)
Alignment B	Modified and Carried Forward	Alignment A > Alignment 2 and Alignment 3	Alignment 2	2A.1: Light Rail	Eliminated	
				2A.2: Light Rail	Eliminated	
				2B: BRT	Eliminated	
			Alignment 3	2C: Avs	Carried Forward	Alternative 2A (At-Grade)
				3A.1: Light Rail	Eliminated	Alternative 2B (Exclusive)
				3A.2: Light Rail	Eliminated	
				3B: BRT	Eliminated	
				3C: Avs	Eliminated	
Alignment C	Eliminated					
Alignment D	Modified and Carried Forward	Alignment D > Alignment 4	Alignment 4	4A.1: Light Rail	Eliminated	
				4A.2: Light Rail	Eliminated	
				4B: BRT	Eliminated	
				4C: Avs	Eliminated	
Alignment E	Eliminated					
Alignment F	Eliminated					

Figure 6.1 – Alternatives Carried Forward



7. STEP 4: FINAL ALTERNATIVE EVALUATION

The Step 3 Screening process resulted in four final alternatives along two alignments connecting the Bayshore/NASA LRT Station with the intersection of North Shoreline Boulevard and Charleston Road. As part of the Final Evaluation, more specific capital cost estimates and operating parameters were developed for each of these alternatives.

To further define the operating parameters and capital cost estimates for the alternatives, a set of assumptions for transit operations, infrastructure needs, and right-of-way constraints were developed for each of the alternatives. Appendix A details the assumptions that were used for developing the operating parameters and capital cost estimates, and includes a more detailed breakdown of the capital cost estimates for each alternative.

The final evaluation of alternatives used the same set of general evaluation criteria as the Step 3 evaluation and screening process. Since all of the alternatives considered in the Step 4 had already been screened for initial feasibility as part of the Step 3 Evaluation Screening, the Step 4 alternatives were evaluated more generally based on how well it could potentially meet the following primary evaluation criteria:

- Cost Effectiveness and Feasibility
- Enhance Mobility and Access
- Minimize Impacts and Support Community Goals

It is important to note that this study did not include detailed environmental analyses or engineering surveys for any of the alternatives. Based on the general information that was available from existing environmental studies and project area stakeholders, all of the alternatives considered in the Step 4 Evaluation Screening are potentially feasible at this level of analysis. Another aspect of feasibility that should be noted is that AV technologies are relatively nascent and have not been as fully developed as either BRT or LRT systems, which have been operating in North America and throughout the world for a number of years. As a result, while the operating and infrastructure needs of BRT and LRT are well known and understood, much less is known about the particular operating and infrastructure needs of different AV systems. Accordingly, there is a greater degree of uncertainty regarding the feasibility of the AV alternatives at this level of analysis. However, considering the rapid state of AV development, this study concluded that AV technology can be implemented near-term, in some form, and

advanced incrementally over the mid and long-term. The background and assumptions regarding AVs related to this study are discussed in more detail below.

7.1. Automated Vehicle Assumptions

Autonomous vehicle technology is progressing rapidly and the transportation industry must adapt to the emergence of AV operations. Many models of 2017 automobiles already have some autonomous features. These include adaptive cruise control, automatic forward-collision braking, automatic parking, and auto-pilot, to name just a few. Tesla currently markets its vehicles by saying that “All Tesla vehicles produced in our factory, including Model 3, have the hardware needed for full self-driving capability at a safety level substantially greater than that of a human driver”. Automated technologies are also rapidly develop within the trucking industry and in freight rail and public rail industries.

A sample of recent and current research and information relating to AV technology includes:

- **NVIDIA will provide Level 4 Capability by 2018:** At the Bosch Connected World 2017 in Berlin, NVIDIA’s CEO Jen-Hsun Huang announced that NVIDIA will provide technology enabling Level-4 autonomous driving capabilities by the end of 2018.
- **Volkswagen Group’s** — VW’s parent company — pledge to add electric motors to its [entire lineup by 2030](#). VW alone plans to introduce 20 electrified cars by 2025. The aggressive push, worth some \$40 billion, was [kickstarted after](#) Volkswagen Group was caught cheating diesel emissions tests in a [massive scandal](#) now referred to as dieselgate. (Source: <https://www.theverge.com/2018/2/19/17027570/volkswagen-id-vizzion-concept-car-geneva-motor-show>)
- **Volvo** told the press that it’s officially entering a partnership with [NVIDIA](#) and Autoliv, with plans to have autonomous cars on the road by 2021. (Source: <https://insideevs.com/volvo-teams-nvidia-autoliv-self-driving-electric-vehicles/>)
- **GM** declared that the Cruise AV would enter production in 2019 at the company's Orion Township facility in Michigan, where the Bolt EV and Sonic are built. The Cruise AV will have a dedicated assembly line at the plant, where the LIDAR modules, built at the Brownstown plant, will be integrated. GM has approved of \$100 million in improvements to both locations. (Source: <http://www.thedrive.com/news/19331/general-motors-autonomous-vehicle-production-begins-next-year>)

7.1.1. AVs and the Step 4 Evaluation

To better distinguish between potential AV alternatives in the Step 4 Evaluation, the two AV alternatives evaluated along each alignment were further divided into AVs operating at-grade and AVs operating in a fully grade-separated right of way. In reality, an AV alternative would most likely operate in a hybrid configuration where AVs would operate in some combination of dedicated at-grade, dedicated elevated, and existing roadway infrastructure. This study assumed either a mostly at-grade or a fully grade separate corridor to simplify the alternatives analysis. However, it is important to note that the operational flexibility offered by AVs may yield considerable more efficiency and lower costs than was assumed for this comparative analysis.

Today, AVs operate mostly in a limited capacity (SAE Level 0-3) in select locations throughout the world. However, there is significant and growing interest in AV technology and the technology is continuing to develop very rapidly. There is significant intellectual and capital investment into AV development and related systems necessary for safe, efficient and cost-effective operations such as artificial intelligence, sensors, data collection, and systems integration (e.g., systems in-vehicle, along the roadside, and as part of smart cities). In many states, legislation is being considered and passed to encourage and allow for development and implementation for driverless technology³. Virtually every major automobile manufacturer, and many high-tech firms⁴, are investing heavily in AV technology. This study believes that AV technology will be safe, reliable, and economically viable in the near future. It will heavily influence every transportation sector including cars, buses, trucks, trains, and aviation, and it can be applied to help address transportation access issues in and around the North Bayshore area. Based on current understanding of existing technology and reasonable expectations of where the technology is quickly evolving to, this study assumes the following for AV operations:

- AVs are not limited to typical automobile sized vehicles and will include full-size buses and vehicles of all sizes.
- AVs can operate completely autonomously (i.e., SAE Level 5) in any environment where human-controlled vehicles operate today.
- AVs can communicate with other AVs operating within its sphere of operations, and with integrated roadside or networked systems.

³ <http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>

⁴ Including Intel, Google, Apple, NVIDIA, Uber, Tesla, Samsung, and Cisco.

- AVs can operate in consists – or groups - of multiple vehicles operating similar to a train.
- AVs may operate in any roadway configuration. A few examples of potential configurations for the North Bayshore area include:
 - Operating on existing streets in mixed traffic; operating with normal traffic; optimizes circulation options, uses existing roadway infrastructure investments, and would have the lowest capital costs.
 - Operating on dedicated guideways; assumes no interaction with normal roadway traffic or mass transit, and would have the highest capital costs.
 - Hybrid; assumes operations on a combination of existing roadways and exclusive rights-of-way, and would have capital costs somewhere in between.

For analysis and comparison purposes in this study, three to four intermediate AV stops, or stations, along the alignment corridor were assumed. These stops would enable passengers to safely board and alight vehicles, and other allow AVs to pass if they are not stopping at a particular station. Further study could determine that either no bypass points or more bypass points are needed. Although there would be multiple stops along the study corridor, some vehicles could bypass the intermediate stations and provide express service between the two endpoints. There would be larger stations and vehicle storage at both endpoints of the alignment.

7.2. Alternatives Evaluated

This section describes each of the six alternatives considered in the Step 4 Evaluation process, including the estimated capital cost for constructing each alternative. The numbering system, has no relationship to priority of the final study recommendations.

The first four alternatives (Alternatives 1A, 1B, 1C, and 1D) are all on Alignment 1 and generally follow Perimeter Road, RT Jones Road, and Charleston Road, with a bridge built over Stevens Creek connecting Charleston Road with Allen Road. This alignment is designed to serve regular traffic, transit vehicles, bicyclists, and pedestrians. The length of Alignment 1 is approximately 2.65 miles between the Bayshore/NASA station and the intersection of North Shoreline Boulevard and Charleston Road.

The next two alternatives (Alternatives 2A and 2B) are along Alignment 2, and generally follow Perimeter Road, US 101, Inigo Way and new roadways between the termini at Bayshore/NASA station and North Shoreline Boulevard and Charleston Road. The length of Alignment 2 is approximately 2.69 miles.

7.2.1. Alignment 1

All three recommended technologies, LRT, BRT, and AVs could use this alignment. This alignment could also allow for multimodal use; allowing for rail, buses, and various forms of personal transport such as walking, cycling, skateboards, motorcycles, scooters, etc., to share the right-of-way.

Alternative 1A – LRT or street car at-grade

Alternative 1A examined operating standard light rail vehicles along the alignment, and essentially functioning as an extension of VTA's light rail system. Given the current operating assumptions expected with the opening of the BART to Silicon Valley Extension in 2018, the conceptual operating plan with this alternative would extend the light rail line currently planned to end at the Old Ironsides station. This line would provide 15-minute frequency between the Bayshore/NASA LRT station, and the extension into the North Bayshore area. Station improvements at the Bayshore/NASALRT station would be required to facilitate transfers between light rail and other modes of access including buses and. Stops locations were proposed as shown in Figure 7.1. The stop locations were needed to generate ridership estimates, and are conceptual in nature; a next phase of study would revisit and refine stop locations.

Travel time estimates are 6 minutes from the Bayshore/NASA LRT station to the intersection of Shoreline Blvd., and Charleston Road. Capital cost estimates for LRT a range between \$400m and \$500m. Alternative 1A is presented in Figure 7.1

Streetcars

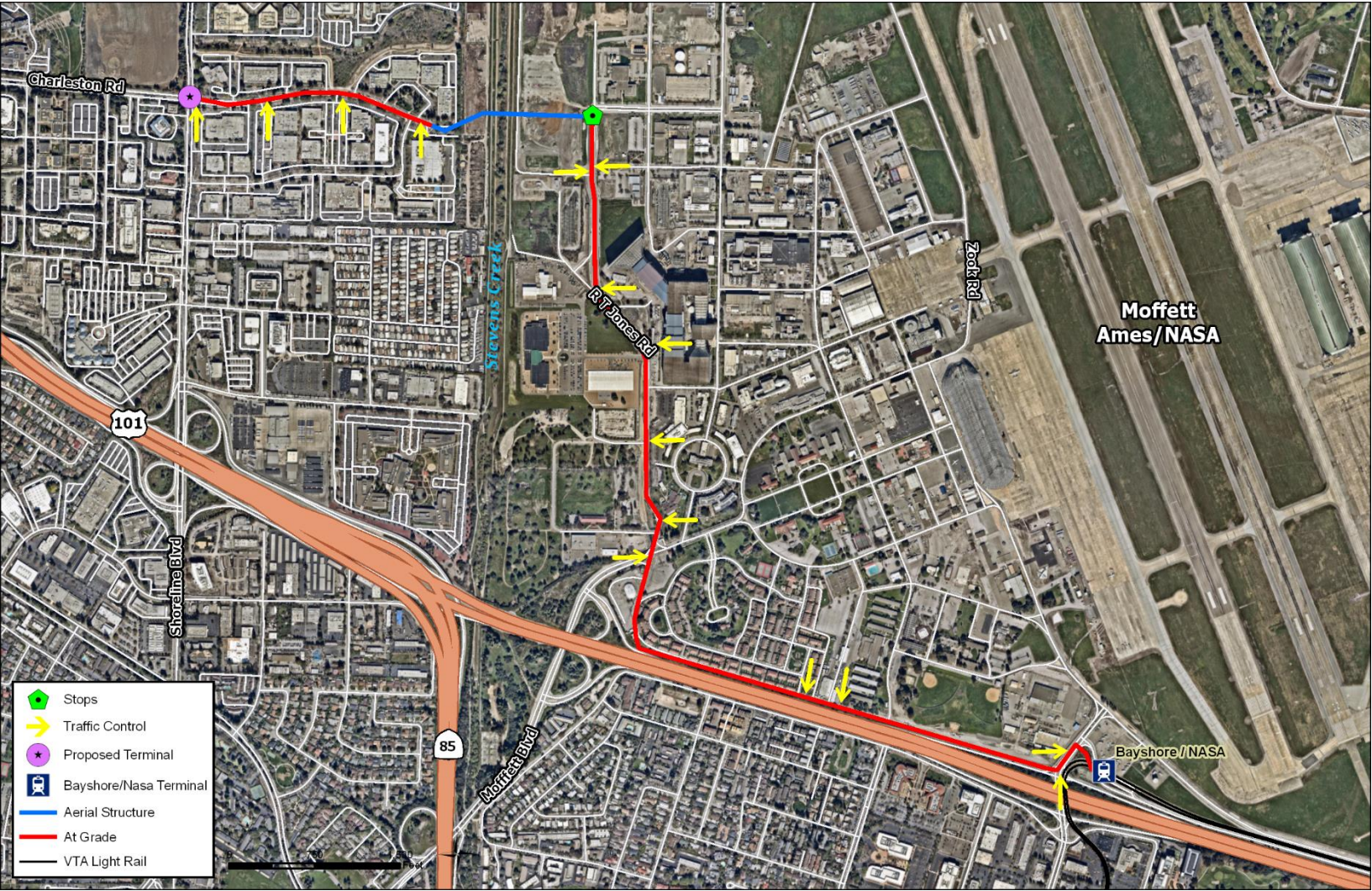
In addition to light rail, the study also considered Streetcars in the evaluation. A Streetcar system would operate different vehicles than the VTA light rail system and could not be interlined with the existing light rail system. While a Streetcar system would require a transfer from another mode, such as LRT or bus, it could offer other potential benefits, including:

- More flexible construction techniques, such a prefabricating track and roadway sections. Prefabricating segments, which could include both rail and roadway, which reduce capital costs, utility relocation needs, and construction time.
- Better integration with the roadway, possibly allowed for shared operations, allowing for more multimodal corridors.
- Greater design flexibility and more efficient operations where tight turns are required.

North Bayshore Transportation Access Study

- Smaller Stations that can be spaced closer together compared to light rail.

Figure 7.1 - Alternative 1A: Light Rail / Streetcar on Alignment 1



Although cost estimates for a streetcar line were not specifically evaluated in this study, review of recently built streetcar systems indicate that construction costs could be significantly lower than a similar Light Rail system. However, a separate rail technology would require its own supporting infrastructure and administrative functions, and could have significant operating and maintenance cost issues compared with LRT. For example, it would require its own maintenance facility, parts, mechanics, and storage yard. It would also have different capital requirements than a typical Light Rail system including different power delivery infrastructure, and it would not benefit from existing LRT infrastructure already in place. In vehicle travel time estimates are comparable with LRT above, but a transfer requirement from VTA light rail would increase total travel time, and is considered a negative time impact.

Alternative 1B and 1C – AVs on exclusive at-grade (1B) or elevated roadway (1C)

Alternatives 1B and 1C assume AVs would operate within exclusive lanes parallel to the roadway or on an elevated structure. Alternative 1B is presented in Figure 7.2 and Alternative 1C is presented in Figure 7.3.

Given that there may be a large number of individual vehicles moving through at-grade intersections during peak periods, it is assumed that vehicles would group together and travel through intersections as consists. To make for efficient operations and a desirable user-experience, these AV platoons would be given signal priority at intersections, similar to bus transit signal priority. The implications of this are that with signal priority and AVs traveling as consists, the traffic at cross streets could be held extended periods with possible significant delay to traffic at those intersections.

Travel time estimates for Alternative 1B are 13 minutes from the Bayshore/NASA LRT station to the intersection of Shoreline Blvd. and Charleston Road. Capital cost estimates for a conventional project range between \$100m and \$120m.

Travel time estimates for the exclusive / elevated roadway alignment studied is 6-minutes from the Bayshore/NASA LRT station to the intersection of Shoreline Blvd. and Charleston Road. Capital cost estimates range between \$230m and \$280m. The high capital costs are largely the product of Aerial Guideway.

Figure 7.2 - Alternative 1B: Autonomous Vehicles At-grade

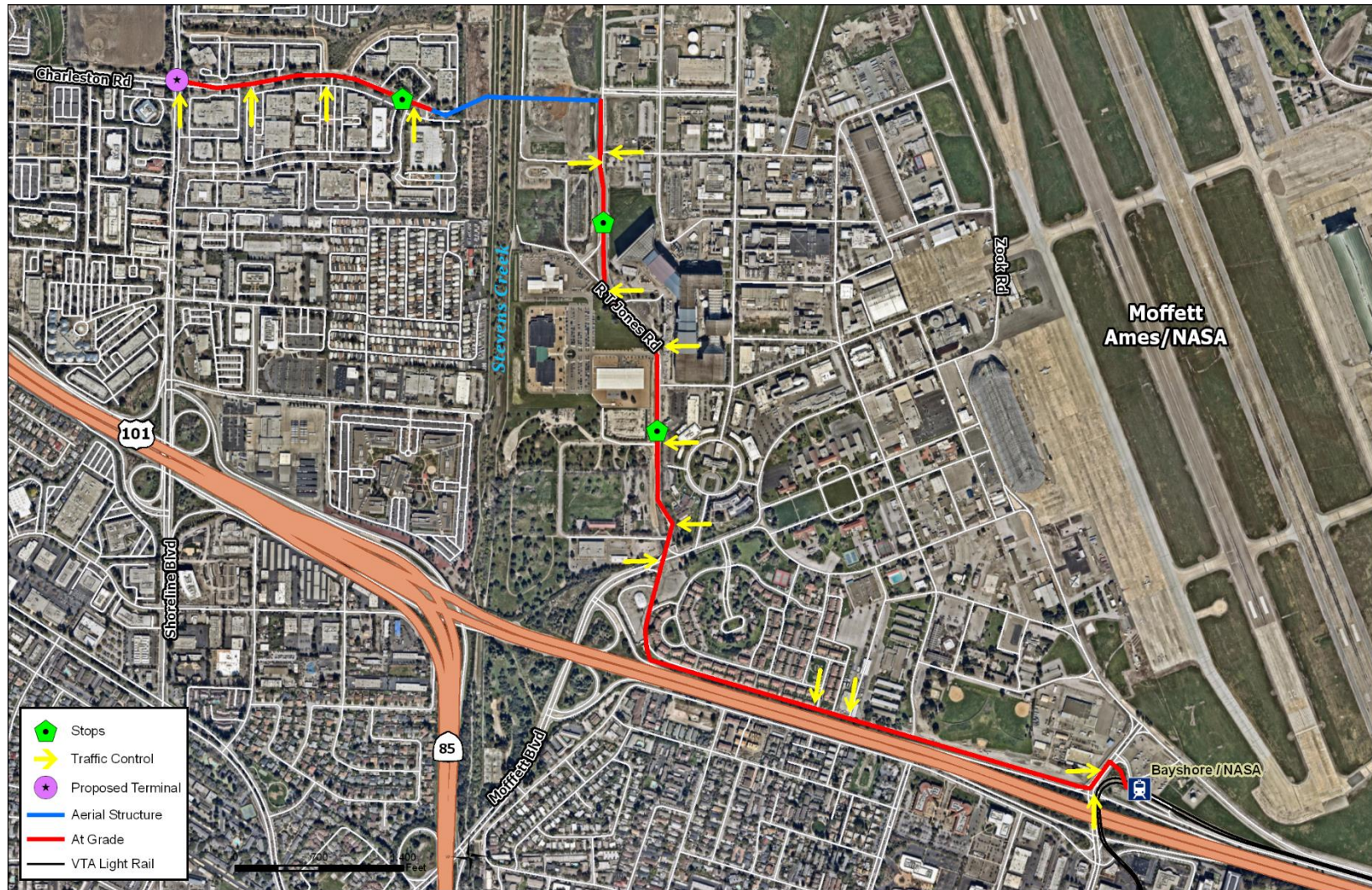
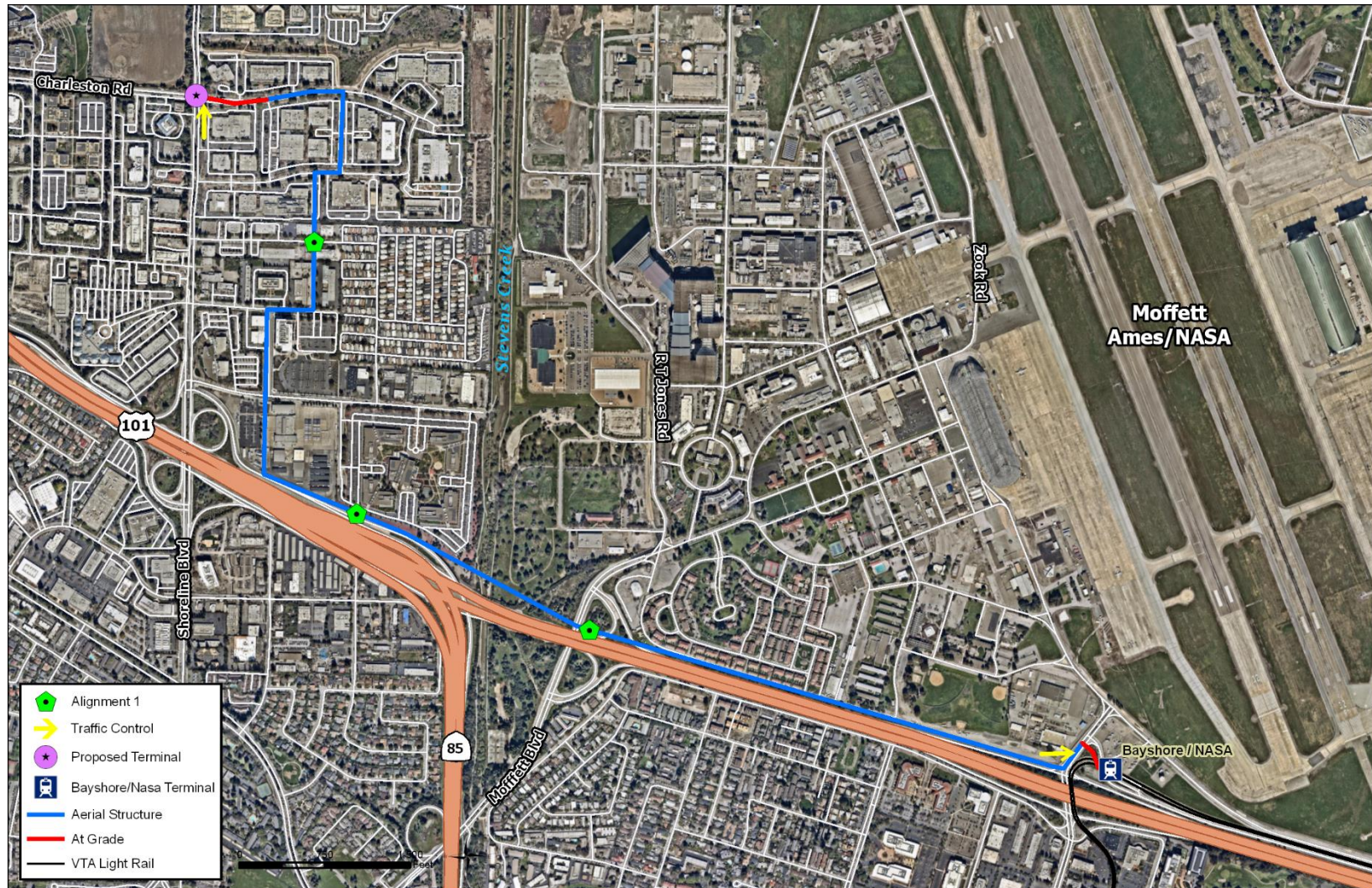


Figure 7.3 - Alternative 1C: Autonomous Vehicles Grade-separated



Alternative 1D – Bus/BRT at-grade

Alternative 1D examined operating standard buses along the same alignment as Alternatives 1A, 1B and 1C, shown in Figure 7.4. Buses would operate in both directions along the corridor at scheduled frequencies, stopping at fixed-stop locations. Passengers could also be offered dynamic stops and advance reservation options for additional trip flexibility and enhanced user-experience.

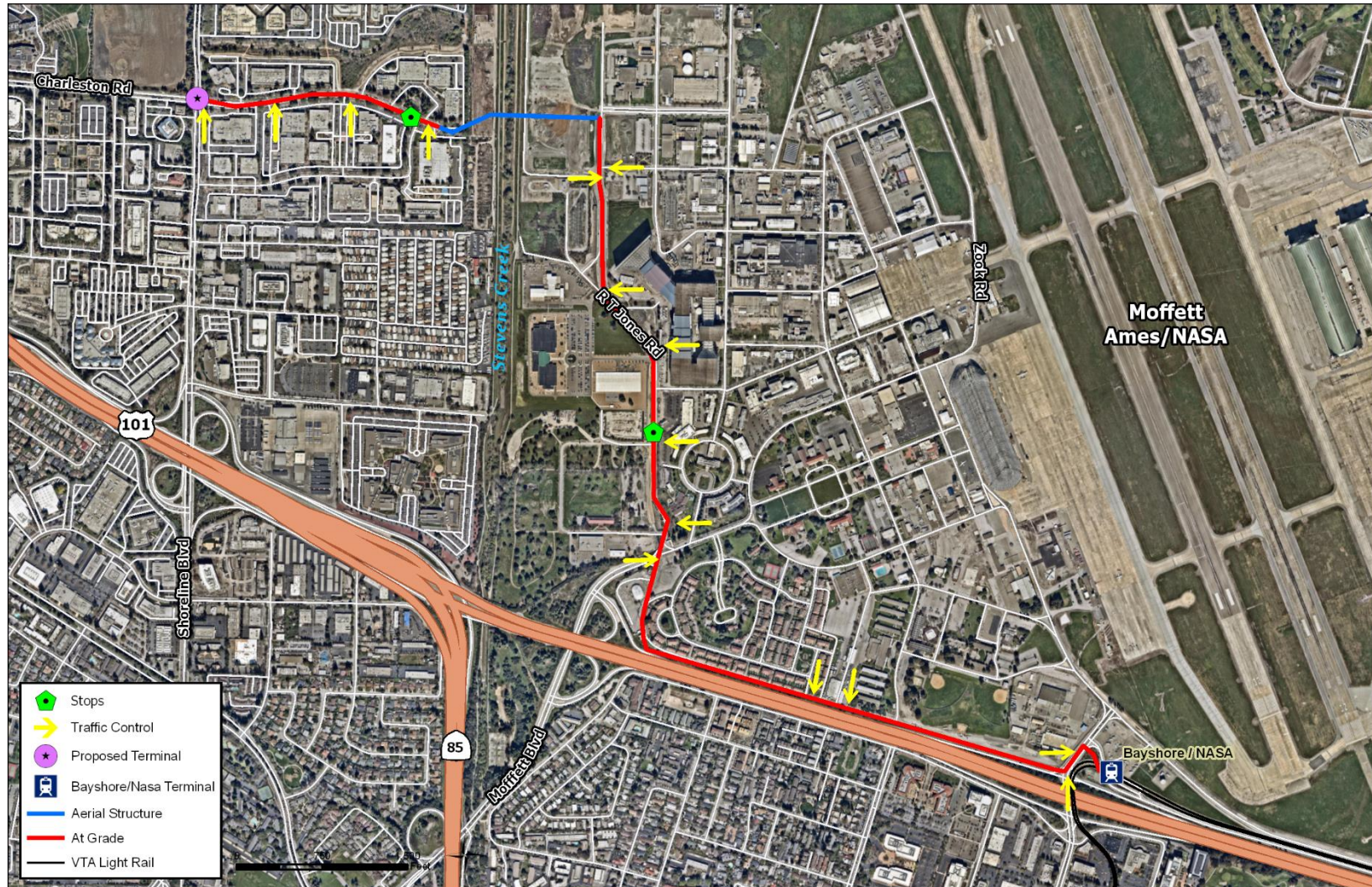
Buses operating at-grade would include VTA public transit buses and the employer operated shuttle buses. In the future, buses operating at-grade could gradually evolve into AV operations as the technologies and policies advance.

For example private employers could begin operating AV capable shuttle buses (SAE Level 4 and 5) in the corridor, and could first focus on safety and user experience benefits⁵. As the technology and infrastructure advance AV shuttle buses could begin operating in consists which would yield some operating efficiencies. Also within this example could be a parallel phased approach to utilizing the physical operating environment; this is a beginning with vehicle operations on normal roadways in mixed traffic. This would be followed by partial dedication (conversion) of one or more lanes to AV operations only, and then as demand merits a natural progression to full dedication and/or grade-separated operating environments. Because of this potential operating and implementation flexibility, a bus/BRT/AV hybrid option appears to offer many near and mid-term benefits, as well as long-term benefits that could meet the growing travel demand needs of the area.

Travel time estimates are 13 minutes from the NASA/Bayshore LRT station to the intersection of Shoreline Blvd., and Charleston Road. Conceptual capital cost estimates for a conventional project range between \$100m and \$120m.

⁵ E.g., subscription, on-demand and smart stop benefits. [add more to this]

Figure 7.4 - Alternative 1D



7.2.2. Alignment 2

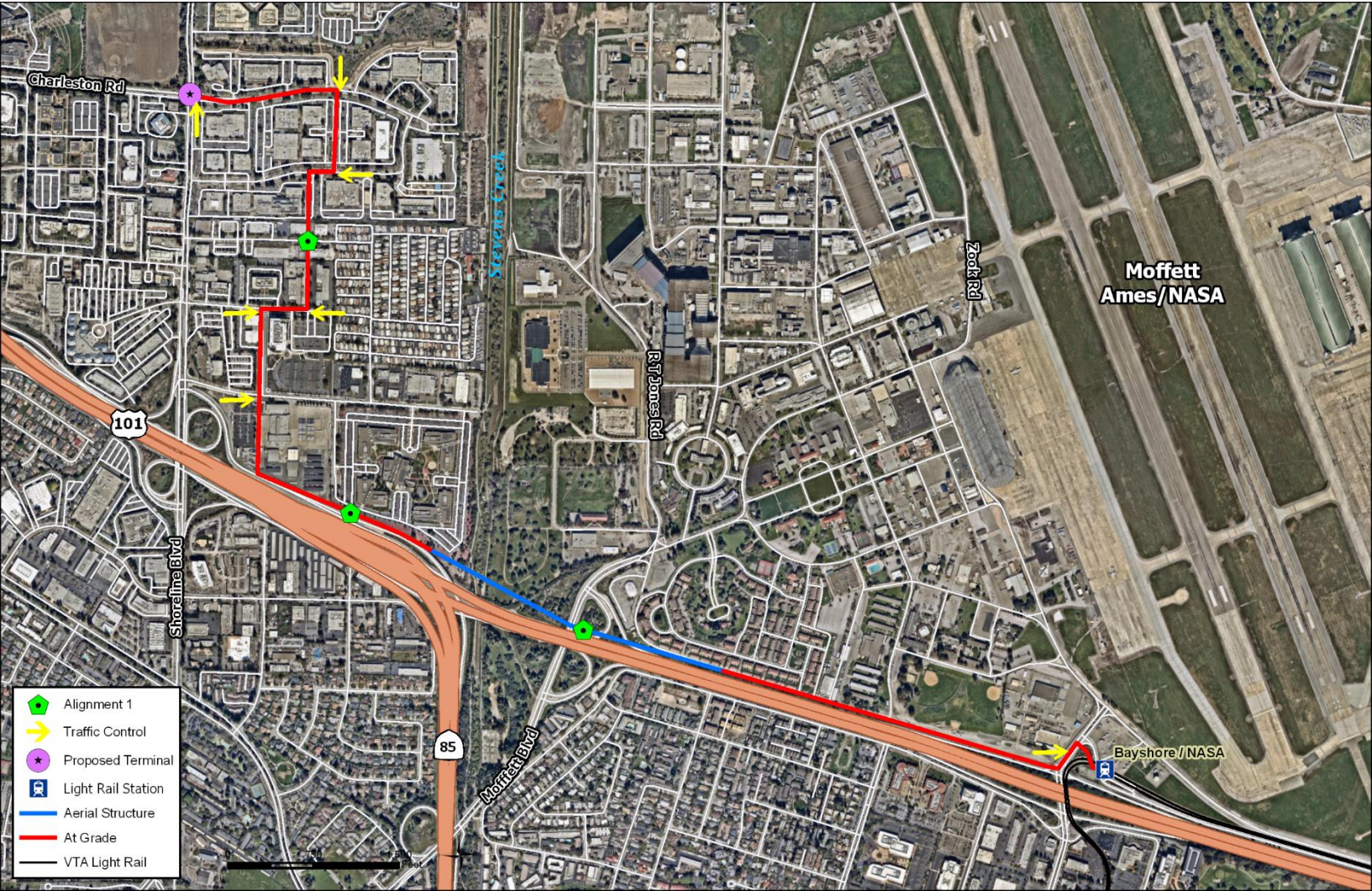
Given the number of roadway crossings and the tight turn configurations of Alignment 2, this alignment was considered suitable only for use by AVs. However, this alignment does not adequately bypass the existing points of traffic congestion and may end up too duplicative with other improvements already recommended or may be recommended by Mountain View's AGT Study. There is also a high level of uncertainty associated with this alignment due to the operational design and timing of the new roadway segments expected new development.

Alternative 2A and 2B – AVs on exclusive at-grade (2A) or elevated roadway (2B)

Alternative 2A is presented in Figure 7.5 and Alternative 2B is presented in figure 7.6. These alignments run west from the Bayshore/NASA LRT Station at-grade adjacent to Highway 101, rise in an aerial section crossing Moffett Boulevard and Stevens Creek, touching back down south of the Microsoft campus, and then heading north roughly in alignment with Inigo Way into the heart of the NBS employment area. The ultimate route north would be determined by land dedications resulting from development; however, existing segments of Inigo Way, Space Park, Shore Bird Ways, and Charleston Road would serve as primary route segments. Passengers on LRT would need to transfer to autonomous vehicles at the Bayshore/NASA Station, requiring a new Transit Center.

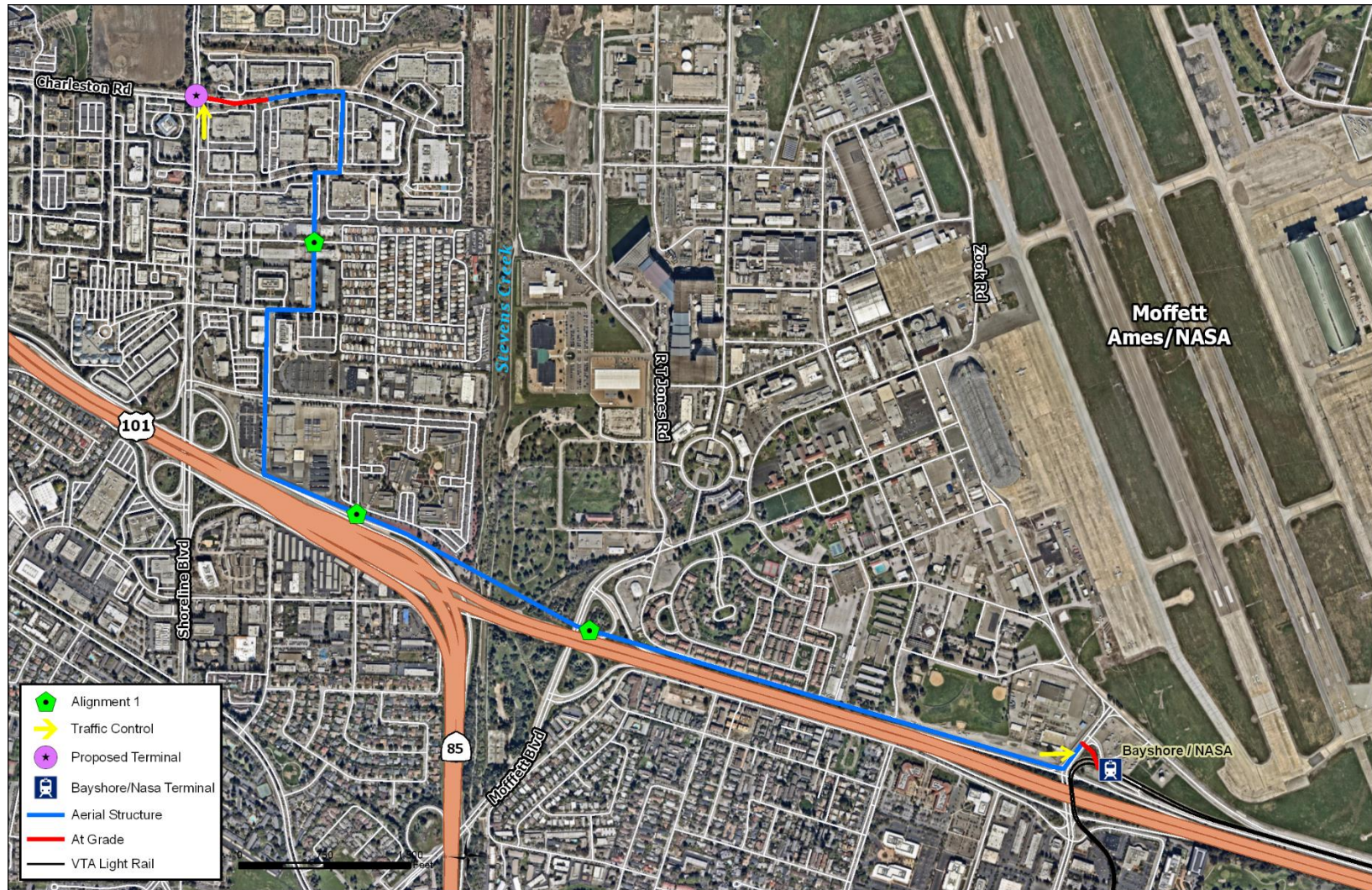
Travel time estimates are 14 minutes from the Bayshore/NASA LRT station to the intersection of Shoreline Blvd. and Charleston Road. Capital cost estimates range between \$100m and \$150m. This alignment was also evaluated as an exclusive roadway/aerial structure with a travel time of approximately 7 minutes, and capital cost estimate between \$300 and \$350m.

Figure 7.5



North Bayshore Transportation Access Study

Figure 7.6 - Alternative 2B



7.3. Step 4 Evaluation Screening Results

A description of the Step 4 Evaluation results is provided below. A summary is shown in Table 8.2. If an alternative received a higher numeric score for any particular criterion, it either had greater potential benefit in terms of improving mobility and access, greater cost effectiveness (in terms of lower estimated capital costs), and/or few, if any, potential negative impacts when compared to other alternatives.

- Alternative 1A: RT Jones with LRT at Grade
- Alternative 1B: RT Jones with AVs at Grade
- Alternative 1C: RT Jones with AVs on Exclusive Roadway
- Alternative 1D: RT Jones with Bus Rapid Transit at Grade
- Alternative 2A: US 101 with AVs at Grade
- Alternative 2B: US 101 with AVs on Exclusive Roadway

A Hybrid Bus/BRT/AV Option would also be a viable alternative, and should be studied further.

7.3.1. Cost Effectiveness and Feasibility

The alternatives with the lowest estimated capital costs are the at-grade BRT and AV alternatives (Alternatives 2A, 1B and 1D), primarily due to the fact that they require significantly less infrastructure than either the aerial AV alternatives (Alternatives 1C and 2B) or the LRT alternative (Alternative 1A). It is important to note that the capital cost estimates developed as part of this study have a high level of uncertainty and are therefore presented as relatively broad ranges. Accordingly, it is not possible to clearly determine which alternative would have the lowest total costs without further study and analysis. The Capital Cost Estimates are presented in Table 7.2.

This study did not assess potential operating costs for each of the alternatives. However, given that operator labor costs currently make up the greatest share of transit operating costs per revenue hour, BRT and LRT operating costs are expected to be greater than AV operating costs per revenue hour.

7.3.2. Enhance Mobility and Access

Alignment 1, on which Alternatives 1A, 1B, 1C, and 1D are located, would serve the planned NASA Research Park and Google Bayview Campus directly. It also would provide a new transit route, as well as a bicyclist and pedestrian route, into the North Bayshore area from the east, and would better connect the North Bayshore area with the planned Google Bayview development as well as NASA and Moffett Field.

Alternative 1A would provide the lowest level of direct access to destinations along Alignment 1 with only one or two intermediate LRT stops between endpoints. However, LRT operated as through service could provide some of the fastest travel times between endpoints, and could provide direct, high-capacity transit service into North Bayshore from North San Jose and the future Milpitas BART Station. Considering estimated ridership, as well as constructability, operability, and cost (capital and O&M) considerations, LRT is viewed a long-term option that becomes viable only with very high demand.

Alternative 1B and 1C would provide a high level of access to destinations along Alignment 1 due to the fact that AVs could have a greater number of intermediate stops and potentially provide point-to-point and on-demand service. Alternative 1C, which would operate in its own grade-separated guideway, would also provide excellent mobility in that it would avoid any intersection delays that might be experienced by the at-grade AV service in Alternative 1B.

Alternative 1D would provide somewhat less direct access to destinations along Alignment 1 than Alternatives 1B and 1C since BRT service would have two or three intermediate stops between the two endpoints and would not provide point-to-point service. BRT as defined is expected to have the longest travel times between the two endpoints; although buses would travel in a dedicated right-of-way at grade, stops at intermediate stations and at intersections would result in somewhat slower overall travel speeds between endpoints.

Alternatives ~~2AB~~ and ~~2BC~~ would potentially serve new residential development planned for the North Bayshore area and could serve the Microsoft campus adjacent to La Avenida Street. This alignment would travel parallel to North Shoreline Boulevard and is located one to two blocks east. Consequently, transit service along Alignment 2, on which Alternatives 2A and 2B are located, would be somewhat duplicative of transit service traveling along North Shoreline Boulevard. Alignment 2 would not directly serve the planned NASA Research Park or the planned Google Bayview Campus. Destinations within the NASA Research Park and Google Bayview

Campus would be located about one-third to one-half mile away from stops or stations along Alignment 2.

Both Alternatives 2A and 2B would provide a high level of access to destinations within North Bayshore due to the fact that AVs would have a greater number of intermediate stops and could potentially provide point-to-point, on-demand service. Alternative 2B, which would operate in its own grade-separated guideway, would also provide excellent mobility (travel time) since it would avoid any intersection delays that might be experienced by the at-grade AV service in Alternative 2A.

7.3.3. Minimize Impacts and Support Community Goals

Alignment 1 requires construction of a bridge over Stevens Creek connecting Charleston Road with Allen Road. There is an egret nesting colony adjacent to this area that may be impacted, as well as other riparian habitats that could be affected by a bridge at this location. These issues would need further detailed study if any of the alternatives along Alignment 1 are pursued further.

The aerial structure needed for Alternative 1C could negatively impact the intake for the NASA/Ames wind tunnel located adjacent to RT Jones Road. Additionally, catenary wires required for LRT under Alternative 1A could also negatively impact the wind tunnel intake. There are also overhead high voltage power lines across RT Jones that could affect by any AV aerial structures or catenary wires required for LRT service.

Alignment 2 requires a bridge structure over the Moffatt Boulevard/US 101 ramps as well as over Stevens Creek. Since the area adjacent to US 101 around Stevens Creek is already disturbed by existing infrastructure, it is less likely that a bridge structure would have additional significant negative impacts to riparian areas around the creek.

Alignment 2 would travel on roads that are still in the planning phase, which makes it is difficult to estimate how much right-of-way is available for dedicated lanes and stations for at-grade AVs proposed in Alternatives 2A. Alternative 2A may also potentially affect improvements being considered by the City of Mountain View for the US 101/Shoreline Boulevard interchange. The aerial AV structure proposed in Alternative 2B would have less direct impact on the roadway right-of-way and intersection operations; however, an elevated structure would have potential visual and aesthetic impacts.

Table 7.1 – Step 4 Evaluation Screening Summary

	Cost Effectiveness (30%)	Enhance Mobility and Access (40%)		Minimize Impacts and Support Community Goals (30%)			Total
Weighting	30%	20%	20%	10%	10%	10%	100%
Alternatives	Capital Cost	Approximate Wait +Travel Time from Bayshore/NASA to Charleston/Shoreline	Increase in Jobs/Residences with Access to Transit	Stevens Creek Impacts	NASA Facilities Impacts	Aesthetic/ Visual Impacts	Total
2A: US 101 with AVs at Grade	25	5	15	10	10	10	75
1B: RT Jones with AVs at Grade	25	5	20	5	10	10	75
1D: RT Jones with BRT at Grade	30	5	10	5	10	10	70
2B: US 101 with AVs on Exclusive Roadway	15	20	10	10	10	1	66
1C: RT Jones with AVs on Exclusive Roadway	15	20	15	5	1	1	57
1A: RT Jones with LRT at Grade	10	20	10	5	5	5	55

Table 7.2 - Conceptual Capital Cost Estimates

	Alternative 1A	Alternative 1B (At-Grade)	Alternative 1C (Exclusive)	Alternative 1D	Alternative 2A (At-Grade)	Alternative 2B (Exclusive)
	Light Rail Transit At Grade	Automated Vehicle Aerial Guideway	Automated Vehicle At Grade	Bus Rapid Transit At Grade	Automated Vehicle Aerial Guideway	Automated Vehicle At Grade
Guideway & Track Elements	\$ 68,000,000	\$ 78,000,000	\$ 11,000,000	\$ 21,000,000	\$ 79,000,000	\$ 16,000,000
Stations, Stops, Terminals, Intermodal	\$ 1,000,000	\$ 13,000,000			\$ 14,000,000	
Support Facilities: Yards, Shops, etc.		\$ 20,000,000	\$ 20,000,000		\$ 20,000,000	\$ 20,000,000
Sitework & Special Conditions	\$ 23,000,000	\$ 15,000,000	\$ 4,000,000	\$ 3,000,000	\$ 15,000,000	\$ 5,000,000
Systems	\$ 111,000,000	\$ 1,000,000	\$ 2,000,000	\$ 2,000,000		\$ 1,000,000
Row, Land, Existing Improvements	\$ 3,000,000	\$ 16,000,000	\$ 17,000,000	\$ 19,000,000	\$ 17,000,000	\$ 17,000,000
Vehicles	\$ 10,000,000	\$ 2,000,000	\$ 2,000,000	\$ 4,000,000	\$ 2,000,000	\$ 3,000,000
Planning	\$ 26,000,000	\$ 17,000,000	\$ 7,000,000	\$ 6,000,000	\$ 18,000,000	\$ 7,000,000
Engineering	\$ 54,000,000	\$ 36,000,000	\$ 14,000,000	\$ 12,000,000	\$ 37,000,000	\$ 16,000,000
Sub-Total Alternative Cost	\$ 296,000,000	\$ 198,000,000	\$ 77,000,000	\$ 67,000,000	\$ 202,000,000	\$ 85,000,000
40% Contingency	\$ 118,000,000	\$ 79,000,000	\$ 31,000,000	\$ 27,000,000	\$ 81,000,000	\$ 34,000,000
Total Alternative Cost	\$ 414,000,000	\$ 277,000,000	\$ 108,000,000	\$ 94,000,000	\$ 283,000,000	\$ 119,000,000
Miles	2.65	2.65	2.65	2.65	2.69	2.69
Total Alternative Cost Per Mile	\$ 156,000,000	\$ 104,000,000	\$ 41,000,000	\$ 35,000,000	\$ 105,000,000	\$ 44,000,000

North Bayshore Transportation Access Study

Table 7.3 - Step 4 Alignments

Step 2 Evaluation		Renumbering	Step 3 Evaluation		Step 4 Final Score	
Alignment A	Modified and Carried Forward	Alignment A > Alignment 1	Alignment 1	1A.1: Light Rail	Eliminated	
				1A.2: Light Rail	Carried Forward	Alternative 1A
				1B: BRT	Carried Forward	Alternative 1D
				1C: Avs	Carried Forward	Alternative 1B (At-Grade)
						Alternative 1C (Exclusive)
Alignment B	Modified and Carried Forward	Alignment A > Alignment 2 and Alignment 3	Alignment 2	2A.1: Light Rail	Eliminated	
				2A.2: Light Rail	Eliminated	
				2B: BRT	Eliminated	
				2C: Avs	Carried Forward	Alternative 2A (At-Grade)
			Alignment 3	3A.1: Light Rail	Eliminated	
				3A.2: Light Rail	Eliminated	
				3B: BRT	Eliminated	
				3C: Avs	Eliminated	
Alignment C	Eliminated					
Alignment D	Modified and Carried Forward	Alignment D > Alignment 4	Alignment 4	4A.1: Light Rail	Eliminated	
				4A.2: Light Rail	Eliminated	
				4B: BRT	Eliminated	
				4C: Avs	Eliminated	
Alignment E	Eliminated					
Alignment F	Eliminated					

8. RECOMMENDATIONS

Based on the results of the analysis, this study recommends both alignments be carried forward for further study in addition to a number of other infrastructure improvements that support these options. In the near-term, a hybrid option mixing a fleet of Buses and AVs to serve the North Bayshore area traveling along an RT Jones alignment is recommended. In the long-term, further study of AVs on the Highway 101 alignment and Light Rail on the RT Jones alignment.

The recommended infrastructure improvements include a Charleston Road Bridge crossing at Stevens Creek, new transit centers at the Bayshore/NASA Light Rail station and Moffett Blvd. Interchange, and a series of dedicated AV stations throughout the area. This study also recommends additional analysis on AV communications and systems management infrastructure and the study of the infrastructure needed to support a bus/AV hybrid option from near-term through long-term implementation phases.

8.1. Near/Mid-Term Recommendation: Automated Vehicle and Bus Hybrid Option, RT Jones Alignment

Conceptual Approach – Near/Mid-term

A phased implementation approach could begin with conventional buses operating on a fixed route, with fixed stops, on conventional roads. When the AV technology is ready to be phased in, AVs could begin operating in this area by serving trips between specific locations along the corridor or within the North Bayshore employment area. For example, a trip from the Bayshore/NASA station to a specific employment campus, serving only that location. Additional trips and locations could then be gradually phased in until a majority of the fleet is fully autonomous. The flexibility allowed by this conceptual approach can allow for adaptability to an extremely broad range of circumstances.

AVs are recommended for further study as a mid-term solution because they would offer operational flexibility and adaptability over existing types of a traditional BRT (and LRT) service. With the ability to travel on both dedicated and public roadway infrastructure, AVs have the ability to function as both a mass transit and a feeder system, thereby greatly increasing utility and minimizing costs of a transportation network. The number of AVs needed to serve a mass transportation network could be phased gradually through several implementation cycles as demand warrants.

Conceptual Approach – Long-term

AVs would also offer a number of long-term operational and infrastructure related benefits to the North Bayshore area. In general they could allow for new design standards allowing for narrower travel lanes and therefore greater capacity, less intrusive lighting, and other potential changes which could maximize operational efficiency and reduce environmental impacts to sensitive habitats.

The North Bayshore area is continuously evolving, and in today's environment of rapid technological innovation, the more flexible and adaptable a transportation system can be, the faster it can respond to changing land uses and transportation needs. The implementation of a bus/BRT/AV network could be instrumental towards the migration to a new transportation system. The readiness and evolution of this technology can be advanced through application in testing/pilot locations such as North Bayshore. It could bring positive local, national, and worldwide attention to the implementing areas; in this case the Mountain View North Bayshore area and City of Mountain View.

8.2. Long-Term Recommendation: Automated Vehicles, Highway 101 alignment

Further study of the AV alternative serving the Highway 101 adjacent alignment is also recommended. As the land use and travel needs of this area change additional mass transportation technologies and alignments may be needed to serve this area.

8.3. Long-Term Recommendation: Light Rail, RT Jones Alignment

As a potential long-term solution for the transportation needs of this area, this study recommends further study of Light Rail Vehicles on Alignment 1.

In the near-term, current travel demand estimates indicate that there may currently not be high enough demand to warrant the high capital cost and significant operating costs of a new LRT line. However, as mass transportation needs change in the area, travel demand for LRT on the RT Jones Road alignment may eventually warrant a higher capacity, high frequency rail connection, such as is suggested in VTA's Transit Sustainability Policy (TSP) and Service Design Guidelines (SDG). It is recommended that further analysis is done to define how a light rail line could operate

on the RT Jones alignment. Further analysis is also recommended to determine if advances in AV technology may supersede the viability and cost-effectiveness of LRT in this context.

8.4. Infrastructure Improvement Recommendations

This study recommends a series of infrastructure improvements to serve the needs of the study recommendations, as well as the future needs of the Project area. Infrastructure improvements include:

- **A Bridge crossing Stevens Creek at Charleston.** While other bridge crossing locations were considered as part of this study (La Avenida Street and Crittenden Lane) Charleston Road connecting with Allen Road is preferred crossing location because it would access North Bayshore in a more optimal location than either the La Avenida or Crittenden crossing. It would also be easier to access and construct than the La Avenida Crossing, due to its proximity to the Army Reserve area and contaminated soils between Stevens Creek and the NASA/AMES site, and the Crittenden crossing, due to the location of floodplains and high water table.
- **AV Transit Centers at the Bayshore/NASA LRT station and Moffett Blvd. Interchange / NASA Research Center entrance.** New Transit Centers would offer efficiency, safety, enhanced user experience, and operational benefits. There is an existing parcel adjacent to the Bayshore/NASA Light Rail station that is currently used for RV and trailer parking and could be designated for use as a Transit Center. Another location recommended for a Transit Center is the area around the Moffett Blvd entrance to the NASA/AMES area. Any of the three recommend Alternatives could be accessed from this location, and a second Transit Center could significantly improve overall access options and transportation network functionality to/from the North Bayshore area.
- **Dedicated AV stations throughout the area.** While they are not necessarily required, AV parking lots throughout the network could also help with operational efficiency and be added as demand warrants over time. Further study of “network-connected” automated parking structures placed in key locations to service AVs and conventional vehicles is also recommended.

8.5. Next Steps

This study revealed there are several viable options to improve transportation access to the North Bayshore area that warrant further study. The following are the next steps for this study, and VTA will continue to seek funding to move forward with these next steps.

- Developing near, mid, and long-term planning and implementation phases. These efforts should focus on the implementation of bus/BRT options and the advancement automated vehicle technology through the levels of automation outlined in the Federal Automated Vehicle Policy through levels SAE 4 and SAE 5; including connected vehicles and connected transportation infrastructure such as integrated signal systems, dedicated/exclusive lanes, and comprehensive control systems operated by computerized management systems.
- Developing a phased implementation plan for AV operations, including plans for partial and fully automated operations, the gradual introduction of AVs into general traffic, and a gradual introduction of AV fleets. This would also include work to determine when to transition to at-grade dedicated and grade-separated lanes
- Planning, design for a bridge crossing at Charleston Road/Allen Road.
- Planning and design for new Transit Centers at the Bayshore/NASA station area and the Moffett Boulevard entrance to NASA/Ames.
- Begin exploration of working with companies to develop AV pilot and testing programs that could serve the North Bayshore area. These efforts would focus on the advancement of AV technology including connected vehicle technology, integrated signal systems and other transportation infrastructure, use of dedicated or exclusive lanes, and computerized management systems.
- Coordination with the City of Mountain View, regarding their AGT Study. This includes coordinating on the need for a new transportation center near the intersection of North Shoreline Boulevard and Charleston Road, and other potential station locations proposed in the AGT Study. The AGT study also recommend elements such as at-grade or elevated structures, connections with other modes, and AV options. The AGT recommendations, and the recommendations from this study, will be coordinated and so that the resulting transportation modes represent an efficient, integrated system.

Appendices:

- Cost Estimates (provided under separate cover).

Appendix A

Capital Cost Estimates

VTA North Bayshore Transportation Study
Cost Estimate Summary

	Alternative Alignment 1				Alternative Alignment 2	
	Light Rail Transit At Grade	Automated Vehicle Aerial Guideway	Automated Vehicle At Grade	Bus Rapid Transit At Grade	Automated Vehicle Aerial Guideway	Automated Vehicle At Grade
Guideway & Track Elements	\$ 68,100,000	\$ 77,900,000	\$ 11,400,000	\$ 21,500,000	\$ 79,200,000	\$ 15,900,000
Stations, Stops, Terminals, Intermodal	\$ 1,100,000	\$ 13,400,000	\$ 400,000	\$ 300,000	\$ 13,600,000	\$ 400,000
Support Facilities: Yards, Shops, Admin. Bldgs		\$ 20,000,000	\$ 20,000,000		\$ 20,000,000	\$ 20,000,000
Sitework & Special Conditions	\$ 23,400,000	\$ 14,500,000	\$ 4,400,000	\$ 3,100,000	\$ 14,700,000	\$ 4,900,000
Systems	\$ 110,500,000	\$ 600,000	\$ 2,400,000	\$ 2,300,000	\$ 400,000	\$ 1,200,000
Row, Land, Existing Improvements	\$ 3,500,000	\$ 15,900,000	\$ 17,300,000	\$ 19,100,000	\$ 16,700,000	\$ 17,400,000
Vehicles	\$ 9,600,000	\$ 1,700,000	\$ 2,000,000	\$ 3,600,000	\$ 2,200,000	\$ 2,500,000
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	\$ 25,900,000	\$ 17,300,000	\$ 6,900,000	\$ 6,000,000	\$ 17,600,000	\$ 7,500,000
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	\$ 54,000,000	\$ 36,000,000	\$ 14,500,000	\$ 12,500,000	\$ 36,700,000	\$ 15,600,000
Sub-Total Alternative Cost	\$ 296,000,000	\$ 197,000,000	\$ 79,000,000	\$ 68,000,000	\$ 201,000,000	\$ 85,000,000
Sub-Total Alternative Cost (Rounded)	\$ 296,000,000	\$ 197,000,000	\$ 79,000,000	\$ 68,000,000	\$ 201,000,000	\$ 85,000,000
40% Contingency	\$ 118,000,000	\$ 79,000,000	\$ 32,000,000	\$ 27,000,000	\$ 80,000,000	\$ 34,000,000
Total Alternative Cost	\$ 414,000,000	\$ 276,000,000	\$ 111,000,000	\$ 95,000,000	\$ 281,000,000	\$ 119,000,000
Total Alternative Cost Per Mile	\$ 157,000,000	\$ 105,000,000	\$ 42,000,000	\$ 36,000,000	\$ 105,000,000	\$ 45,000,000

MTA North Bayshore Transportation Study
Alternative 1A Light Rail Transit-At Grade

	Units	Quantity	Unit Cost	Cost
Guideway & Track Elements				\$ 68,096,000
Guideway: Aerial Structure (24' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (32' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (40' Wide)	LF	1,400	\$ 16,450	\$ 23,030,000
Guideway: At-Grade	LF	12,600	\$ 410	\$ 5,166,000
Track	TF	14,000	\$ 2,850	\$ 39,900,000
Stations, Stops, Terminals, Intermodal				\$ 1,080,000
At Grade Station (Automate Vehicle)	EA		\$ -	\$ -
At Grade Station (Bus Rapid Transit)	EA		\$ -	\$ -
At Grade Station (Light Rail Transit)	EA	3	\$ 360,000	\$ 1,080,000
Aerial Station (Automated Vehicle)	EA		\$ 2,744,000	\$ -
Elevators Escalators	EA		\$ 1,670,100	\$ -
Support Facilities: Yards, Shops, Admin. Bldgs				\$ -
Administrative Building and Maintenance Facility	LS		\$ 20,000,000	\$ -
Sitework & Special Conditions				\$ 23,363,418
Demolition 3% of Total Infrastructure Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	3%	\$ 179,718,600	\$ 5,391,558
Site Utilities, Utility Relocation 10% of Total Improvement Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	10%	\$ 179,718,600	\$ 17,971,860
Systems				\$ 110,542,600
Train Control and Signals	TF	14,000	\$ 2,850	\$ 39,900,000
Traffic Signals and Crossing Protection	EA	15	\$ 150,000	\$ 2,250,000
Traction Power Supply and Distribution	TF	14,000	\$ 3,990	\$ 55,860,000
Communication	TF	14,000	\$ 860	\$ 12,040,000
Fare Collection System and Equipment	EA	3	\$ 164,200	\$ 492,600
Central Control	EA		\$ 100,000	\$ -
Row, Land, Existing Improvements				\$ 3,472,000
ROW Acquisition	SF	56,000	\$ 62	\$ 3,472,000
Vehicles				\$ 9,610,700
Light Rail	EA	2	\$ 4,805,350	\$ 9,610,700
Bus	EA		\$ 722,920	\$ -
Automated Vehicle	EA		\$ 40,000	\$ -
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	12%	\$ 216,164,718	\$ 25,939,766
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	25%	\$ 216,164,718	\$ 54,041,180
Total				\$ 296,145,664

VTa North Bayshore Transportation Study
Alternative 1B Automated Vehicle-At Grade

	Units	Quantity	Unit Cost	Cost
Guideway & Track Elements				\$ 11,354,000
Guideway: Aerial Structure (24' Wide)	LF	1,400	\$ 6,040	\$ 8,456,000
Guideway: Aerial Structure (32' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (40' Wide)	LF		\$ -	\$ -
Guideway: At-Grade	LF	12,600	\$ 230	\$ 2,898,000
Track	TF		\$ 2,850	\$ -
Stations, Stops, Terminals, Intermodal				\$ 382,000
At Grade Station (Automate Vehicle)	EA	5	\$ 76,400	\$ 382,000
At Grade Station (Bus Rapid Transit)	EA		\$ -	\$ -
At Grade Station (Light Rail Transit)	EA	3	\$ -	\$ -
Aerial Station (Automated Vehicle)	EA		\$ 2,744,000	\$ -
Elevators Escalators	EA		\$ 1,670,100	\$ -
Support Facilities: Yards, Shops, Admin. Bldgs				\$ 20,000,000
Administrative Building and Maintenance Facility	LS	1	\$ 20,000,000	\$ 20,000,000
Sitework & Special Conditions				\$ 4,431,180
Demolition 3% of Total Infrastructure Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	3%	\$ 34,086,000	\$ 1,022,580
Site Utilities, Utility Relocation 10% of Total Improvement Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	10%	\$ 34,086,000	\$ 3,408,600
Systems				\$ 2,350,000
Train Control and Signals	TF		\$ 2,850	\$ -
Traffic Signals and Crossing Protection	EA	15	\$ 150,000	\$ 2,250,000
Traction Power Supply and Distribution	TF	-	\$ 3,990	\$ -
Communication	TF		\$ 860	\$ -
Fare Collection System and Equipment	EA		\$ 164,200	\$ -
Central Control	EA	1	\$ 100,000	\$ 100,000
Row, Land, Existing Improvements				\$ 17,329,000
ROW Acquisition	SF	279,500	\$ 62	\$ 17,329,000
Vehicles				\$ 2,000,000
Light Rail	EA		\$ 4,805,350	\$ -
Bus	EA		\$ 722,920	\$ -
Automated Vehicle	EA	50	\$ 40,000	\$ 2,000,000
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	12%	\$ 57,846,180	\$ 6,941,542
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	25%	\$ 57,846,180	\$ 14,461,545
Total				\$ 79,249,267

VTa North Bayshore Transportation Study
Alternative 1C Automated Vehicle-Aerial Guidway

	Units	Quantity	Unit Cost	Cost
Guideway & Track Elements				\$ 77,900,000
Guideway: Aerial Structure (24' Wide)	LF	13,000	\$ 5,980	\$ 77,740,000
Guideway: Aerial Structure (32' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (40' Wide)	LF		\$ -	\$ -
Guideway: At-Grade	LF	1,000	\$ 160	\$ 160,000
Track	TF		\$ 2,850	\$ -
Stations, Stops, Terminals, Intermodal				\$ 13,395,100
At Grade Station (Automate Vehicle)	EA	2	\$ 76,400	\$ 152,800
At Grade Station (Bus Rapid Transit)	EA		\$ -	\$ -
At Grade Station (Light Rail Transit)	EA	3	\$ -	\$ -
Aerial Station (Automated Vehicle)	EA	3	\$ 2,744,000	\$ 8,232,000
Elevators Escalators	EA	3	\$ 1,670,100	\$ 5,010,300
Support Facilities: Yards, Shops, Admin. Bldgs				\$ 20,000,000
Administrative Building and Maintenance Facility	LS	1	\$ 20,000,000	\$ 20,000,000
Sitework & Special Conditions				\$ 14,539,863
Demolition 3% of Total Infrastructure Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	3%	\$ 111,845,100	\$ 3,355,353
Site Utilities, Utility Relocation 10% of Total Improvement Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	10%	\$ 111,845,100	\$ 11,184,510
Systems				\$ 550,000
Train Control and Signals	TF		\$ 2,850	\$ -
Traffic Signals and Crossing Protection	EA	3	\$ 150,000	\$ 450,000
Traction Power Supply and Distribution	TF		\$ 3,990	\$ -
Communication	TF		\$ 860	\$ -
Fare Collection System and Equipment	EA		\$ 164,200	\$ -
Central Control	EA	1	\$ 100,000	\$ 100,000
Row, Land, Existing Improvements				\$ 15,890,600
ROW Acquisition	SF	256,300	\$ 62	\$ 15,890,600
Vehicles				\$ 1,720,000
Light Rail	EA		\$ 4,805,350	\$ -
Bus	EA		\$ 722,920	\$ -
Automated Vehicle	EA	43	\$ 40,000	\$ 1,720,000
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	12%	\$ 143,995,563	\$ 17,279,468
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	25%	\$ 143,995,563	\$ 35,998,891
Total				\$ 197,273,921

MTA North Bayshore Transportation Study
Alternative 1D Bus Rapid Transit-At Grade

	Units	Quantity	Unit Cost	Cost
Guideway & Track Elements				\$ 21,462,000
Guideway: Aerial Structure (24' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (32' Wide)	LF	1,400	\$ 13,170	\$ 18,438,000
Guideway: Aerial Structure (40' Wide)	LF		\$ -	\$ -
Guideway: At-Grade	LF	12,600	\$ 240	\$ 3,024,000
Track	TF		\$ 2,850	\$ -
Stations, Stops, Terminals, Intermodal				\$ 305,600
At Grade Station (Automate Vehicle)	EA		\$ -	\$ -
At Grade Station (Bus Rapid Transit)	EA	4	\$ 76,400	\$ 305,600
At Grade Station (Light Rail Transit)	EA	3	\$ -	\$ -
Aerial Station (Automated Vehicle)	EA		\$ 2,744,000	\$ -
Elevators Escalators	EA		\$ 1,670,100	\$ -
Support Facilities: Yards, Shops, Admin. Bldgs				\$ -
Administrative Building and Maintenance Facility	LS		\$ 20,000,000	\$ -
Sitework & Special Conditions				\$ 3,122,288
Demolition 3% of Total Infrastructure Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	3%	\$ 24,017,600	\$ 720,528
Site Utilities, Utility Relocation 10% of Total Improvement Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	10%	\$ 24,017,600	\$ 2,401,760
Systems				\$ 2,250,000
Train Control and Signals	TF		\$ 2,850	\$ -
Traffic Signals and Crossing Protection	EA	15	\$ 150,000	\$ 2,250,000
Traction Power Supply and Distribution	TF		\$ 3,990	\$ -
Communication	TF		\$ 860	\$ -
Fare Collection System and Equipment	EA		\$ 164,200	\$ -
Central Control	EA		\$ 100,000	\$ -
Row, Land, Existing Improvements				\$ 19,114,600
ROW Acquisition	SF	308,300	\$ 62	\$ 19,114,600
Vehicles				\$ 3,614,600
Light Rail	EA		\$ 4,805,350	\$ -
Bus	EA	5	\$ 722,920	\$ 3,614,600
Automated Vehicle	EA		\$ 40,000	\$ -
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	12%	\$ 49,869,088	\$ 5,984,291
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	25%	\$ 49,869,088	\$ 12,467,272
Total				\$ 68,320,651

VTA North Bayshore Transportation Study
Alternative 2A Automated Vehicle-At Grade

	Units	Quantity	Unit Cost	Cost
Guideway & Track Elements				\$ 15,928,000
Guideway: Aerial Structure (24' Wide)	LF	2,200	\$ 6,040	\$ 13,288,000
Guideway: Aerial Structure (32' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (40' Wide)	LF		\$ -	\$ -
Guideway: At-Grade	LF	12,000	\$ 220	\$ 2,640,000
Track	TF		\$ 2,850	\$ -
Stations, Stops, Terminals, Intermodal				\$ 382,000
At Grade Station (Automate Vehicle)	EA	5	\$ 76,400	\$ 382,000
At Grade Station (Bus Rapid Transit)	EA		\$ -	\$ -
At Grade Station (Light Rail Transit)	EA	3	\$ -	\$ -
Aerial Station (Automated Vehicle)	EA		\$ 2,744,000	\$ -
Elevators Escalators	EA		\$ 1,670,100	\$ -
Support Facilities: Yards, Shops, Admin. Bldgs				\$ 20,000,000
Administrative Building and Maintenance Facility	LS	1	\$ 20,000,000	\$ 20,000,000
Sitework & Special Conditions				\$ 4,869,800
Demolition 3% of Total Infrastructure Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	3%	\$ 37,460,000	\$ 1,123,800
Site Utilities, Utility Relocation 10% of Total Improvement Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	10%	\$ 37,460,000	\$ 3,746,000
Systems				\$ 1,150,000
Train Control and Signals	TF		\$ 2,850	\$ -
Traffic Signals and Crossing Protection	EA	7	\$ 150,000	\$ 1,050,000
Traction Power Supply and Distribution	TF		\$ 3,990	\$ -
Communication	TF		\$ 860	\$ -
Fare Collection System and Equipment	EA		\$ 164,200	\$ -
Central Control	EA	1	\$ 100,000	\$ 100,000
Row, Land, Existing Improvements				\$ 17,384,800
ROW Acquisition	SF	280,400	\$ 62	\$ 17,384,800
Vehicles				\$ 2,520,000
Light Rail	EA		\$ 4,805,350	\$ -
Bus	EA		\$ 722,920	\$ -
Automated Vehicle	EA	63	\$ 40,000	\$ 2,520,000
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	12%	\$ 62,234,600	\$ 7,468,152
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	25%	\$ 62,234,600	\$ 15,558,650
Total				\$ 85,261,402

VTA North Bayshore Transportation Study
Alternative 2B Automated Vehicle-Aerial Guideway

	Units	Quantity	Unit Cost	Cost
Guideway & Track Elements				\$ 79,228,000
Guideway: Aerial Structure (24' Wide)	LF	13,200	\$ 5,990	\$ 79,068,000
Guideway: Aerial Structure (32' Wide)	LF		\$ -	\$ -
Guideway: Aerial Structure (40' Wide)	LF		\$ -	\$ -
Guideway: At-Grade	LF	1,000	\$ 160	\$ 160,000
Track	TF		\$ 2,850	\$ -
Stations, Stops, Terminals, Intermodal				\$ 13,625,500
At Grade Station (Automate Vehicle)	EA	2	\$ 191,600	\$ 383,200
At Grade Station (Bus Rapid Transit)	EA		\$ -	\$ -
At Grade Station (Light Rail Transit)	EA	3	\$ -	\$ -
Aerial Station (Automated Vehicle)	EA	3	\$ 2,744,000	\$ 8,232,000
Elevators Escalators	EA	3	\$ 1,670,100	\$ 5,010,300
Support Facilities: Yards, Shops, Admin. Bldgs				\$ 20,000,000
Administrative Building and Maintenance Facility	LS	1	\$ 20,000,000	\$ 20,000,000
Sitework & Special Conditions				\$ 14,722,955
Demolition 3% of Total Infrastructure Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	3%	\$ 113,253,500	\$ 3,397,605
Site Utilities, Utility Relocation 10% of Total Improvement Cost (Guideway and Track Elements, Stations, Sitework, Systems)	PCT	10%	\$ 113,253,500	\$ 11,325,350
Systems				\$ 400,000
Train Control and Signals	TF		\$ 2,850	\$ -
Traffic Signals and Crossing Protection	EA	2	\$ 150,000	\$ 300,000
Traction Power Supply and Distribution	TF		\$ 3,990	\$ -
Communication	TF		\$ 860	\$ -
Fare Collection System and Equipment	EA		\$ 164,200	\$ -
Central Control	EA	1	\$ 100,000	\$ 100,000
Row, Land, Existing Improvements				\$ 16,690,400
ROW Acquisition	SF	269,200	\$ 62	\$ 16,690,400
Vehicles				\$ 2,200,000
Light Rail	EA		\$ 4,805,350	\$ -
Bus	EA		\$ 722,920	\$ -
Automated Vehicle	EA	55	\$ 40,000	\$ 2,200,000
General (Mobilization, Environmental) 12% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	12%	\$ 146,866,855	\$ 17,624,023
Engineering (Administrative, Preliminary, Final, Construction) 25% of Total Improvement Cost (Guideway and Track Elements, Stations, Support Facilities, Sitework, Systems, ROW Acquisition)	PCT	25%	\$ 146,866,855	\$ 36,716,714
Total				\$ 201,207,591



Date: April 4, 2018
 Current Meeting: April 12, 2018
 Board Meeting: N/A

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: Using Big Data for CMP Monitoring Report

FOR INFORMATION ONLY

BACKGROUND:

Every two years, the Santa Clara Valley Transportation Authority (VTA) measures traffic conditions on major county roadway facilities that are part of the Congestion Management Program (CMP) network. The VTA CMP network is comprised of freeways, expressways, urban arterials and rural highways in Santa Clara County. VTA conducts this monitoring effort in order to meet the requirements of the Level of Service (LOS) element of the CMP (California Statute, Government code 65088). Since 1997, VTA has used aerial photography to collect the monitoring data. The results of the data collections are compiled into the annual *CMP Monitoring and Conformance Report* which is adopted by the VTA Board of Directors.

Recently, new data technologies and performance measurement approaches have been transforming congestion monitoring practices. These technologies and approaches revolve around the emerging field of Big Data and Analytics (Big Data). As part of the 2017 CMP, VTA noted that a transition to big data could improve the monitoring program by providing more data at a lower cost and by widening the scope of congestion analysis.

VTA has been working with VTA's Technical Advisory Committee's working group, the Systems Operations & Management (SOM) Committee to help transition from aerial photography to Big Data.

DISCUSSION:

With the aerial photography method, each CMP freeway segment was captured via aerial photography four times during the AM (6:15 - 9:45 AM) and PM (3:15 - 6:45 PM) peak periods during the month of September. For each CMP segment, the number of vehicles were counted and a traffic density value was determined based on the segment's length, the number of cars and

the number of lanes. The AM and PM photos with the highest density value were then reported as the density and corresponding LOS for that segment. The speed and volume estimates were calculated using the density for each segment.

With Big Data, VTA will use information obtained from INRIX, which is a private provider of speed data collected for most roadways on a regional scale. INRIX aggregates traffic from GPS-enabled vehicles, mobile devices, traditional road sensors and hundreds of other sources. Traffic data from these sources are collected and aggregated for every minute. This traffic data is reported by INRIX using discrete roadway links that are termed as Traffic Message Channels (TMCs). The data that is collected through INRIX is an aggregate of traffic and not of specific driver behavior.

VTA will use INRIX to capture speed data in 15-minute intervals during the morning and evening peak periods in September and October. These months are selected because they are typically the peak months for traffic. VTA will use the speed data to calculate traffic volumes and density.

Changing methodologies to calculate traffic congestion will likely result in some different findings than in previous reports. However VTA expects these will be minor. Additionally, as with every year, changes in infrastructure, land-use and growth will also lead to changes in congestion findings. Overall, the transition to Big Data will provide more detailed traffic data for Member Agencies.

The next *CMP Monitoring and Conformance Report* is scheduled to be brought to committees in May and will include the transition to Big Data.

Prepared By: John Sighamony
Memo No. 6459



Date: April 3, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: Express Bus Performance Report

FOR INFORMATION ONLY

BACKGROUND:

In an effort to inform discussions about the highest and best uses of VTA transit dollars, this memo provides a performance report of VTA's Express bus program, which has remained largely unchanged for years and is in need of a fresh look in light of changes to the regional travel market and operating environment.

Because the introduction of BART service to Santa Clara County will have a significant impact on long-distance travel patterns, VTA's long-distance Express bus network was not studied as part of the Next Network transit service plan. As a first step in analyzing the Express bus network for potential changes, this memo provides a review of the Express bus network's performance.

VTA currently operates 13 Express bus routes specifically designed to serve commuters making long-distance trips to major employment centers. These 100-series routes typically offer a few one-way trips during each weekday commute period. These long-distance routes complement VTA's non-Express bus and light rail routes that focus on the shorter-distance travel market.

VTA currently operates four Express routes that serve as a connection with BART at the Fremont BART station in Alameda County: Express 120 (Lockheed Martin and Shoreline), 140 (Mission College), 180 (Great Mall and Aborn/White), and 181 (Diridon Station). Per the BART Silicon Valley Berryessa Extension project plan, the Next Network service plan allocates the resources from these routes to non-Express routes that will connect with BART at Milpitas and Berryessa. As such, these four routes will be discontinued upon introduction of the Next Network and are not discussed in this performance report.

DISCUSSION:

This performance report provides a high-level review of VTA's Express bus program.

Attachment A provides a map of the Express network and a summary of Express performance. All costs and performance figures are from the most recent quarter of service (October 2017 -- December 2017).

THE EXPRESS NETWORK

VTA operates nine Express routes that are not related to BART and will continue to operate as part of the Next Network service plan. Each Express route follows a consistent design: one-way commuter service from a residential area (sometimes several) to an employment area in the morning and the reverse in late afternoon. They typically utilize the freeway's High Occupancy Vehicle lane (HOV) network for non-stop travel between the home and work ends. Service is provided during weekday peak periods only; there is no midday or weekend service. Many Express riders are daily riders and enjoy a reliable and fast commute. The Express routes can be grouped by the employment area they serve (see Attachment A map):

To Stanford Research Park:

Express 101 from Camden & Highway 85

Express 102 from South San Jose

Express 103 from Eastridge

Express 104 from Penitencia Creek Transit Center

To Moffett Park:

Express 121 from Gilroy and Morgan Hill

Express 122 from South San Jose

To Downtown San Jose:

Express 168 from Gilroy and Morgan Hill

To Mountain View:

Express 185 from Gilroy and Morgan Hill

To IBM/Bailey Avenue (reverse commute; southbound in the AM):

Express 182 from Palo Alto and Valco

THE EXPRESS FLEET

Express service is provided with specialized over-the-road coaches designed for long-distance service. Express buses are Gillig 40-foot diesel-electric hybrid premium coaches (ADA accessible) designed specifically for non-stop long-distance service, featuring:

- Reclining, high-back seats
- Free Wi-Fi
- Personal reading lights
- Overhead storage racks
- Footrests
- Single door at the front

VTA owns 50 Express vehicles (20 manufactured in 2011, 20 in 2014, and 10 in 2016), though at current service levels and traffic speeds, the Express network of nine routes requires just 40 vehicles at peak (including a 20% “spares” buffer). Because they lack a rear door to facilitate simultaneous boarding and alighting, Express vehicles are not well-suited for use on non-Express routes. However, VTA deploys some of the extra Express buses on a handful of special school-oriented “trippers” on school days (because these trippers have relatively low turnover).

PERFORMANCE

Attachment B shows key performance indicators for the Express network, using data from the most recent quarter of October - December 2017 and using FY18 unit costs. Express ridership, like public transit ridership in general, fluctuates from quarter to quarter depending on the season; performance figures from the October - December quarter as discussed in this memo are representative of the routes’ yearlong “typical” performance. Note the first group of columns report boardings, service hours, and costs *per weekday*. The second group of columns show planning-level cost and fare revenue estimates by route.

Rider Demographics

In 2017, VTA conducted an on-board survey (with over 15,000 responses) to gather information about transit riders’ trip patterns, preferences, and demographics. Survey responses provide insight into Express ridership -- 55% are male, 8% are students, 96% have at least one vehicle in the household, and 93% are between ages 25 and 64. In addition, the data also provides insight into the demographics of Express bus riders *as compared to non-Express bus riders*.

Survey responses indicate that when compared to non-Express riders, Express riders have much higher income, are nearly twice as likely to have a driver license, much less likely to have a mobility disability, and much more likely to have proficiency in English:

	<u>Express Riders</u>	<u>Non-Express Riders</u>
Household income > \$100,000	48%	10%
Household income < \$50,000	6%	38%
Have a driver license	91%	47%
Have a mobility disability	< 1%	7%
Have limited English proficiency	< 1%	6%

Ridership and Productivity

Express routes collectively had 1,298 daily boardings, or 649 roundtrip riders, which is low. However, ridership is not the only measure of an Express route’s success. Express routes also serve a unique purpose to provide long-distance service for riders making long journeys. As such, rider trip distances are comparatively long on the Express network. The average Express bus rider made a 30-mile journey onboard the bus, which is significantly longer than the average 3-mile journey for non-Express riders.

All of the Express routes had very low productivity, measured in boardings per total hour. This key performance metric is used to evaluate the effectiveness of VTA transit dollars by

determining the number of riders carried per hour of service. The nine Express routes had between 2.8 and 9.9 boardings per hour, with an average of 7.2 boardings per hour. For comparison, the non-Express bus average was 20.7 boardings per hour. VTA's Transit Service Guidelines, to be considered by the Board of Directors in April 2018, establishes a minimum productivity standard of 15 boardings per hour, which none of the Express routes would meet.

Importantly, the Express routes' low productivity is largely due to their service design and not a problem of "empty buses." In fact, the average Express bus carries about 20 riders, half a full bus. It is the design of Express service itself that limits productivity. Urban transit is most productive on routes with high turnover, where riders board and alight all along the length of a route. Turnover on Express routes, however, is much lower and therefore boardings per hour of service is lower. In fact, in an ideal scenario (indicated on the last row of the Attachment B table) where every Express bus was 100% full (a rider in every seat), the Express network would average just 15.5 boardings per hour, still far lower than VTA's non-Express network average.

Cost and Fare Revenue

Based on performance for the quarter, the nine Express routes had an annualized fully-allocated cost of approximately \$10 million, with an estimated \$500,000 in offsetting fare revenue. This equates to a farebox recovery rate of 5% and a net cost per boarding (after fare revenue) of \$27.95. For comparison, VTA's non-Express bus farebox recovery for the quarter was 11% with a net cost per boarding of \$7.63. (These are planning-level estimates of the Express routes' costs and fare revenues; systemwide figures are reported in VTA's Comprehensive Annual Financial Report and Biennial Budget.)

For many years, VTA received capital funds from the Federal Transit Administration (Sections 5307 and 5309) as a result of operating Express buses in High Occupancy Vehicle lanes, however VTA no longer receives these funds due to eligibility changes in these funding programs. The funds had been a significant and longstanding justification for continuing the Express program, as the funds helped offset the cost of the Express bus program. Due to changes in the federal program's definition of "fixed guideway," VTA Express buses no longer qualify for these funds.

On a unit cost basis, Express bus service costs more to provide than non-Express bus service due to several factors that drive up its unit cost (service hours):

1. It costs more to buy, store, and maintain a sub-fleet of Express vehicles that are only used for brief periods each day and that are not well-suited for non-Express routes.
2. Express bus service schedules are less efficient because buses have to travel long distances before and after their revenue trips. (Non-revenue time for VTA's Express routes makes up 42% of their total hours, which is significantly higher than 8% for non-Express routes.)
3. Express service is less efficient to schedule into full-time operator shifts because the service is only offered during short peak periods.

The unique Express service characteristics of low ridership turnover, long-distance non-stop travel, and higher unit costs are the reason transit operators like VTA charge a higher Express fare. VTA's adult cash Express fare was \$4, compared to \$2 for non-Express routes. However, about 50% of Express riders boarded free with a VTA EcoPass unlimited ride pass (renamed SmartPass on January 1) provided through their employer, school, or other institution. On January 1, VTA rolled out a new fare structure that aims to improve the average fare per boarding on the Express network through higher fares and a restructured pass program.

Collaboration

Many of VTA's Express routes are the result of close collaboration between VTA and regional institutions and employment groups, such as Stanford Research Park and San Jose State University. In coordination with employer groups and institutions, VTA staff continually monitor passenger loads and ridership patterns to inform service adjustments designed to respond to rider demand. As such, staff continually adjust schedules, modify route alignments, add trips where warranted, and discontinue unpopular trips. Also note that changes to VTA Express routes would directly impact the SmartPass (formerly EcoPass) program.

NEXT STEPS

This performance report is provided for reference as VTA discusses the highest and best use of its transit operating dollars. VTA can proceed with one of two options or a combination thereof regarding the Express bus network as listed below. Board discussion and guidance on express service given current performance and VTA's financial condition would be beneficial as staff proceeds with the next steps.

1. VTA can continue to operate the Express bus network as it exists today, but conduct a planning study to evaluate the network and develop a new Express bus service plan for implementation in 2019. The study would be similar to the Next Network Transit Service Plan for the non-Express bus network that was conducted between 2015 and 2017. This option would assume no change to the Express bus network's overall level of service (no increase or decrease in resources).
2. VTA can explore the redistribution of some or all of the resources devoted to the Express bus network to more effective transit solutions. Staff can develop a proposal to redistribute Express bus resources to more productive transit routes in the non-Express bus network. Staff can also explore alternative commuter service solutions that may be more cost-effective than Express buses, including vanpools, carpools, and other public-private partnerships.

Prepared By: Jay Tyree
Memo No. 6460

VTA Express

excludes Fremont BART Express routes;
farebox and net cost are planning-level estimates

performance for October - December 2017

9 routes

50 Express vehicle fleet size

40 vehicles needed for peak service (incl. spares)

649 roundtrip riders per day

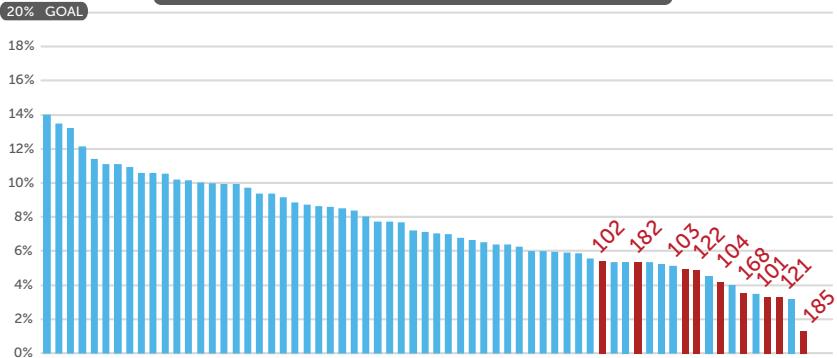
30 miles average trip length

\$10M annual operating cost (fully-allocated)

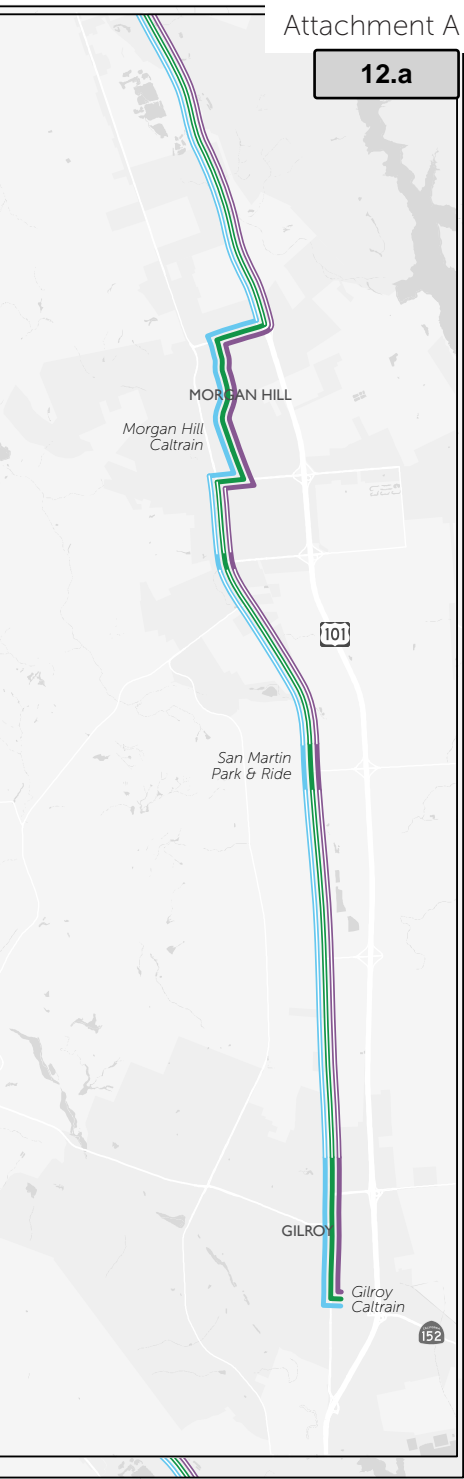
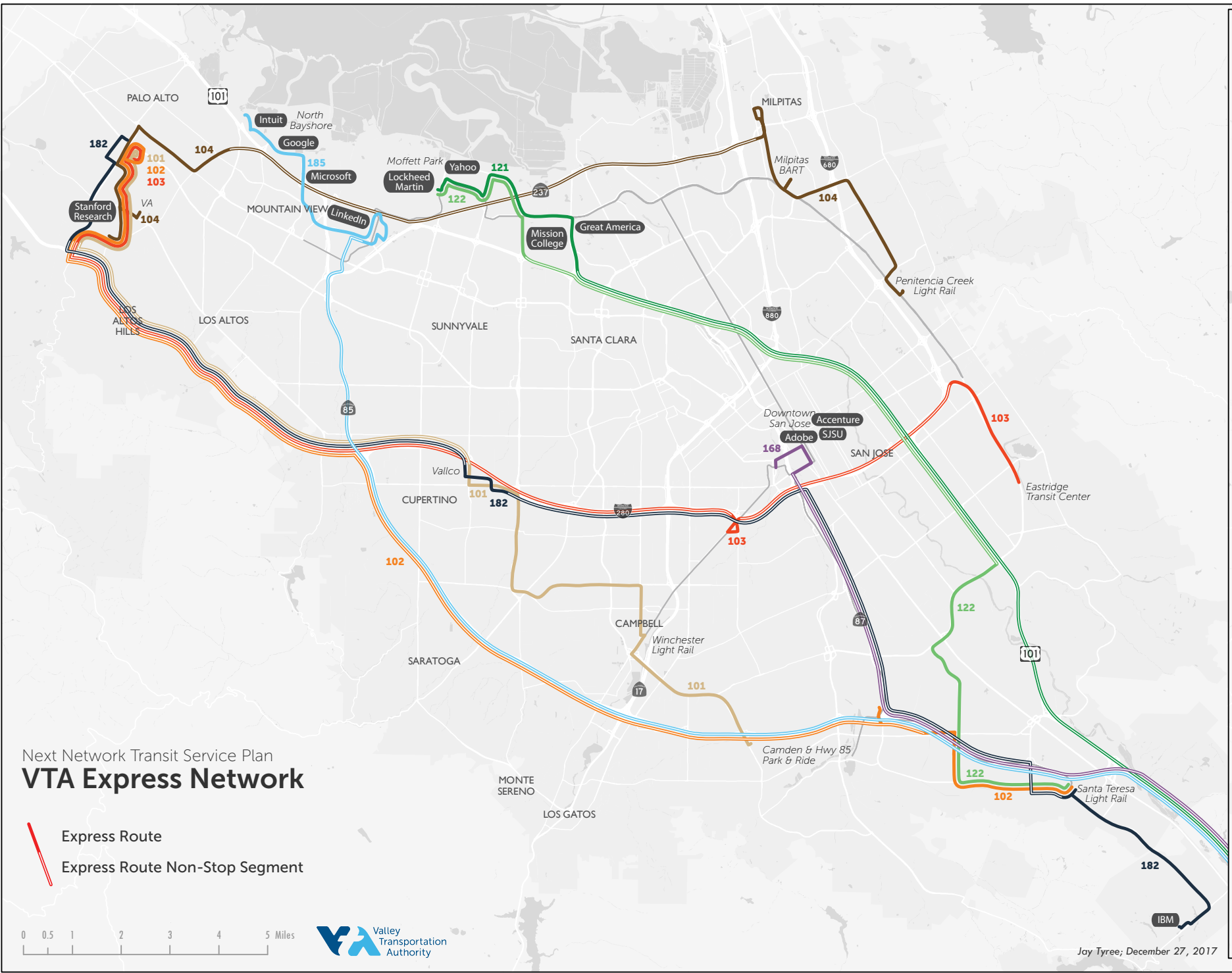
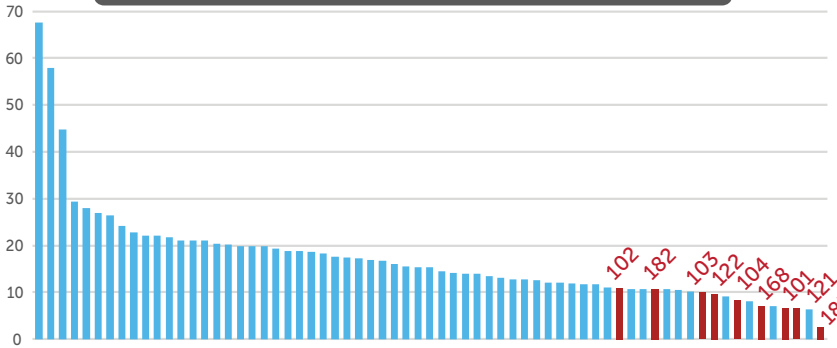
5% average farebox recovery

\$27.95 net cost per rider

FAREBOX RECOVERY (ALL VTA ROUTES)



BOARDINGS PER TOTAL HOUR (ALL VTA ROUTES)



to Stanford Research Park

101
Camden & Hwy 85 -- Palo Alto
2 trips each direction daily
13 passengers/trip (33% full)

to Moffett Park

103
Eastridge -- Palo Alto
4 trips each direction daily
20 passengers/trip (51% full)

to downtown San Jose

121
Gilroy -- Moffett Park
6 trips each direction daily
17 passengers/trip (44% full)

reverse commute

182
Palo Alto -- IBM/Bailey Ave
1 trip each direction daily
14 passengers/trip (36% full)

to Mountain View

185
Gilroy -- Mountain View
3 trips each direction daily
9 passengers/trip (23% full)

102

South San Jose -- Palo Alto
7 trips each direction daily
22 passengers/trip (56% full)

104

Penitencia Creek -- Palo Alto
2 trips each direction daily
19 passengers/trip (49% full)

122

South San Jose -- Moffett Park
1 trip each direction daily
20 passengers/trip (51% full)

COUNT PER DAY							PRODUCTIVITY FOR THE QUARTER			
							SORT ▼			
VTA EXPRESS routes	BOARDINGS	REVENUE HOURS	TOTAL HOURS	GROSS COST	FARE REVENUE	NET COST	BOARDINGS / TOTAL HOUR	FAREBOX RATIO	NET COST / BOARDING	REV HR / TOT HR
102 South San Jose -- Palo Alto	306	20	31	\$6,514	\$481	\$6,033	9.9	7%	\$19.69	64%
122 South San Jose -- Lockheed/Moffett	40	2	4	\$849	\$62	\$787	9.9	7%	\$19.85	57%
103 Eastridge Transit Center -- Palo Alto	156	11	17	\$3,532	\$245	\$3,287	9.3	7%	\$21.07	65%
104 Penitencia Creek Transit Center -- Palo Alto	77	6	9	\$1,967	\$120	\$1,846	8.2	6%	\$24.08	67%
168 Gilroy Transit Center -- San Jose Diridon	284	18	38	\$8,073	\$446	\$7,627	7.4	6%	\$26.82	47%
182 Palo Alto -- IBM/Bailey Ave	28	3	4	\$825	\$44	\$781	7.2	5%	\$27.89	67%
121 Gilroy Transit Center -- Lockheed/Moffett	298	28	49	\$10,405	\$468	\$9,937	6.1	5%	\$33.31	57%
101 Camden & Hwy 85 -- Palo Alto	52	6	9	\$1,896	\$82	\$1,814	5.8	4%	\$34.67	64%
185 Gilroy Transit Center -- E Whisman/Shoreline	56	12	20	\$4,247	\$88	\$4,159	2.8	2%	\$74.28	58%
<i>Express routes sum/average</i>	<i>1,298</i>	<i>105</i>	<i>181</i>	<i>\$38,309</i>	<i>\$2,037</i>	<i>\$36,272</i>	<i>7.2</i>	<i>5%</i>	<i>\$27.95</i>	<i>58%</i>
<i>...ideal scenario (every Express bus 100% full)</i>	<i>2,808</i>	<i>105</i>	<i>181</i>	<i>\$38,309</i>	<i>\$4,409</i>	<i>\$33,900</i>	<i>15.5</i>	<i>12%</i>	<i>\$12.07</i>	<i>58%</i>

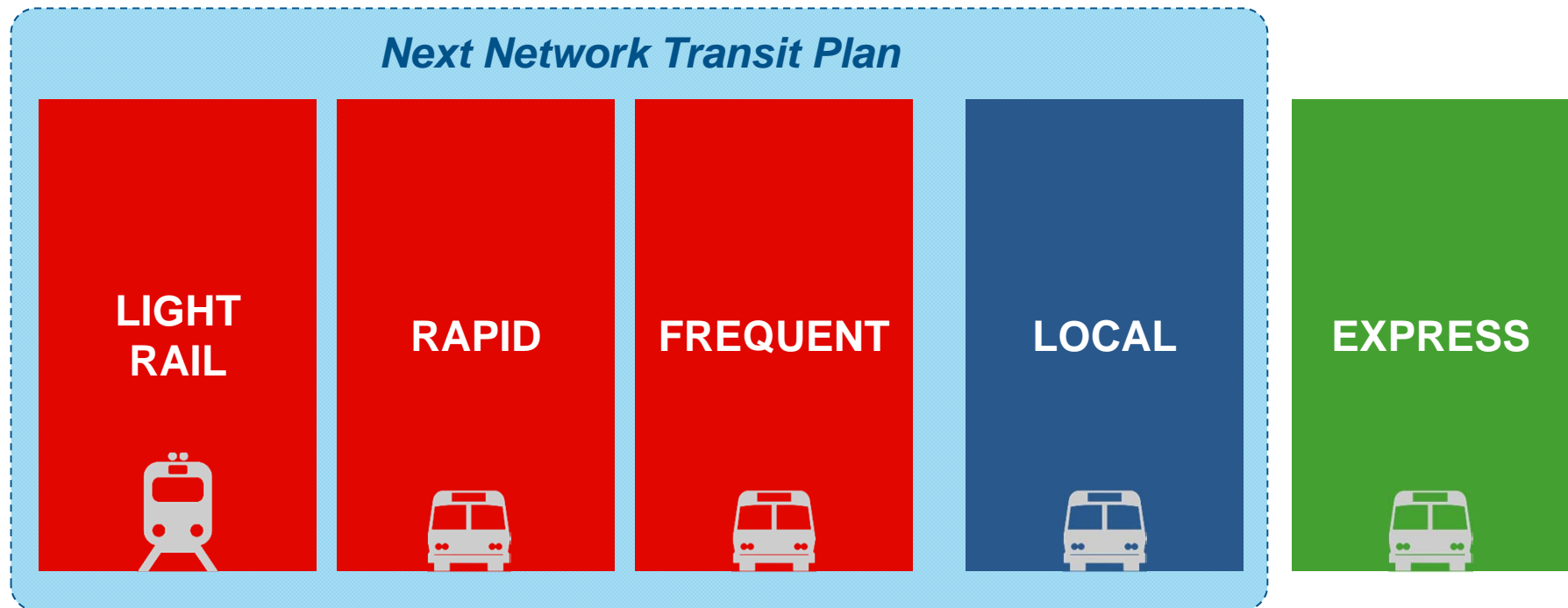
CAC Agenda Item 16
TAC Agenda Item 13
PAC Agenda Item 12

Express Bus Performance Report

Spring 2018

April Advisory Committees

Next Network Transit Plan Excludes Express Program



History of VTA Express Bus Program

- Many routes have operated since late 1970's, some newer
 - Productivity has historically been poor, despite service improvements
 - **2011 Express Bus Business Plan** was most recent comprehensive study
 - Employer engagement
 - Rider and community surveys
 - Market research
 - New service plan
- ***Performance continues to decline***

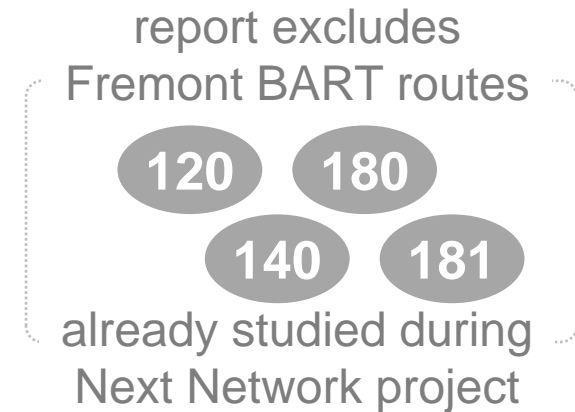
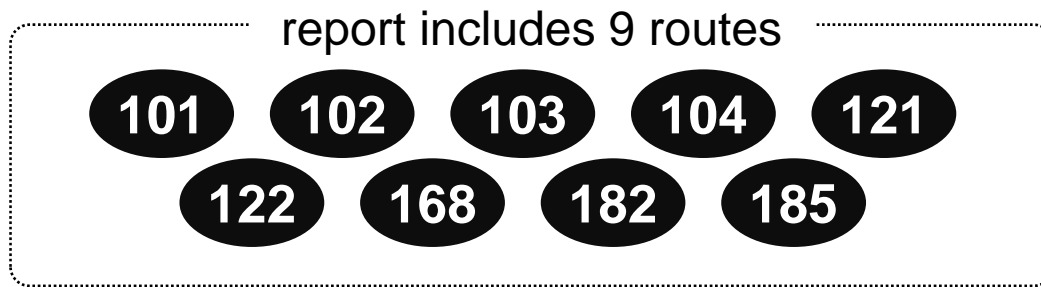


Express Bus Service Design



- Long-distance trips
- Home ↔ Work trips
- Travel non-stop in HOV lanes
- Weekday peak periods only
- One-way (in commute direction)

This Express Bus Performance Report



- Performance data from most recent quarter (October – December 2017)
- Purpose: information to inform discussion
- *Staff seeks guidance on next steps for the Express bus program*

Express Bus Routes Grouped by Employment Center

Stanford Research Park

- 101** Campbell, SR-85 Park & Ride
- 102** South San Jose (Santa Teresa)
- 103** East San Jose (Eastridge)
- 104** Milpitas, Berryessa

IBM / Bailey Ave

- 182** Palo Alto, Vallco



Moffett Park

- 121** Gilroy, Morgan Hill
- 122** South San Jose (Santa Teresa)

Downtown San Jose

- 168** Gilroy, Morgan Hill

North Bayshore

- 185** Gilroy, Morgan Hill

Express Bus Vehicles

Similar to standard 40-foot buses, but with premium features:

- Reclining, high-back seats
- Wi-Fi
- Personal reading lights
- Overhead storage racks
- Footrests
- Single door at the front

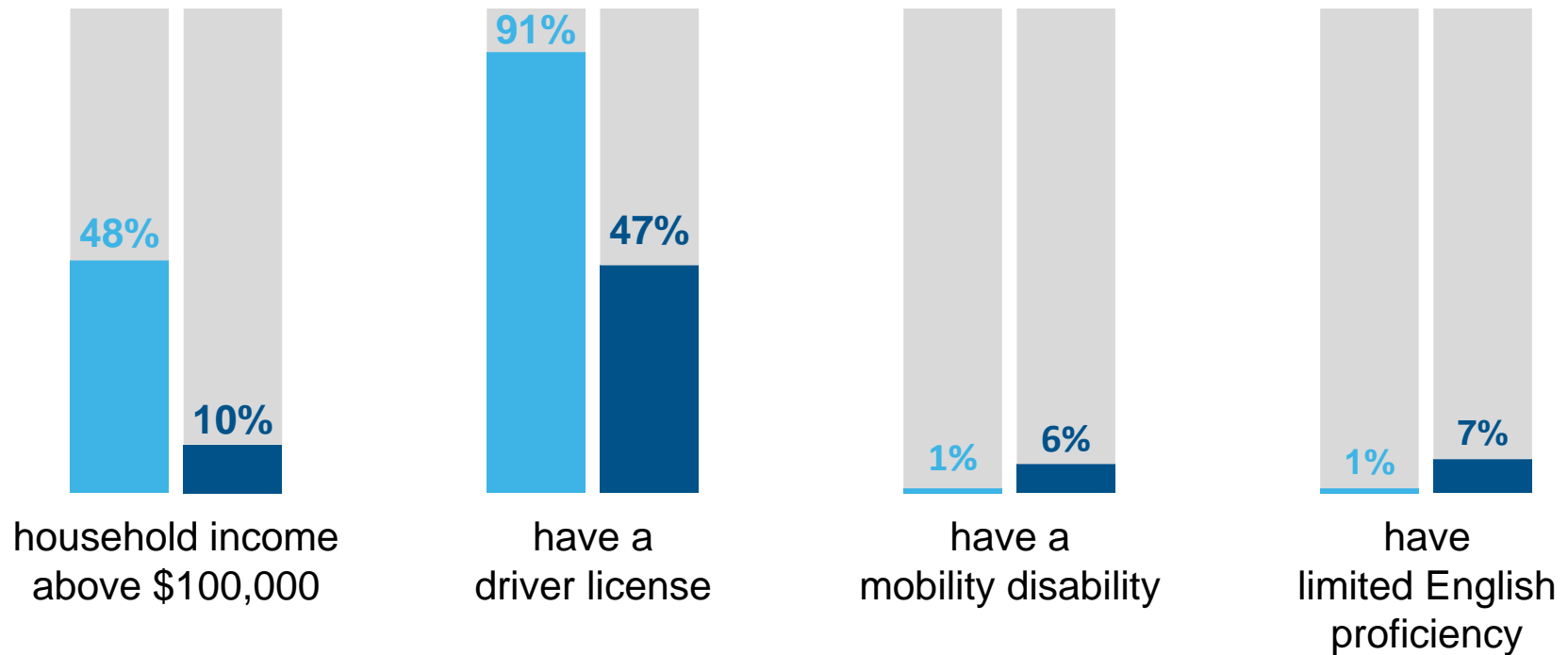
VTA owns **50**



Express Bus Rider Demographics

Express riders

all VTA riders



Ridership for All Nine Express Bus Routes

1,298

daily
boardings

649

daily riders
making a roundtrip

30

miles
average trip distance

Cost and Fare Revenue for All Nine Express Bus Routes

\$10 million

annual cost of service
(fully-allocated cost)

\$500,000

fare revenue

Productivity for All Nine Express Bus Routes

18

riders onboard
each bus trip

46%

full
(seats occupied)

7.2

boardings per
hour

5%

farebox
recovery

\$27.95

cost per boarding

Productivity for All Nine Express Bus Routes

VTA local bus

18

riders onboard
each bus trip

46%

full
(seats occupied)

7.2

boardings per
hour

20.5

5%

farebox
recovery

11%

\$27.95

cost per boarding

\$7.63

Fundamental Challenges of Express Bus Service Design

- On long-distance non-stop routes, ridership turnover is near zero, so productivity and fare revenue are low
- Higher unit cost for Express bus service than local bus
 - Sub-fleet of specialized vehicles (maintenance, training, etc.)
 - Long travel before + after trips (“non-revenue” time)
 - Inefficient scheduling of full-time operators for peak-only services

“Perfect Ridership” Scenario (every seat occupied)

39

riders onboard
each bus trip

100%

full
(seats occupied)

15.5

boardings per
hour

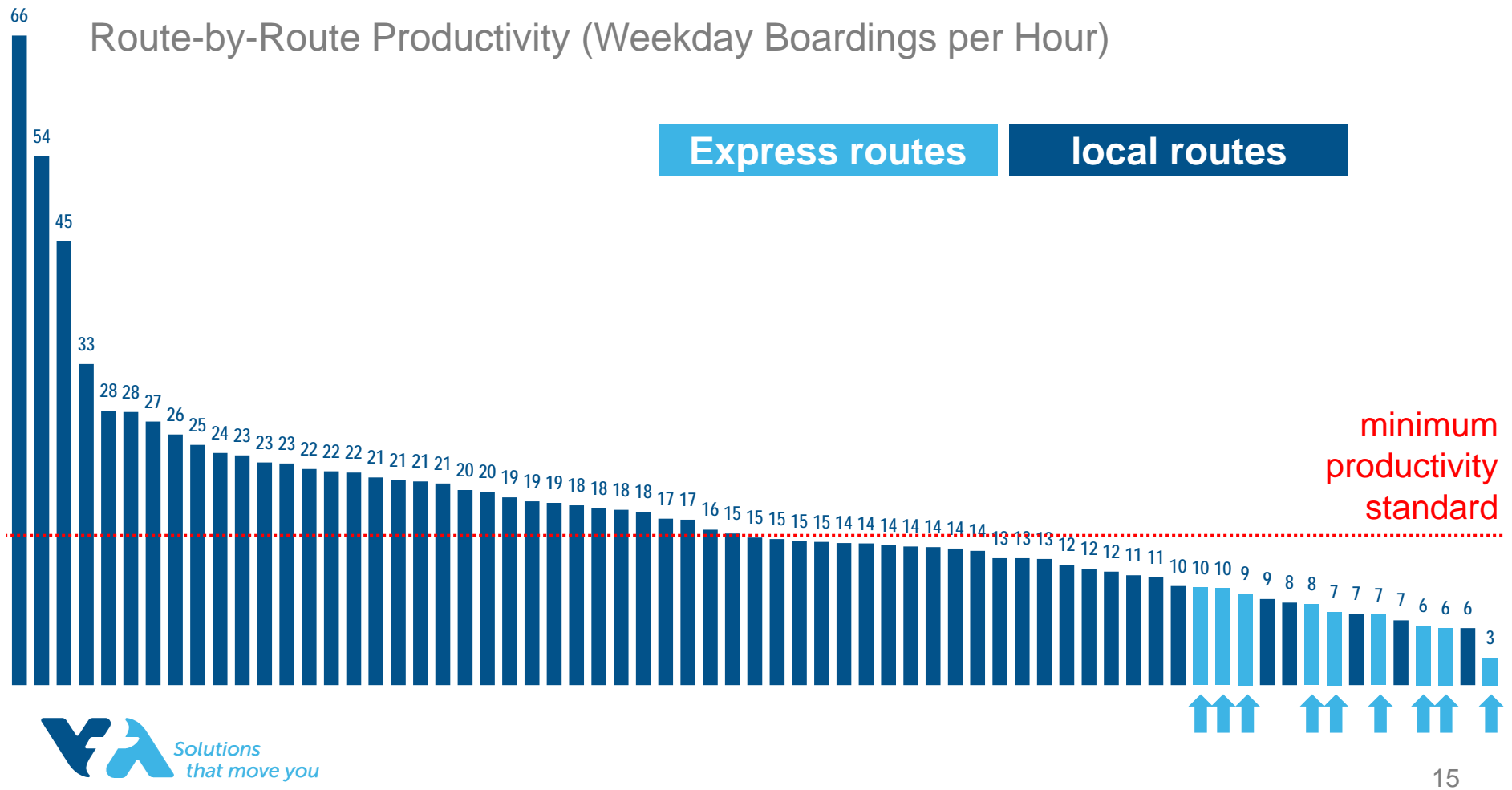
12%

farebox
recovery

\$12.07

cost per boarding

Route-by-Route Productivity (Weekday Boardings per Hour)



Express Bus Benefits and Challenges

Benefits

- Can connect isolated communities
- Convenient service for riders
- Congestion reduction?

Challenges

- Low ridership
- Low farebox recovery
- High unit cost to provide service
- Few riders per dollar spent
- Rider demographics

Staff Seeks Guidance for Express Bus Future

- Conduct service redesign study for Express bus network?
- Continue to fund Express bus program at current level?
 - Reallocate some/all Express bus funds to more productive uses?
- Explore alternative fare strategies?
- Other strategies to explore?





Date: April 4, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: Fast Transit Program

FOR INFORMATION ONLY

BACKGROUND:

The average speed of VTA's transit service is significantly declining. When transit speeds decline, on-time reliability suffers and transit becomes less appealing to riders. Furthermore, slowing routes become increasingly more expensive to operate as more buses or trains are needed to maintain the same frequency of service. This is especially concerning on VTA's highest ridership routes, which are among the slowest in VTA's system, particularly during peak periods. Several solutions exist to address declining speeds, and many other transit agencies have found success with them, but they will require coordination between VTA and its Member Agencies to implement them.

The Fast Transit Program is designed to address one of VTA's Business Lines as described in its 2016 Strategic Plan: A network of Fast, Frequent and Reliable Transit Service. As currently envisioned, the Fast Transit Program is a policy and planning effort that seeks to accomplish the goals of increasing transit speeds and improving on-time reliability in VTA's transit service network. The Program's three major components are (1) the development and adoption of a transit speed policy that is supported at the local agency level, (2) a comprehensive examination of the causes of VTA's declining speeds and reliability (3) a targeted set of cost-effective recommended short and long term speed improvement projects.

DISCUSSION:

Declining Speeds

The decline in transit operating speeds - if not corrected - will continue to reduce VTA's cost-

effectiveness, and the usefulness of VTA transit to the public. Over the past 30 years, VTA's travel speeds have declined approximately 20 percent, though the decline has been steeper in recent years, amounting to about 1.0 to 1.5 percent annually. This means more buses must be added to routes to maintain frequency, and these resources must be taken from other routes or added at an additional cost.

For example, the average weekday travel speed of Route 22 has declined 34 percent, from 15.7 miles per hour in 1995 to 10.3 miles per hour today. The number of buses needed to provide 15-minute service in the weekday peak period, when travel speeds average an even lower 9 miles per hour, has increased from 15 to 22 over that time—a 47 percent increase in the operating cost. The decline in travel speed over that time has made riding Route 22 less appealing and is a likely contributor to stagnant or decreasing ridership despite increased travel demand and land use intensification along the corridor.

Financial Impact of Decreased Transit Travel Speeds

Each one percent of speed decline corresponds to about \$3.2 million that VTA must spend to maintain the same frequency of service. This is money spent that provides no additional value to riders; in fact, their experience is worse due to slower travel speeds.

The decline in travel speeds has ramifications for the quantity of routes that can be operated. If this trend cannot be changed, VTA will perpetually be looking to trim routes or frequencies from its network to feed the needs of other routes, which undermines and weakens the frequent network it endeavors to operate. Furthermore, the declining appeal of VTA transit threatens to lower fare revenue and encourage riders to find other ways to get around, such as driving, which adds to congestion, which in-turn causes transit travel speeds to decrease.

Ridership Impact of Decreased Transit Travel Speeds

A 2016 TransitCenter survey (TransitCenter: Who's on Board 2016) of transit riders in 17 US metro areas found that the aspects of the transit experience that most heavily impact one's likelihood to use transit include frequency, travel time, and reliability. Declining transit travel speeds erode all three of these. As more money is spent on fewer routes, agencies will be tempted to reduce frequencies as a cost-saving measure. The longer the trip takes, the less appealing it becomes to riders. Longer travel times also correlate with decreased on-time reliability as the types of delay experienced and the potential range of their duration widens.

Benefits of Increased Transit Travel Speeds

Increasing transit travel speeds is essential for improving public transit ridership and cost-effectiveness. It makes transit more attractive to non-riders and improves the experience for current riders, encouraging them to take more transit trips. More ridership brings in more farebox revenue, which lowers the per-passenger subsidy paid by transit agencies and provides funding that can be invested in more transit service. More transit service, more ridership and

moving people in more space-efficient ways is good for the overall mobility of the region. It may also offer benefits to other modes by reducing potential conflicts at problem locations. Increasing transit speeds will allow routes to make more stops per hour and record more boardings per hour, which is VTA's baseline metric for route performance.

Causes for Speed Declines

There are three main causes for transit speed declines:

- Increased vehicle congestion - Economic growth and land use intensification increase demand on the transportation network, increasing congestion and slowing all vehicles. Increased congestion can also make it more difficult for buses to pull back into the travel lane after picking up and dropping off passengers. The American Public Transportation Association calls out slow transit speeds due to increased congestion as a fundamental concern in critical need of attention (APTA: Understanding Recent Ridership Changes, March 2018).
- Increased delay at signals - As traffic congestion levels increase, city traffic engineers respond by adjusting traffic signal timing. Often, this includes lengthening signal cycles or giving more time to some movements. In some cases, this means transit vehicles experience more time waiting at red lights.
- Increased stop frequency and dwell time at stops/stations - Increased ridership can lead to buses making more stops to board and alight passengers and longer boarding times as more fares must be collected or passes inspected. Since VTA ridership has been declining since 2016, this is unlikely to be a significant contributor to VTA's transit speed declines.

Potential Solutions

Transit agencies across the nation are struggling with declines in transit travel speeds and on-time performance, and many have undertaken efforts to address this problem. Solutions generally fall into smaller scale, low-cost, low-infrastructure strategies that can be implemented piecemeal and large scale, high-cost strategies that require considerable construction.

Small Scale Strategies

- Transit signal priority - The approach to signal timing has in some cities evolved from maximizing vehicle-throughput to maximizing person-throughput. Accordingly, a strong case can be made that transit vehicles that carry large volumes of passengers should be prioritized over private automobiles that carry fewer passengers. Signal priority can take the form of extending green lights for approaching transit vehicles, shortening red light durations for waiting transit vehicles or turning a red light green as a transit vehicle approaches. On some corridors consideration should be given to providing transit with transit signal pre-emption which allows buses or trains to pre-empt signals to get a green

light at the intersection. These types of improvements can offer a high benefit at a low cost as they are infrastructure-minimal.

- Bus stop balancing - Choosing bus stop locations is a balance between ease of access, which encourages close stop spacing, and speed, which encourages wide stop spacing. The route designer must balance convenience to the rider who is boarding/alighting with the delay incurred by riders who are traveling through. Transit agencies in New York, Baltimore, Providence, Portland, and Columbus have all reported success in combatting declining transit speeds by removing or consolidating stops that record few boardings or are located in close proximity to other stops.
- Fast boarding - Transit agencies have used multiple approaches to make boarding faster. New York MTA has eliminated on-board fare payment on Select Bus routes. Select Bus riders must use a MTA card or cash to buy a ticket at the station. San Francisco Muni has reported time savings after allowing passengers to board through the rear doors if they use electronic payment like a Clipper card. LA Metro is giving away 150,000 TAP cards to Orange Line BRT riders to encourage less cash payment and more rear-door boarding. Increasing Clipper Card and mobile ticketing app usage (like VTA's EZfare app) complement this goal.
- Eliminating timepoints - Buses ahead of schedule would no longer have to wait at timepoints, which delays customers on board. Ideally, time point elimination would be combined with dynamic headway tracking technology, which allows drivers to track where they are in relation to other buses. This allows drivers to maintain even spacing.

Large Scale Strategies

- Dedicated transit lanes - Some agencies have found that dedicated transit lanes are the most effective way to maximize person throughput and prevent traffic congestion from delaying high-capacity vehicles. While this can be difficult, politically, it is easily the most effective way of decreasing travel speeds and improving on-time reliability. New York, Chicago and Los Angeles have invested heavily in dedicated transit lanes.
- In-lane stopping - In places where buses face difficulty entering the travel lane after leaving a bus stop, such as a duckout or a curbside stop located in the parking lane, allowing the bus to stop in the travel lane to board and alight passengers can help improve travel speeds. This strategy is best accompanied by fast boarding strategies to minimize the delay incurred by vehicles that are behind the bus.

Rider Information and Experience

- Re-define on time performance - On time performance is a leading indicator of reliability and rider experience because the rider can count on the bus arriving to the stop on time. VTA defines on-time as departing a location within three minutes before and five minutes after its published scheduled time. Reducing the metric to the industry standard

of one minute before and 4 minutes after the published time, will better align VTA's metric with a rider's experience of on-time service.

- Expand real-time information - Riders like real-time information because knowing when the bus or train will arrive removes uncertainty and sets realistic expectations (TransitCenter: Who's on Board 2016).

Municipal Role and Responsibility

The causes of transit travel speed declines are largely outside of the VTA's control. Traffic congestion is driven by land use decisions that require long trips and an urban form that promotes travel by automobile. Additionally, absent a special circumstance, each city controls and maintains their streets and signal timing. As such, addressing transit speed declines will require city coordination and support. Planning to accommodate growth near transit and in ways that encourage short trips helps prevent speed declines. Prioritizing transit at signals increases transit travel speeds and maximizes overall mobility.

Preliminary discussions with city staff have indicated an interest in making transit faster and many cities' general plans support fast and reliable transit (Attachment A), but implementation often requires policy guidance. As the Fast Program develops, VTA will seek input from local jurisdictions on opportunities for, and challenges to, increasing transit speeds. Ideally, local jurisdictions adopt policies that prioritize the need to speed up transit especially on VTA's frequent service network.

Policy Development

This effort will seek to place a greater importance on faster transit within VTA and will pursue development of a policy statement as such. Additionally, VTA will welcome opportunities to help local jurisdictions develop policies that can improve transit travel speeds. Speeding up transit will rely on policy guidance from VTA's Board of Directors as well as input from VTA's advisory committees and local jurisdictions. VTA's Board of Directors will be asked to consider the actions necessary to fix speed problems, such as reconsidering VTA's priorities about stop spacing and resource allocation. One time capital expenditures to implement transit preferential solutions will be far less costly than continuing to address declines in speed and reliability by adding more service hours. We also hope the VTA Board will guide local jurisdictions to adopt the VTA transit speed policy or endorse their own set of compatible actions.

Next Steps

Staff will perform a comprehensive speed and reliability analysis to identify the causes of transit speed declines and will start a conversation with Santa Clara County cities about the potential for

improving transit travel speeds. Staff will also work with VTA's bus operators and light rail operators to gain input on causes of speed declines from their in-the-field experience. Future discussion with VTA committees and the Board of Directors will inform potential policy development.

Prepared By: Tamiko Percell
Memo No. 6486

Campbell					
Plan	Adoption	Section	Subheading	Page Number	Transit Supportive Language
The City of Campbell General Plan	11/6/2011	Land Use and Transportation	Goal LUT-2	Pg. LUT-44 (Pg. 71 PDF)	Strategy LUT-2.1I: Public Transit: Coordinate with regional transportation agencies including VTA and the Metropolitan Transportation Commission (MTC) to improve public transportation service and promote public transit as a viable alternative to driving, particularly within the Priority Development Areas (PDA).
		Land Use and Transportation	Goal LUT-2	Pg. LUT-44 (Pg. 71 PDF)	Strategy LUT-2.1m Transit Schedule Integration: Support the integration of light-rail, bus, and shuttle schedules and multi-modal transit stations to reduce the loss of time associated with using public transportation.
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Santa Clara County General Plan 1995-2010	12/20/1994	Countywide Issues and Policies-Transportation	Transportation System Management (TSM)	Pg. F-18 (Pg. 102 PDF)	C-TR 10 Transportation System Management (TSM) measures should be employed to ensure maximum operating efficiency of the existing system of roads and highways, including but not limited to the following: a. signal synchronization, signal pre-emptions for transit vehicles b. ramp metering c. traffic surveillance and traffic advisory signs
		Countywide Issues and Policies-Transportation	Implementation Recommendations	Pg. F-20 (Pg. 104 PDF)	C-TR(i) 12 Continue to implement techniques which increase highway and expressway efficiency, including: a. designation of high occupancy vehicle lanes b. construction of special freeway on-ramps for buses, carpools, vanpools c. traffic signal preemption systems for transit vehicles on freeway on-ramps d. a coordinated program of signalization, channelization, ramp metering e. traffic signal preemption systems for rail transit vehicles on city streets
Cupertino					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Cupertino General Plan Community Vision 2015-2040	10/20/2015	Chapter 5 Mobility Element	Goal M-4 Transit	Pg. M-18 (Pg. 184 PDF)	POLICY M-4.1: TRANSIT AGENCIES Coordinate with VTA to improve transportation service, infrastructure and access in the city, and to connect to transportation facilities such as Caltrain and VTA light rail stations.
		Chapter 5 Mobility Element	Goal M-4 Transit	Pg. M-19 (Pg. 185 PDF)	POLICY M-4.5: ACCESS TO TRANSIT SERVICES Support right-of-way design and amenities consistent with local transit goals to improve transit as a viable alternative to driving.
		Chapter 5 Mobility Element	Goal M-8	Pg. M-23 (Pg. 189 PDF)	POLICY M-8.3: TRANSPORTATION SYSTEMS MANAGEMENT (TSM) PROGRAMS Employ TSM strategies to improve efficiency of the transportation infrastructure including strategic right of-way improvements, intelligent transportation systems and optimization of signal timing to coordinate traffic flow.

Gilroy 2040 General Plan					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Gilroy 2040 General Plan	Dec-15	Chapter 6 Transportation and Circulation	13 Transit	Pg. 6-8 (Pg. 8 PDF)	Action 13.D Signal Preemption for Buses. In accordance with the recommendations of the Bay Area Air Quality Management District in the 2000 Clean Air Plan, study signal pre-emption for buses on arterial streets with a high volume of bus traffic.
		Chapter 6 Transportation and Circulation	12 Traffic Circulation and Parking	Pg. 6-8 (Pg. 8 PDF)	Action 12.J Signal Timing. In accordance with the recommendations of the Bay Area Air Quality Management District in the 2000 Clean Air Plan, continue and expand local signal timing programs.
Los Altos					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Los Altos General Plan 2002-2020	Nov-02	Circulation Element	Local Circulation System	Pg. 28 (Pg. 30 PDF)	C 6: TRAFFIC SIGNAL COORDINATION AND SYNCHRONIZATION Coordinate traffic signal operations with the State, County, and adjacent communities where feasible. Install coordinated signal systems on all major arterial roadways in the City to improve traffic flow as appropriate. Funding should be obtained from all available City, County, State and Federal sources, as well as developer contributions.
		Circulation Element	Transit	Pg. 30 (Pg. 32 PDF)	C 14: TRANSIT SERVICE LEVELS Work with the Santa Clara Valley Transportation Authority to ensure maintenance of adequate service levels and to evaluate the need to modify routing, bus stop and shelter locations, scheduling, and equipment. Route adjustments should be made to include major collectors through the City and service should link Downtown and other commercial areas to neighborhoods.
Town of Los Altos Hills General Plan Update 2007					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Town of Los Altos Hills General Plan Update 2007	4/26/2007	Circulation & Scenic Roadways Element			No applicable language on transit priority
Los Gatos					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Los Gatos 2020 General Plan	9/20/2010	Chapter 6 Transportation Element	Goal TRA-6	Pg. TRA-29 (Pg. 29 PDF)	Action TRA-6.2 Develop and implement signalization improvements to increase traffic flow at the intersections of Santa Cruz Avenue and Main Street, University Avenue and Main Street, Santa Cruz Avenue and Los Gatos/Saratoga Road, and University Avenue and Los Gatos/Saratoga Road.
		Chapter 6 Transportation Element	Goal TRA-2	Pg. TRA-22 (Pg. 22 PDF)	Policy TRA-2.6 Street improvements such as curb cuts, sidewalks, bus stop turnouts, bus shelters, light poles, traffic signals, benches, and trash containers shall be planned as an integral part of development projects to ensure safe movement of people and vehicles and minimize disruption to the streetscape.

Milpitas					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
City of Milpitas General Plan	Dec-94	Chapter 3 Circulation Element	Transportation Demand Management-Implementing Policy	Pg. 3-24 (Pg. 24 PDF)	3.c-l-1 Support regional planning efforts for the development of mass transit facilities such as transit priority for designated bus rapid transit, bus queue jump lanes, exclusive bus queue jump lanes, exclusive transit lanes, and other transit preferential treatments.
		Chapter 3 Circulation Element	Transportation Demand Management-Implementing Policy	Pg. 3-24 (Pg. 24 PDF)	3.c-l-3 Implement measures to enhance transit efficiency where feasible as such farside bus stop locations and bus stop pullouts.
Monte Sereno					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Monte Sereno General Plan	12/16/2008				No applicable language that relates to transit priority
Morgan Hill					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
2035 General Plan City of Morgan Hill	7/27/2016	Transportation	Transit GOAL TR-6	Pg. TR-35 (Pg. 227 PDF)	Street Design for Improved Bus Service. Coordinate with VTA to provide improved local bus service and to encourage people to ride the bus for local as well as longer trips (e.g., to Gilroy and San Jose). The design of key arterial streets such as Hale/Santa Teresa, the Butterfield Corridor and Monterey Road should consider incorporating bus curb lanes or duckouts, enhanced stop amenities, transit signal priority, and supporting pedestrian improvements.
		Transportation	Transportation Demand Management GOAL TR-10	Pg. TR-47 (Pg. 239)	Transportation Demand Management Technologies. Work with VTA and the State to implement Transportation Demand Management technologies that can improve the performance, reliability, and safety of the transportation system, such as signal coordination, centralized traffic control, red-light and speed enforcement cameras, and real-time travel information.
Mountain View					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Mountain View 2030 General Plan	7/10/2012	Chapter 3 Land Use and Design	Land Use Mix, Distribution and Intensity Goal LUD-22	Pg. 73 (Pg. 87 PDF)	LUD 22.6: Improved mobility. Support improved mobility within San Antonio Center for vehicles, transit, bicyclists and pedestrians.
		Chapter 4 Mobility	Goals and Policies-Transit	Pg. 112 (Pg. 126 PDF)	MOB 5.1: Transit agencies. Coordinate with local and regional transit agencies including Metropolitan Transportation Commission, VTA, JPB (Caltrain), SamTrans and the California High-Speed Rail Authority to improve transportation service, infrastructure and access in the city.

Mountain View 2030 General Plan <i>continued</i>	7/10/2012	Chapter 4 Mobility	Goals and Policies- Transit	Pg. 112 (Pg. 126 PDF)	MOB 5.4: Connecting key areas. Identify and implement new or enhanced transit services to connect Downtown, El Camino Real, San Antonio, Nor th Bayshore, East Whisman and NASA Ames Research Park.
		Chapter 4 Mobility	Goals and Policies- Transit	Pg. 112 (Pg. 126 PDF)	MOB 5.5: Access to transit services. Support right-of-way design and amenities consistent with local transit goals to make it easier to get to transit services and improve transit as a viable alternative to driving.
		Chapter 3 Land Use and Design	Land Use Mix, Distribution and Intensity Goal LUD-3	Pg. 49 (Pg. 63 PDF)	Land use and transportation. Focus higher land use intensities and densities within a half-mile of public transit service, and along major commute corridors.
Palo Alto					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
City of Palo Alto Comprehensive Plan 2030	11/13/2017	Transportation Element	Enhancing Rail and Bus Service	Pg. 81 (Pg. 89 PDF)	Program T1.12.3 Work with VTA to study the feasibility of, and if warranted provide, traffic signal prioritization for buses at Palo Alto intersections, focusing first on regional transit routes. Also, advocate for bus service improvements on El Camino Real such as queue jump lanes and curbside platforms.
		Transportation Element	Enhancing Rail and Bus Service	Pg. 81 (Pg. 89 PDF)	Program T1.11.1 Collaborate with Stanford University, VTA, Caltrain and other agencies to pursue improvements to the Palo Alto Transit Center area aimed at enhancing the pedestrian experience and improving circulation and access for all modes, including direct access to El Camino Real for transit vehicles.
San Jose					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Envision San Jose 2040: General Plan	11/1/2011	Chapter 5 Interconnected City	Grand Boulevard	Pg. 29 (Pg. 274 PDF)	Signal priority for transit vehicles, bus stops, and, where appropriate, exclusive transit lanes, are or can be provided. Other travel modes, including automobiles, bicycles, and trucks, are accommodated in the roadway, but if there are conflicts, transit has priority. (Grand Boulevards: 1) North First Street/Monterey Highway, 2) Capitol Avenue/Capitol Expressway, 3) Alum Rock Avenue/Santa Clara Street/The Alameda, 4) San Carlos Street/ Stevens Creek Boulevard, 5) Meridian Avenue, 6) Winchester Boulevard, 7) Saratoga Avenue)
		Chapter 6 Land Use and Transportation	Public Transit Goal TR- 3 Maximize use of Public Transit	Pg.41 (Pg. 322 PDF)	TR-3.2 Ensure that roadways designated as Grand Boulevards adequately accommodate transit vehicle circulation and transit stops. Prioritize bus mobility along Stevens Creek Boulevard, The Alameda, and other heavily traveled transit corridors.

Envision San Jose 2040: General Plan <i>continued</i>	11/1/2011	Chapter 6 Land Use and Transportation	Public Transit Goal TR-3 Maximize use of Public Transit	Pg.41 (Pg. 322 PDF)	TR-3.6 Collaborate with Caltrans and Santa Clara Valley Transportation Authority to prioritize transit mobility along the Grand Boulevards identified on the Growth Areas Diagram. Improvements could include installing transit signal priority, queue jump lanes at congested intersections, and/or exclusive bus lanes.
		Chapter 6 Land Use and Transportation	Goal TR- 12- Intelligent Transportation system	Pg. 54 (Pg. 335 PDF)	TR-12.6 Work with VTA to implement transit vehicle priority that allows buses to travel on-schedule and provide reliable service.
		Chapter 6 Land Use and Transportation	Goal TR-5 Vehicular Circulation	Pg. 43 (Pg. 324 PDF)	TR-5.2 Implement Intelligent Transportation Systems (ITS) strategies to maximize the efficiency of the existing transportation systems through advanced technologies, such as adaptive signal controls, real-time transit information, and real-time parking availability.
		Chapter 6 Land Use and Transportation	Goal TR- 12- Intelligent Transportation system	Pg. 53 (Pg. 334 PDF)	TR-12.2 Enhance the safety and effectiveness of transit service, bicycle, and pedestrian travel as alternative modes using advanced ITS systems.
		Chapter 6 Land Use and Transportation	Goal TR- 12- Intelligent Transportation system	Pg. 54 (Pg. 335 PDF)	TR-12.7 Collaborate with VTA to provide real-time transit information at key transit stations and stops, as well as via mobile devices, to provide users with real-time information on bus travel routes and times.
		Chapter 6 Land Use and Transportation	Public Transit Goal TR-3 Maximize use of Public Transit	Pg.41 (Pg. 322 PDF)	TR-3.8 Collaborate with transit providers to site transit stops at safe, efficient, and convenient locations, and to develop and provide transit stop amenities such as pedestrian pathways approaching stops, benches and shelters, nighttime lighting, traveler information systems, and bike storage to facilitate access to and from transit stops.
		Chapter 6 Land Use and Transportation	Public Transit Goal TR-3 Maximize use of Public Transit	Pg.41 (Pg. 322 PDF)	TR-3.9 Ensure that all street improvements allow for easier and more efficient bus operations and improved passenger access and safety, while maintaining overall pedestrian and bicycle safety and convenience.
		Chapter 6 Land Use and Transportation	Goal TR-4 Passenger Rail Service	Pg.41 (Pg. 322 PDF)	TR-4.1 Support the development of amenities and land use and development types and intensities that increase daily ridership on the VTA, BART, Caltrain, ACE and Amtrak California systems and provide positive fiscal, economic, and environmental benefits to the community.

Envision San Jose 2040: General Plan <i>continued</i>	11/1/2011	Chapter 6 Land Use and Transportation	Public Transit Goal TR-3 Maximize use of Public Transit	Pg.41 (Pg. 322 PDF)	TR-3.3 As part of the development review process, require that new development along existing and planned transit facilities consist of land use and development types and intensities that contribute toward transit ridership. In addition, require that new development is designed to accommodate and to provide direct access to transit facilities.
Santa Clara					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
City of Santa Clara 2010-2035 General Plan	11/16/2010	Chapter 5 Goals and Policies	Transit Network Policies	Pg. 5-98 (Pg. 174 PDF)	5.8.3-P3 Support transit priority for designated Bus Rapid Transit, or similar transit service, through traffic signal priority, bus queue jump lanes, exclusive transit lanes and other appropriate techniques.
		Chapter 5 Goals and Policies	El Camino Real Focus Area Goals	Pg. 5-48 (Pg. 124 PDF)	5.4.1-G4 Pedestrian, bicycle and transit priority for mobility in the El Camino Real Focus Area.
		Chapter 5 Goals and Policies	El Camino Real Focus Area Policies	Pg. 5-49 (Pg. 125 PDF)	5.4.1-P15 Work with Valley Transportation Authority to improve transit access, information and frequency along El Camino Real, including the implementation of a Bus Rapid Transit or similar transit service near Regional Mixed-Use areas.
		Chapter 5 Goals and Policies	El Camino Real Focus Area Policies	Pg. 5-50 (Pg. 126 PDF)	5.4.1-P16 Work with Valley Transportation Authority and Caltrans toward a roadway design for El Camino Real that includes narrower and/or reduced travel lanes, enhanced pedestrian facilities, wider sidewalks, street trees, planted medians, and enhanced signage and lighting, as well as transit and bicycle lanes without increasing overall right of- way requirements.
		Chapter 5 Goals and Policies	Downtown Focus Area Goals	Pg. 5-51 (Pg. 127 PDF)	5.4.2-G4 Pedestrian and transit priority for mobility in the Downtown Focus Area.
Saratoga					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
General Plan City of Saratoga	11/17/2010	Circulation and Scenic Highway Element update	Transit-Policies	Pg. 42 (Pg. 47 PDF)	CI-Policy-4.2 Install transit improvements to improve service, increase safety, and maintain traffic flow on streets serving as transit routes.
General Plan City of Saratoga	11/17/2010	Circulation and Scenic Highway Element update	Street System and Standards of Service - Implementation	Pg. 40 (Pg. 45 PDF)	CI-Action-2.4 Install coordinated signal systems on all major arterial roadways in the City to improve traffic flow as appropriate. Funding should be obtained from all available City, County, State and Federal funding sources, and developer contributions.

Sunnyvale					
Plan	Adoption	Section	Subheading	Page Number	Applicable Language
Sunnyvale General Plan	Apr-17	Chapter 3 Land Use and Transportation	Goal C: An Effective Multimodal Transportation System	Pg. 33 (Pg. 33 PDF)	Work in coordination with the Santa Clara Valley Transportation Authority (VTA) to ensure that the City creates streets that are transit-friendly, including bus signal preemption, adequate street and transit stop furniture, and appropriate lighting for nighttime riders.
		Chapter 3 Land Use and Transportation	Goal C: An Effective Multimodal Transportation System	Pg. 27 (Pg. 27 PDF)	As part of the development project review process in mixed-use and other high-intensity use areas, require that adequate transit stops or a dedicated transit lane is provided, even if bus stops are not yet located there. Ensure that off-street loading areas do not conflict with adjacent uses or impede pedestrian, bicycle, or transit access.
		Chapter 3 Land Use and Transportation	Goal C: An Effective Multimodal Transportation System	Pg. 33 (Pg. 33 PDF)	Monitor and participate in planning and implementation of the Grand Boulevard Initiative and Bus Rapid Transit (BRT) on El Camino Real to ensure that local Sunnyvale interests such as a quality streetscape, bicycle facilities, and pedestrian facility enhancements are incorporated and that capacity for transit does not sacrifice safety and service for other travel modes.
		Chapter 3 Land Use and Transportation	Goal A: Coordinated Regional and Local Planning	Pg. 17 (Pg. 17 PDF)	Promote transit-oriented and mixed-use development near transit centers such as Lawrence Station, Downtown, and El Camino Real and in neighborhood villages.

TAC Agenda Item #16
CAC Agenda Item #17
BPAC Agenda Item #7
PAC Agenda Item #13

Fast Transit Program

Advisory Committees

April 2018

Business line #1:

FAST

FREQUENT

RELIABLE



VTA Transit Speeds are Declining

14.1 MPH

1988

12.8 MPH

2005

12.6 MPH

2001

11.6 MPH

2016



Slowing Routes Require More Buses

Buses needed for 15-minute service on Route 22

1995

15.7 MPH



15 Buses

2018

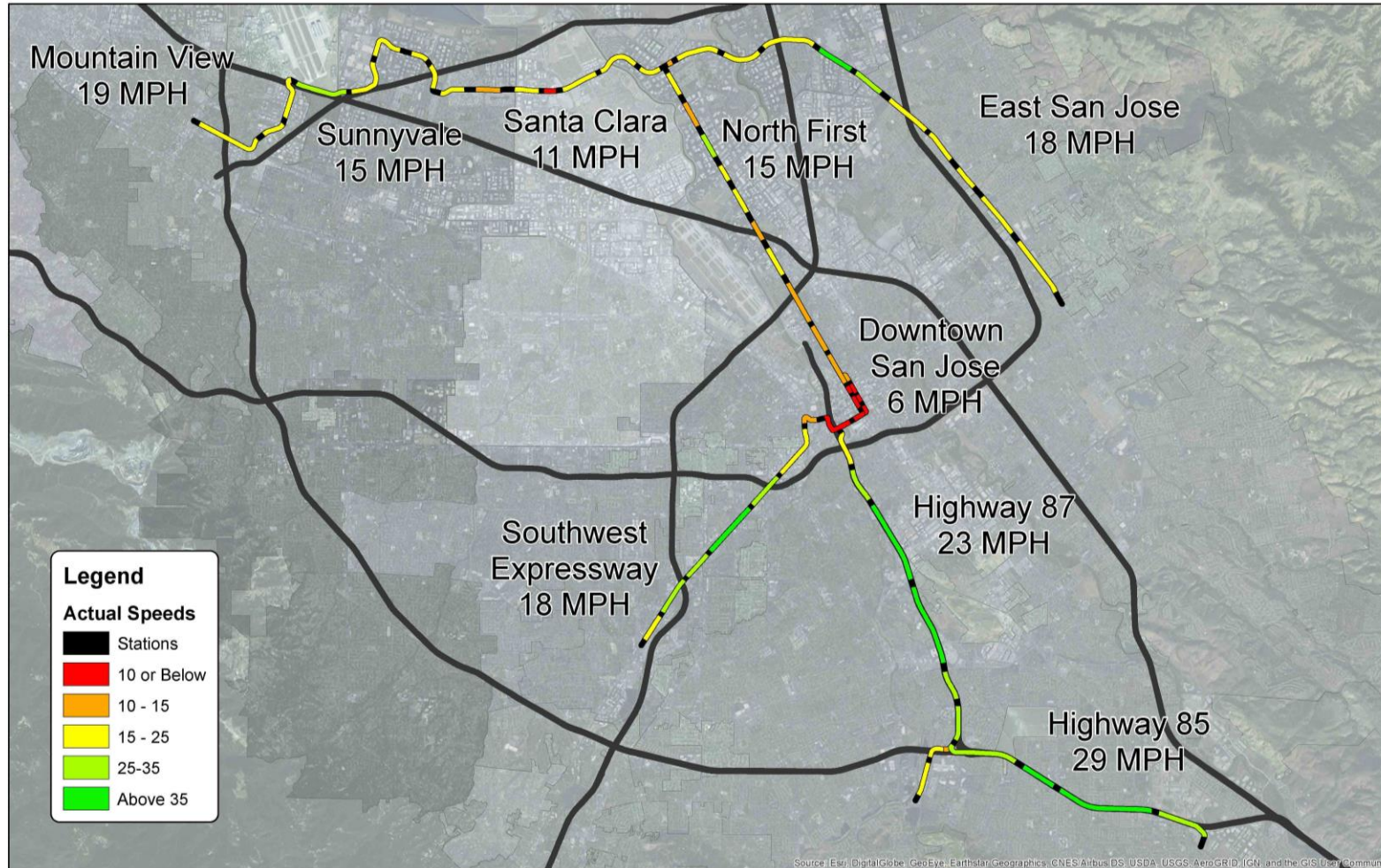
10.3 MPH



22 Buses



Slowing Routes Require More Trains



FAST TRANSIT IS GOOD



Causes of Slow Transit



Increased Traffic Congestion

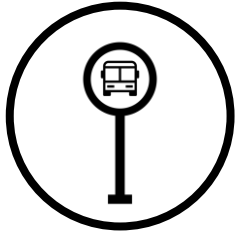


Increased Signal Delays

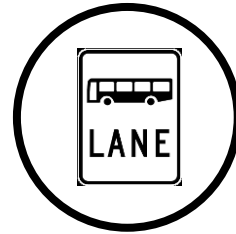


Frequent Stops/Dwell Time

Potential Solutions



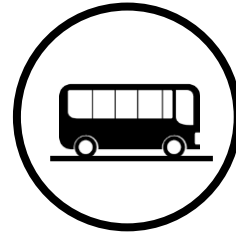
Bus Stop Balancing



Dedicated Transit Lanes



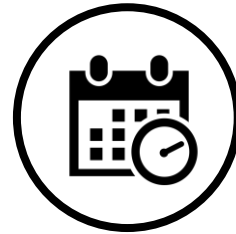
Transit Signal Priority



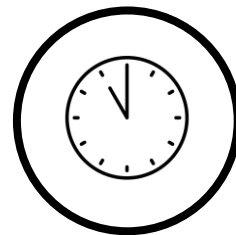
In-lane Stopping



Faster Boarding



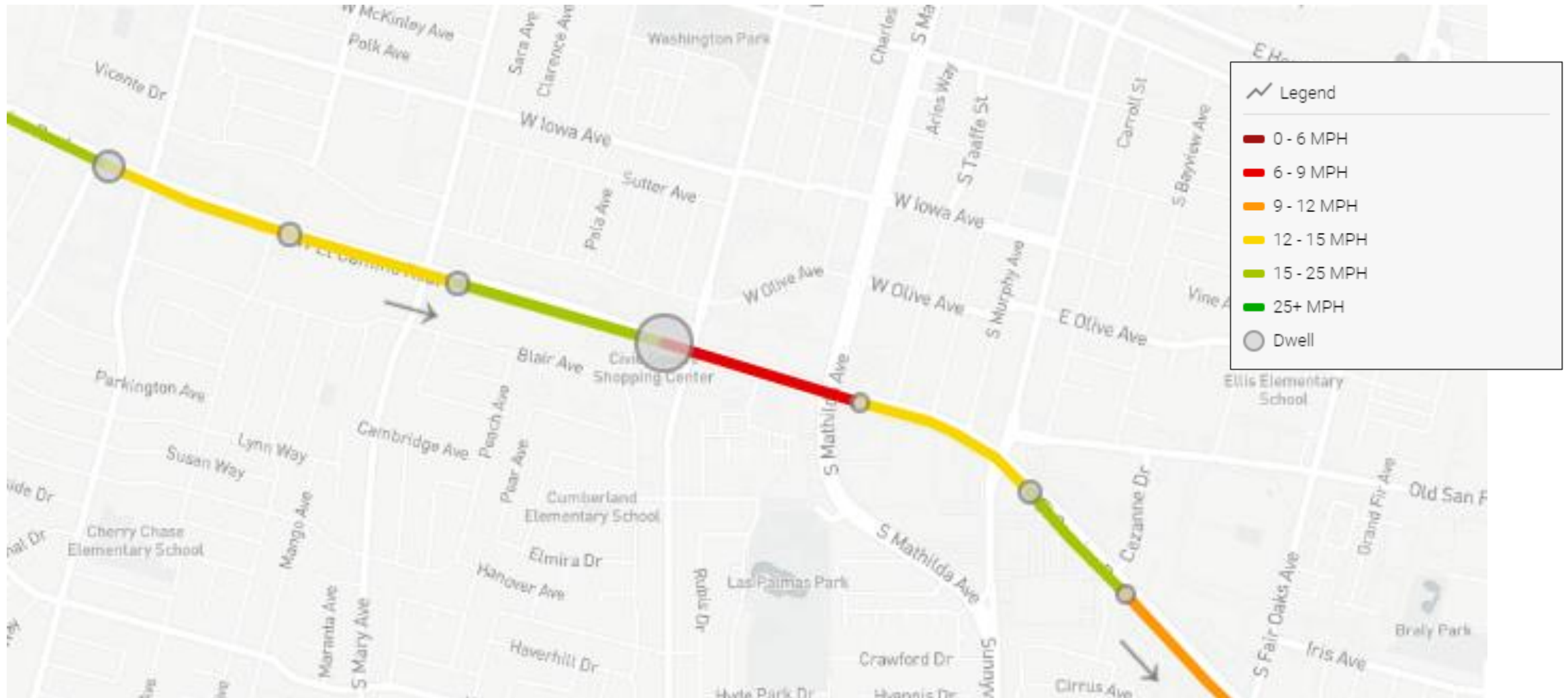
Headway Management



Real-time Information



Speed and Reliability Analysis



The Path Forward

- Adopt a transit speed policy for VTA and local jurisdictions
- Identify VTA's slow speed locations and causes
- Recommend speed improvement projects



Date: March 9, 2018
 Current Meeting: April 12, 2018
 Board Meeting: May 3, 2018

BOARD MEMORANDUM

TO: Santa Clara Valley Transportation Authority
 Policy Advisory Committee

THROUGH: General Manager, Nuria I. Fernandez

FROM: Director - Planning & Programming, Chris Augenstein

SUBJECT: City of Santa Clara Multimodal Improvement Plan Update

FOR INFORMATION ONLY

BACKGROUND:

The City of Santa Clara will present an update on the Multimodal Improvement Plan (MIP) associated with the City Place Santa Clara project. The MIP is intended to address existing and future deficiencies in the Level of Service (LOS) of specific intersections in the City of Santa Clara, which are part of the Santa Clara County Congestion Management Program (CMP) administered by VTA. The process for approving an MIP requires Member Agencies to first adopt their MIP, then submit the MIP for VTA's final approval. The City of Santa Clara is currently developing the MIP.

The state CMP legislation requires Member Agencies to prepare a deficiency plan for CMP system facilities (such as key arterial roadway or Expressway intersections) located within their jurisdictions that exceed the CMP traffic LOS standard. The traffic LOS standard for the Santa Clara County CMP is LOS E. Since the 2013 VTA CMP document, VTA has referred to deficiency plans as Multimodal Improvement Plans (MIPs).

MIPs are plans that “trade off” making physical traffic capacity improvements, such as widening an intersection or roadway, with offsetting measures to improve transportation conditions on the CMP transportation network. The legislation requires that MIPs improve system-wide traffic LOS and contribute to a significant improvement in air quality. MIPs provide a way for local jurisdictions to pursue multimodal improvements or off-setting auto capacity improvements at other locations, when it is infeasible or undesirable to make physical traffic capacity improvements at an impacted location.

MIP Contents

MIPs must be prepared in accordance with the VTA Board-adopted *Deficiency Plan Requirements* document, developed in 1992 and updated in 2010. These requirements are in conformance with state CMP legislation as well as regional guidelines established by the Bay Area Quality Management District (BAAQMD). The MIP process should demonstrate innovative, integrative, coordinated and comprehensive transportation strategies that reinforce community goals.

The VTA requirements identify three types of MIPs that may be developed: a “mini” plan that addresses a single CMP intersection or roadway facility; a “specific area” plan that addresses a CMP intersection or roadway facility within a specific area or district; or an “areawide” plan that addresses all the CMP system roadways in an entire city, or covers multiple jurisdictions. MIPs must also include a Deficiency Analysis describing the causes of the deficiency, an Action List that provides a comprehensive list of improvements to offset the identified deficiency, an Action Plan that specifies the steps that will be taken to implement the plan, a Monitoring Program to track implementation of the Action Plan, an Environmental Documentation section that describes the environmental analysis completed, and a Multijurisdictional Coordination section that describes the involvement of other agencies.

DISCUSSION:

City of Santa Clara Multimodal Improvement Plan

The City of Santa Clara is preparing an MIP in order to address anticipated LOS deficiencies at seven CMP intersections in Santa Clara, based on the findings in the *City Place Santa Clara Project Draft Environmental Impact Report* published in October 2015. The City Place project will be a phased mixed-use development on 240 acres of City-owned property and will include 9.16 million gross square feet of development. The conceptual land use program includes 5.7 million square feet of commercial office space, 1.5 million square feet of retail, 700 hotel rooms, up to 1,680 residential units, and approximately 84 acres of open space.

Santa Clara’s Deficient CMP Facilities

The City Place DEIR included a total of 125 study intersections, of which 37 are designated as CMP intersections. Of the 37 CMP intersections, there are 22 in the City of Santa Clara, 13 in the City of San Jose, and two in the City of Sunnyvale. Of the 22 CMP intersections within Santa Clara, the City Place DEIR found that there would be significant impacts (before mitigation) at 19 of these intersections under future cumulative traffic conditions, based on both the City of Santa Clara’s and VTA’s impact criteria. Mitigation measures were developed for the impacted intersections within the DEIR, but it was found that the project’s impact could be only partially mitigated at seven intersections and that they would continue to operate at an unacceptable level of service under post-mitigation conditions, necessitating preparation of an MIP. The seven intersections and responsible agencies are listed below.

Intersection	Jurisdiction
Great America Parkway/Tasman Drive	City

Great America Parkway/Mission College Boulevard	City
Agnew Road-De La Cruz Boulevard/Montague Expressway	City/County
San Tomas Expressway/Monroe Street	City/County
De La Cruz Boulevard/Central Expressway	City/County
Scott Boulevard/Central Expressway	City/County
Lafayette Street/El Camino Real	City/Caltrans

Next Steps

The City of Santa Clara and VTA will continue to work in partnership as the City develops the MIP. The City is currently drafting an “Action List” which is the basis for the “Action Plan”. The Action Plan will include scheduling, costs and standards for implementing the proposed improvements. The VTA Deficiency Plan Requirements also require that the MIP include information on addressing deficiencies across City boundaries, and a monitoring plan to track the MIP’s progress. It is anticipated that the final MIP will be brought to the Santa Clara City Council and VTA Board later this year.

Prepared By: Melissa Cerezo
Memo No. 6476

Proposed Multimodal Improvements

Attachment 14.a

Part A: Seven Mini-Plans

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
TRANSIT SERVICE				
Great America Parkway and Tasman Drive	Station Area Master Plan	Fund master plan for Santa Clara Great America Train Station. VTA to lead project with support of City of Santa Clara, ACE and Capitol Corridor.	VTA	\$ 500,000
	Regional rail enhancements	Capitol Corridor Vision Plan plans for increased service and reduced travel times between Oakland and San Jose. ACE also plans to increase service to San Jose. City of Santa Clara is supportive of Capitol Corridor and ACE enhancements, including double tracking.	Capitol Corridor, ACE	NA
	Transit integrated with land use project	City Place includes an on-site non-motorized network oriented toward nearby transit stations, including Great America Capitol Corridor and ACE Train Station, and the Lick Mill LRT Station.	City Place	NA
	Local shuttle service	City Place may provide local shuttles connecting to transit stations and local destinations. Shuttle schedules will be coordinated with train schedules.	City Place	NA
	Regional shuttle service	City Place employers may provide shuttle service for long-distance commutes when office population warrants.	City Place	NA
	Enhanced transit stops	City Place includes transit stops conveniently located at building entrances, and including amenities such as shelters and loading zones.	City Place	NA
	Discounted transit fares	City Place is required to develop a TDM Plan, which may include pre-tax commuter incentives or subsidized transit passes for office employees, retail employees, and residents.	City Place	NA
	Install Transit Signal Priority for bus transit	Install transit signal priority at 16 signalized intersections along Great America Parkway and Bowers Ave Ave from Tasman Drive to El Camino Real: 1)GAP/Tasman, 2)GAP/Old Glory Lane, 3)GAP/Patrick Henry Dr, 4)GAP/Mission College, 5) GAP/US 101 North Ramps, 6)Bowers Ave/US 101 South Ramps, 7)Bowers Ave/Augustine, 8)Bowers Ave/Scott Blvd, 9) Bowers Ave/Kifer Rd, 10)Bowers Ave/Mead Ave, 11) Bowers Ave/Chromite Dr, 12) Bowers Ave/Monroe St, 13) Bowers Ave/Cabrillo Ave, 14) Bowers Ave/Barkley Ave, 15) Bowers Ave/Warburton Ave,16)Bowers Ave/El Camino Real	City	\$ 80,000
Great America Parkway and Mission College Boulevard	Install Transit Signal Priority for bus transit	Install transit signal priority at 6 signalized intersections along Mission College Boulevard from Mission College Blvd to Montague Expy: 1) Mission College Blvd/Mission College Blvd , 2) Mission College Blvd/Santa Clara Marriot, 3)Mission College Blvd/Freedom Circle, 4)Mission College Blvd/Agnew Rd, 5) Mission College Blvd/Juliette Ln, 6)Mission College Blvd/Burton Dr.	City	\$ 35,000
Scott Blvd Boulevard and Central Expressway	Construct bus duckouts and pedestrian pads	Construct bus duckout and pedestrian pads at westbound Scott Blvd east of San Tomas Expy, eastbound Scott Blvd Boulevard at Jay Street, and eastbound and westbound Scott Blvd at Space Park Drive.	City	\$ 1,200,000
San Tomas Expressway and Monroe Street	Install transit Signal Priority for bus transit	Install transit signal priority at 8 signalized intersections along Scott Blvd from Bowers Ave to Monroe St: 1) Scott Blvd/Bowers Ave, 2)Scott Blvd/Octavius St, 3) Scott Blvd/Olcott St, 4) Scott Blvd/Jay St, 5)Scott Blvd/Space Park Dr, 6) Scott Blvd/Walsh Ave, 7) Scott Blvd/Martin Ave, 8) Scott Blvd/Monroe St.	City	\$ 40,000
Lafayette Street and El Camino Real	Regional rail enhancements	Caltrain is planning electrification and expansion of service. VTA is planning a BART extension to Santa Clara. City of Santa Clara is supportive of Caltrain and BART enhancements.	Caltrain, VTA	NA
	California High Speed Rail	Actively participate with the California High Speed Rail Authority in planning any future high-speed rail service to address urban design, traffic, noise and compatibility issues	CaHSRA	NA
	Airport People Mover	Airport Automated People Mover connecting the Santa Clara Caltrain and future BART station to San Jose International airport.	City/VTA	NA

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
BICYCLE AND PEDESTRIAN ACCESS AND FACILITIES				
Great America Parkway and Tasman Drive	Bicycling integrated with land use project	City Place is designed as a bicycle-friendly community, with bike paths, bike lanes, and shared bike routes connecting all areas of the site. Bike parking facilities are included throughout the site. Connections to nearby bike trails and bike lanes will encourage biking by residents and employees.	City Place	NA
	Install bike lockers and racks	At Convention Center, Youth Soccer Park, Old Ironsides LRT station, Great America LRT station, Lick Mill LRT station	City	\$ 275,000
	Implement bike sharing	Great America Parkway Light Rail Station /Lick Mill Light Rail station, City Place, Great America Theme Park	City	NA
	Bike and pedestrian trail improvements	Calabazas Creek Trail improvements (share of trail)	City	\$ 2,400,000
	Implement complete bicycle network	City Place includes an on-site bicycle network with connections to the Bay Trail, San Tomas Aquino Creek Trail, Guadalupe River Trail, and other existing and planned bike facilities.	City Place	NA
	Install Standard Bicycle Lane	Lick Mill Blvd from Tasman Drive to Montague Expy	City	\$ 150,000
	Walking integrated with land use project	City Place is a pedestrian-oriented project, including an on-site pedestrian network that connects all land uses. This will facilitate walking for the daily trips of residents, commuters and visitors.	City Place	NA
	Install pedestrian signals	City Place includes pedestrian signals within project at new signalized access points.	City Place	NA
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors for crossings across major streets and accessible pedestrian signals at the following 10 signalized intersections: 1) Tasman Drive/Patrick Henry Drive, 2) Tasman Drive/Old Ironsides Dr, 3) Tasman Drive/Great America Parkway, 4)Tasman Drive/Convention Center Dr, 5)Tasman Drive/Centennial Blvd, 6) Tasman Drive/Calle De Sol, 7) Tasman Drive/Lick Mill Blvd; 8)Great America Parkway/Old Mountain View-Alviso Rd, 9) Great America Parkway/Bunker Hill Lane and 10) Great America Parkway/Old Glory Lane	City	\$ 200,000
	Upgrade safety lighting with Light Emitting Diode (LED) luminaires at signalized intersections	Install safety lighting with LED luminaires at 5 signalized intersections along GAP: 1)GAP/Old Mountain View-Alviso, 2)GAP/Bunker Hill Ln, 3)GAP/Tasman Dr., 4)GAP/Old Glory Ln, 5) GAP/Patrick Henry Dr. Install safety lighting with LED luminaires at 4 signalized intersections along Tasman Dr. 1) Tasman Dr/Patrick Henry Dr, 2) Tasman Dr/Old Ironsides Dr, 3)Tasman Dr/Convention Center, 4)Tasman Dr/Centennial Blvd .	City	\$ 80,000
	Install sidewalk	North side of Tasman Drive between Centennial Blvd and Calle del Sol including Lafayette St overcrossing	City Place	NA
	Install pedestrian lighting	City Place will include pedestrian-scaled lighting within the City Place pedestrian network	City Place	NA
	Enhance uncontrolled crosswalks	Provide enhanced crosswalks at 3 locations: 1) Patrick Henry Dr. between Democracy Way and Patrick Henry Dr.(access to Calabazas Creek trail), 2) Old Ironsides Dr. north of Old Glory Ln.,3) Patrick Henry Dr. north of Bunker Hill Ln.	City	\$ 250,000
	Financial incentives	City Place will prepare a TDM Plan. Among the measures that may be included are pre-tax benefits for employees for bicycle expenses and financial subsidies for City Place residents who commute by walking or biking.	City Place	NA

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
BICYCLE AND PEDESTRIAN ACCESS AND FACILITIES (continued)				
Great America Parkway and Mission College Boulevard	Implement bike sharing	Mission Community College, Mercado	City	NA
	Bike and pedestrian trail improvements	Redesign and reconstruct San Tomas Aquino Creek Trail crossing at Agnew Rd	City	\$ 300,000
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors for crossings across major streets and accessible pedestrian signals at 7 signalized intersections: 1)Mission College Blvd/Mission College Blvd, 2)Mission College Blvd/GAP, 3) Mission College Blvd/Santa Clara Marriot, 4)Mission College Blvd/Freedom Circle, 5)Mission College Blvd/Agnew Rd, 6) Mission College Blvd/Juliette Ln, 7)Mission College Blvd/Burton Dr	City	\$ 125,000
	Upgrade safety lighting with Light Emitting Diode (LED) luminaires	Install safety lighting with LED luminaires at 7 signalized intersections: 1)Mission College Blvd/Mission College Blvd, 2)Mission College Blvd/GAP, 3) Mission College Blvd/Santa Clara Marriot, 4)Mission College Blvd/Freedom Circle, 5)Mission College Blvd/Agnew Rd, 6) Mission College Blvd/Juliette Ln, 7)Mission College Blvd/Burton Dr	City	\$ 112,000
	Enhance uncontrolled crosswalks	Provide enhanced crosswalks at 1) Mission College Blvd near Our Lady's Way, and 2) Freedom Circle south of Hichborn	City	\$ 120,000
Agnew Road - De La Cruz Boulevard and Montague Expressway	Install bike lockers and racks	At Northside Library, Thamien Park, Live Oak Park, Montague Park, and Agnew Park	City	\$ 100,000
	Implement bike sharing	City library at Rivermark Plaza	City	NA
	Install standard bicycle lanes	De La Cruz bicycle lanes from Montague Expressway to Trimble Road	City	\$ 150,000
	Install bicycle detectors	Install bicycle sensors at 3 locations on Montague Expy: 1)Montague Expy/Lick Mill Rd, 2)Montague Expy/De La Cruz Blvd, 3)Montague Expy/Mission College Blvd	County	\$ 90,000
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors for crosswalks crossing major streets and accessible pedestrian signals at 7 signalized intersections: 1)Lafayette St/Agnew Rd, 2) Agnew Rd/Sun Fire Way, 3) Agnew Rd/Harrigan Dr, 4) De La Cruz Blvd/Greenwood Dr, 5) De La Cruz Blvd/Aldo Av, 6) De La Cruz Blvd/Laurelwood Rd, 7) Lick Mill Blvd/Moreland Way	City	\$ 120,000
	Upgrade safety lighting with Light Emitting Diode (LED) luminaires	Upgrade safety lighting with Light Emitting Diode (LED) luminaires at 7 signalized intersections : 1) Lafayette St/Agnew Rd, 2) Agnew Rd/Sun Fire Wy, 3) Agnew Rd/Harrigan Dr, 4) De La Cruz/Greenwood Dr, 5)De La Cruz/Aldo, 6) De La Cruz Blvd/Laurelwood Rd, 7)Lick Mill Blvd/Moreland Way	City	\$ 112,000
	New Sidewalk	Montague Expy between Agnew Rd and Lafayette St	County	\$ 1,000,000
	Enhance uncontrolled crosswalks	Provide enhanced crosswalks at 6 locations: 1) crossing Lick Mill Blvd at E. River Parkway/Park View Dr, 2)crossing Lick Mill Blvd at Fitzpatrick Way, 3) crossing Agnew Rd at Avina Circle, 4) crossing Agnew Rd at Garrity Way, 5) crossing Moreland Way at Fitzpatrick Way, 6)crossing Laurie Avenue south of Kevin Way	City	\$ 600,000
San Tomas Expressway and Monroe Street	Install bike lockers and racks	At Walter E. Schmidt Youth Activity Center, Skate Park and Teen Center, Bowers Ave Park, Warburton Swim Center, Bracher Park, southwest corner of San Tomas Expy/Monroe St at San Tomas Aquino Creek trailhead.	City	\$ 120,000
	Bike and pedestrian trail improvements	1) San Tomas Aquino Creek Trail at Monroe St limit line delineation system	City	\$ 300,000
		2) Saratoga Creek Trail (share of trail)	City	\$ 1,000,000
	Install standard bicycle lane	Monroe Street between San Tomas Aquino Creek Trail and Lawrence Expressway	City	\$ 450,000
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors for crossings across major streets and accessible pedestrian signals at 8 signalized locations: 1)Monroe St at San Tomas Expy, 2) Monroe St/San Tomas Aquino Creek Trail, 3) San Tomas Expy/Scott Blvd, 4)Scott Blvd/Martin Ave., 5)Scott Blvd/Monroe Ave., 6)Monroe St/Bowers Ave, 7)Monroe St/Los Padres Blvd, 8) Monroe St/Scott Blvd.	City/County	\$ 130,000
	Enhance uncontrolled crosswalks	Provide enhanced crosswalks at 4 locations: 1)crossing Monroe St at Quinn Avenue, 2) crossing Monroe St at Cabrillo Ave, 3)crossing Chromite Dr east of Alhambra Dr, 4)crossing Chromite Dr west of Cortez Dr.	City	\$ 150,000

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
BICYCLE AND PEDESTRIAN ACCESS AND FACILITIES (continued)				
Scott Blvd Boulevard and Central Expressway	Implement bike sharing	Santa Clara Square	City	NA
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors for crossings across major streets and accessible pedestrian signals at 8 signalized intersections: 1)Central Expy/Scott Blvd, 2)Central Expy/Bowers Ave, 3) San Tomas Expy/Walsh Ave, 4)Scott Blvd/Jay St, 5)Scott Blvd/Space Park Dr, 6)Scott Blvd/Walsh Ave, 7)Scott Blvd/Olcott St, 8)Scott Blvd/Octavius Dr	City/County	\$ 160,000
	Upgrade safety lighting with Light Emitting Diode (LED) luminaires	Install safety lighting with LED luminaires at 10 intersections: 1) Scott Blvd/Central, 2)Scott Blvd/Jay, 3)Scott Blvd/Space Park, 4)Scott Blvd/Walsh Ave, 5)Scott Blvd/Octavius St, 6)Scott Blvd/Olcott St, 7)Scott Blvd/Bowers Ave, 8)Scott Blvd/Lakeside Dr, 9)Scott Blvd/Oakmead Village Dr, 10)Scott Blvd/Garrett Dr.	City/County	\$ 100,000
	Enhance uncontrolled crosswalks	Provide enhanced crosswalks at 1)Space Park Drive at Kenneth St and Alfred St; 2) Lawson Lane near San Tomas Expy	City	\$ 100,000
De La Cruz Boulevard and Central Expressway	Install standard bike lane	Install standard bicycle lane on Lafayette Street from Central Expressway to Laurelwood Road. The bicycle lane continues north on Basset Street, just parallel to Lafayette Street from Laurelwood Road to Agnew Road.	City	\$ 350,000
	Enhance bicycle crossing markings	De La Cruz Blvd at Ewert Road	City/County	\$ 20,000
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors crossing the major street and accessible pedestrian signals at 6 signalized intersections: 1)De La Cruz Blvd/Central Expy, 2)De La Cruz Blvd/Martin Ave, 3)De La Cruz Blvd/Airport Technology Park, 4)Lafayette St/Walsh Ave, 5)De La Cruz Blvd/Reed St, and 6)Coleman Ave/Brokaw Rd	City/County	\$ 160,000
	Upgrade street lighting with Light Emitting Diode (LED) luminaires	Upgrade safety lighting with LED luminaires at 5 intersections: 1)De La Cruz Blvd/Martin Ave, 2)De La Cruz Blvd/Airport Technology Park, 3)Lafayette St/Walsh Ave, 4)De La Cruz Blvd/Reed St, and 5)Coleman Ave/Brokaw Rd	City/County	\$ 50,000
Lafayette Street and El Camino Real	Install bike lockers and racks	At City Hall, Police Headquarters, Senior Center, Fremont Park, Larry Marsalli Park, Mission Library, Triton Museum	City	\$ 140,000
	Implement bike sharing	At Santa Clara Station, Franklin Square, Santa Clara University, City Hall, Santa Clara Town Center, El Camino Center	City	NA
	Install standard bicycle lanes	1) Lafayette St bicycle lane from Reed to Central Expy, 2)Coleman Ave from San Jose City Limit to De La Cruz Blvd and Reed St	City	\$ 500,000
	Enable bike access on regional transit	Bikes are permitted on Caltrain, Capitol Corridor and ACE trains, and will be permitted on future BART trains serving Santa Clara	Caltrain, Capitol, ACE, BART	NA
	Install pedestrian wayfinding	To Santa Clara Train Station within 1/4 mile	City	\$ 50,000
	Install crosswalk motion sensors and accessible pedestrian signals	Install crosswalk motion sensors crossing the major street and accessible pedestrian signals at 10 intersections: 1)El Camino Real/Scott Blvd, 2)El Camino Real/Lincoln St, 3)El Camino Real/Monroe St, 4) El Camino Real/Lafayette St, 5)El Camino Real/McCormick Dr, 6)El Camino Real/Los Padres Blvd, 7)Lafayette St/Lewis St, 8)Lafayette St/Benton St, 9)Lafayette St/Homestead St, 10)Lafayette St/Market St	City	\$ 190,000
	Upgrade safety lighting with Light Emitting Diode (LED) luminaires	Install safety lighting with LED luminaires at 10 intersections: 1)ECR/Scott Blvd, 2)ECR/Lincoln St, 3)ECR/Monroe St, 4)ECR/Lafayette St, 5)ECR/McCormick Dr, 6)ECR/Los Padres Blvd, 7) Lafayette St/Lewis St, 8)Lafayette St/Benton St, 9)Lafayette St/Homestead Rd, 10)Lafayette St/Santa Clara St.	City	\$ 160,000
	Enhance uncontrolled crosswalks	Provide enhanced crosswalks at 5 locations: 1)Benton St at Washington St, 2)The Alameda south of Fremont St, 3)Monroe St south of Harrison(near Senior Center), 4) Monroe St north of Fremont (near Senior Center), 5) Monroe St south of Warburton	City	\$ 150,000

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
FREEWAY AND ARTERIAL OPERATIONS				
Great America Parkway and Tasman Drive	Install Travel Time data collection systems	Install travel time data collection systems at 3 locations along Great America Parkway (GAP), at the intersections of 1)Great America Parkway/Tasman Dr., 2)GAP/Old Mountain View-Alviso Road, and 3)GAP/Great America Way. Also, 2 additional locations along Tasman Drive at 1)Tasman Drive/Patrick Henry Drive and 2)Tasman Drive/Lick Mill Blvd.	City	\$ 55,000
	Install traffic monitoring cameras	Old Mountain View-Alviso Rd at Betsy Ross Dr	City	\$ 25,000
	Install Changeable Message Signs(CMS)	Install 2 CMS's on Lafayette St: one north of Tasman Drive and one south of Tasman Dr.	City	\$ 2,000,000
	Install Adaptive Traffic Signals	Install adaptive traffic signals along Great America Parkway (GAP) between US 101 and SR 237 at 5 intersections: 1)GAP/Great America Way, 2)GAP/Old Mountain View-Alviso Road, 3)GAP/Tasman Drive, 4)GAP/Old Glory Lane, and 5)GAP/Bunker Hill Ln. Also, 4 additional intersections under the GAP and Mission College MIP intersection area plan actions.	City	\$ 1,200,000
	Retime signal coordination at 5-year intervals up to 2035	1) Great America Parkway, from GAP/Great America Way to US 101 Southbound Ramps/Bowers Ave.	City	\$ 180,000
		2) Tasman Drive, from Patrick Henry Drive to Lick Mill Blvd	City	\$ 150,000
		3) Lafayette St., from Great America Way to El Camino Real	City	\$ 180,000
	New traffic signals	City Place includes signalization of new access points along Lafayette Street, and also at the intersection of Calle del Sol / Calle de Luna	City Place	NA
	Carpool incentives	City Place will include priority parking for carpools and vanpools	City Place	NA
Great America Parkway and Mission College Boulevard	Install Travel Time data collection systems	Install travel time data collection systems at 8 intersections: 1)GAP/Old Glory Ln, 2) GAP/Patrick Henry Dr, 3)GAP/Mission College Blvd, 4)GAP/US 101 northbound ramps, 5) Bowers Ave/US 101 southbound ramps, 6)Mission College Blvd/Mission College Blvd, 7)Mission College Blvd/Agnew Rd, and 8)Mission College Blvd/Burton Dr.	City	\$ 85,000
	Install Adaptive Traffic Signals	Install adaptive traffic signals along Great America Parkway (GAP) at 4 intersections: 1)GAP/Patrick Henry Drive, 2)GAP/Mission College Blvd, 3)GAP/US 101 northbound ramps, 4)Bowers Ave./US 101 southbound ramps	City	\$ 1,400,000
	Retime signal coordination at 5-year intervals up to 2035	Retime 8 traffic signals along Mission College Blvd from Great America Parkway to Montague Expressway at five year intervals up to year 2035	City	\$ 180,000
Agnew Road/De La Cruz Boulevard and Montague Expressway	Install Travel Time data collection systems	Install travel time data collection systems at 5 signalized intersections: 1) Agnew Rd/Sun Fire Wy, 2) Agnew Rd/Harrigan Dr, 3) De La Cruz Blvd/Laurelwood Rd, 4)Lick Mill Blvd/Moreland Way, 5)Lick Mill Blvd/Hope Dr	City	\$ 55,000
	Install traffic monitoring cameras	At 4 Intersections: 1) Lafayette St./Hope Dr.,2) Lafayette/Norman, 3)De La Cruz/Aldo Ave, 4)De La Cruz/Laurelwood Rd.	City	\$ 80,000
	Retime traffic signals at 5 year intervals up to 2035	Retime traffic signals along Agnew Rd/De La Cruz Blvd from Lafayette St to Laurelwood Rd	City	\$ 180,000

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
FREeway AND ARTERIAL OPERATIONS (continued)				
Scott Blvd Boulevard and Central Expressway	Install Travel Time data collection systems	Install travel time data collection systems at 5 intersections: 1)Scott Blvd/Garrett, 2)Scott Blvd/Bowers Ave, 3)Scott Blvd/Octavius, 4)Scott Blvd/Space Park Dr, and 5)Scott Blvd/Walsh Ave.	City	\$ 55,000
	Install traffic monitoring cameras	At 2 intersections: 1)Scott Blvd /Space Park Dr and 2)Scott Blvd/Walsh Ave	City	\$ 50,000
	Improve corridor coordination	At Scott Blvd/Jay St and Scott Blvd/Space Park Dr with county expressway intersections	City	\$ 30,000
	Retime signal coordination at 5-year intervals up to 2035	Retime traffic signals along Scott Blvd. from Garrett Drive to Space Park Dr.	City	\$ 180,000
	Install traffic responsive system	Install traffic responsive system on Scott Blvd from Garrett Drive to Space Park Dr.	City	\$ 60,000
De La Cruz Boulevard and Central Expressway	Install Travel Time data collection systems	Install travel time data collection systems at 3 locations: 1)De La Cruz Blvd/Martin Ave, 2)De La Cruz Blvd/Reed St, 3)Brokaw Rd./Coleman Av.	City	\$ 90,000
	Install traffic monitoring cameras	At 3 intersections: 1)De La Cruz Blvd Blvd/Airport Technology Park, 2)De La Cruz Blvd/Martin Ave, and 3)De La Cruz Blvd/Reed St	City	\$ 60,000
	Retime signal coordination at 5-year intervals up to 2035	At 4 intersections: 1)De La Cruz Blvd/Airport Technology Park, 2)De La Cruz Blvd/Martin Ave, 3) De La Cruz Blvd/Reed St. and 4)Coleman Ave/Brokaw Rd	City	\$ 150,000
San Tomas Expressway and Monroe Street	Install traffic monitoring cameras	At 2 intersections: 1)Monroe Street/Los Padres Blvd and 2)Monroe St/Scott Blvd	City	\$ 50,000
	Install Travel Time data collection systems	Install travel time data collection systems at 6 intersections: 1)Monroe/Nobili, 2) Monroe/Bowers Ave, 3)Monroe/Scott Blvd, 4)Benton/Scott Blvd, 5)Scott Blvd/Martin Ave, and 6)Scott Blvd/Warburton Ave.	City	\$ 65,000
	Retime signal coordination at 5-year intervals up to 2035	Retime traffic signals along Scott Blvd. from Martin Ave to El Camino Real every 5 years up to 2035	City	\$ 180,000
	Install Traffic responsive system	Install traffic responsive system on Scott Blvd from Martin Ave to El Camino Real	City	\$ 65,000
	Intersection modifications	San Tomas Expy & Monroe St: Provide additional right-turn lane from westbound Monroe to northbound San Tomas Expy	City	\$ 350,000
		Monroe St & Los Padres Blvd: Install protected left-turn signals for eastbound and westbound Monroe St	City	\$ 300,000
		Bowers Ave & Cabrillo Ave: Install protected left-turn signals and lanes for northbound and southbound Bowers Ave	City	\$ 300,000
	Traffic Signal Cabinet Upgrade	Monroe Street at Los Padres Blvd	City	\$ 50,000
Lafayette Street and El Camino Real	Install Travel Time data collection systems	Install travel time data collection systems at 5 intersections along ECR: 1)ECR/Scott Blvd, 2)ECR/Monroe, 3)ECR/Lafayette , 4)ECR/McCormick Dr, 5)ECR/Los Padres Blvd	City	\$ 125,000
		Install travel time data collection systems at 7 intersections along Lafayette St: 1)Lafayette/Great America Way, 2)Lafayette/Agnew, 3)Lafayette/Montague West, 4)Lafayette/The Alameda, 5)Lafayette/Lewis, 6)Lafayette St/Benton St, 7)Lafayette St/Homestead Rd		
	Install traffic monitoring cameras	At 4 locations: 1)ECR/Lincoln, 2)ECR/Monroe, 3)ECR/Lafayette, 4)Lafayette/Benton	City	\$ 100,000
	Retime signal coordination at 5-year intervals up to 2035	1) El Camino Real from Los Padres to Lafayette	City	\$ 165,000
		2) Lafayette St from Reed St to Homestead Rd.	City	\$ 150,000

MIP Intersection	Action Name and Description	Location and Description	Responsibility	Cost Estimate
TRANSPORTATION DEMAND MANAGEMENT STRATEGIES				
Great America Parkway and Tasman Drive	Transportation Management Agency	City Place may include the formation of a Transportation Management Agency (TMA). Among the activities under consideration for the TMA are the following: Creation of a website and marketing program and coordination with employers and tenants for distribution; Transportation information packets for all new City Place employees and residents; Links to all transit schedules and route maps, as well as the bicycle network, through a City Place "online kiosk;" Information on nearby transit services attractively displayed in retail area; Carpool and vanpool matching services; Guaranteed ride home services; and a Bicycle encouragement program.	City Place	NA
	Car share services	As part of required TDM Plan, City Place may include car share services on site, for residents, commuters and visitors.	City Place	NA
	Multi-passenger demand responsive ride services	As part of required TDM Plan, City Place may accommodate demand responsive ridehail and crowd-source transportation services on site.	City Place	NA
	Parking management	As part of required TDM Plan, City Place may include parking management strategies such as paid parking and unbundled parking to restrict the parking supply. These strategies would be paired with a residential permit parking program to ensure that City Place residents do not park in nearby neighborhoods.	City Place	NA
	Telecommuting	City Place may be equipped with high-speed communications infrastructure to facilitate telecommuting for both employees and residents.	City Place	NA
LAND USE STRATEGIES				
Great America Parkway and Tasman Drive	City Place Project	City Place will be a high-density, mixed-use, transit-oriented project located adjacent to major train stations. A complete commercial district will be located on site, at or close to employment and residential sites. The project is oriented around internal pedestrian and bicycle networks to facilitate walking and biking within City Place.	City Place	NA
	Tasman East Focus Area	Focus Area Specific Plan in progress	City	NA
	Patrick Henry Specific Plan	Specific Plan to begin in mid-2018.	City	NA
Great America Parkway and Mission College Boulevard	Great America Parkway Focus Area	Specific Plan to begin in mid-2018.	City	NA
	Freedom Circle Specific Plan	Specific Plan to begin in mid-2018.	City	NA
Lafayette Street and El Camino Real	El Camino Real Focus Area	Priority development area. Specific Plan underway	City	NA
	Downtown Focus Area	Planning requirements included in General Plan	City	NA
Scott Blvd Boulevard and Central Expressway	Lawrence Station Focus Area	Specific Plan completed	City	NA
	Central Expressway Focus Area	Santa Clara Square including 1,800 housing units, 2.1 MSF office and 500 KSF retail under development; Planning for the remainder to commence in 2023	City	NA
De La Cruz Boulevard and Central Expressway	Santa Clara Station Focus Area	Priority development area. Specific Plan completed	City	NA
	De La Cruz Focus Area	Planning to commence in 2023	City	NA
				\$20,664,000

Proposed MIP Improvements - Part B

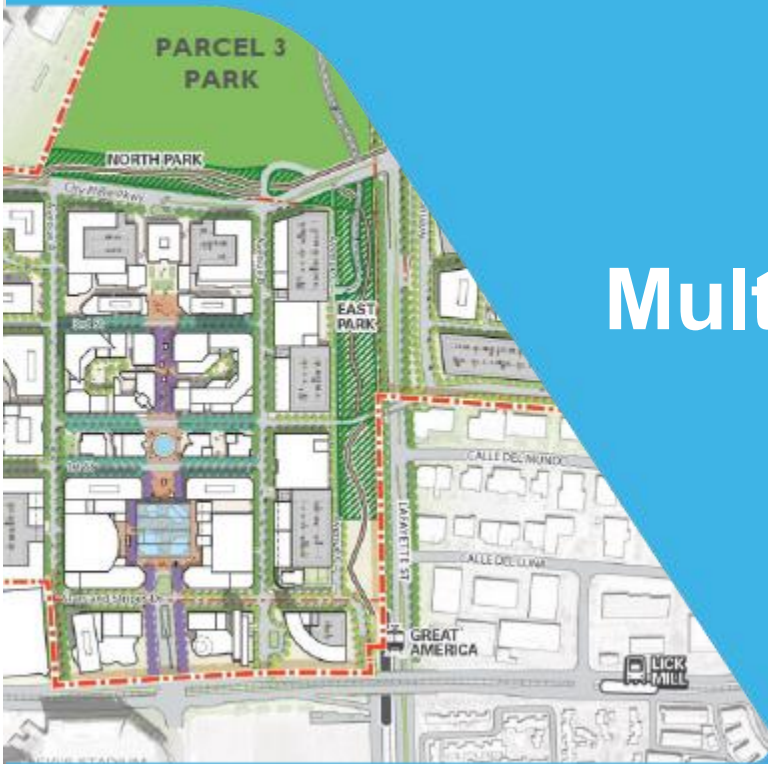
Intersection Improvements: Mitigation Measures from City Place EIR

City Place EIR #	Intersection	Proposed Improvement	City Place Responsibility
City of Santa Clara Intersections			
8	Great America Parkway & Tasman Drive*	Add a southbound right-turn lane and a third westbound left-turn lane.	\$1,415,400
13	Calle Del Sol and Tasman Drive	Add a westbound right-turn lane. Reconfigure southbound approach to include two left-turn lanes and one right-turn lane with overlap phase.	\$1,075,000
14	Lick Mill Blvd and Tasman Drive	Reconfigure northbound and southbound approaches to two left-turn lanes, one through lane, and one right-turn lane. Add second WB left-turn lane.	\$1,978,700
21**	Mission College Blvd & Montague Expwy*	Near-term: Add a third southbound left-turn lane	\$21,556
		Long-term: Construct interchange (City's share of \$18 M total cost is \$1,110,600)	\$24,433
22	Agnew Rd/De La Cruz Blvd & Montague Expwy*	Add a second northbound left-turn lane	\$424,300
23	Lick Mill Blvd and Montague Expwy	Add a third southbound left-turn lane.	\$312,800
51**	Lawrence Expwy and Kifer Road	Construct interchange. City's share is \$12,189,400.	\$792,311
52**	Lawrence Expwy & Reed Ave/Monroe St*	Construct interchange. City's share is \$9,297,000	\$520,632
53**	Lawrence Expwy and Cabrillo Avenue	An interchange is identified at this intersection as a Tier 3 priority in the County's Draft 2040 Expressway Plan. City's share is \$14M.	\$812,000
54	Lawrence Expwy and Benton Street	Add a second southbound left-turn lane and a second eastbound left-turn lane.	\$948,600
55	Lawrence Expwy & Homestead Rd*	Add a third eastbound through lane and a third westbound through lane	\$2,342,740
56**	Lawrence Expwy and Pruneridge Ave	An interchange is identified at this intersection as a Tier 3 priority in the County's Draft 2040 Expressway Plan. City's share is \$14M.	\$378,000
58	Great America Parkway & SR 237 EB Ramps *	Add a third southbound through lane (from adjacent intersection #57 in San Jose) and a second eastbound right-turn lane	\$1,704,644
59	Great America Parkway and Great America Way	Add a second westbound right-turn lane with an overlap phase and a second southbound left-turn lane.	\$1,180,800
60	Great America Parkway and Old Mountain View-Alviso Road	Add a second southbound left-turn lane.	\$430,600
70**	Bowers Ave & Scott Blvd*	Add a second southbound left-turn lane	\$37,610
71	Bowers Ave & Central Expwy*	Near-term: Add a third southbound left-turn lane and a third eastbound left-turn lane Long-term: Construct interchange. (City's share of total project cost of \$60 million is \$30 million.)	\$1,994,400 \$1,020,000
72**	Bowers Avenue and Kifer Road-Walsh Avenue	Add a second eastbound left-turn lane.	\$2,029

City Place EIR #	Intersection	Proposed Improvement	City Place Responsibility
73	Bowers Avenue and Monroe Street	Add a northbound and a southbound left-turn lane. Change northbound and southbound to protected left-turn phasing.	\$255,550
74**	Bowers Ave/Kiely Blvd & El Camino Real*	Add a second eastbound left-turn lane	\$23,118
75**	San Tomas Expwy & Scott Blvd*	Near-term: Add a second westbound right-turn lane	\$52,000
		Long-term: Construct Interchange.	\$1,105,000
76	San Tomas Expwy and Walsh Avenue	Add a second eastbound left-turn lane.	\$581,800
77**	San Tomas Expwy & Monroe Street*	Add a second northbound left-turn lane	\$36,000
78**	San Tomas Expwy & El Camino Real*	Construct interchange. (City's share of \$22 million total cost is 33%, \$7,333,333.)	\$220,000
79	San Tomas Expwy and Benton Street	Add a second eastbound left-turn lane.	\$144,700
80**	San Tomas Expwy & Homestead Rd*	Add a second eastbound left-turn lane	\$9,926
82	San Tomas Expwy and Pruneridge Avenue	Add a second northbound left-turn lane.	\$271,900
83**	San Tomas Expwy & Saratoga Ave*	Widen San Tomas to four lanes, both directions, with exclusive right-turn lanes and maintain HOV lanes.	\$35,637
90	Lafayette Street and Calle De Luna	Reconstruct the westbound approach to include two left-turn lanes and one right-turn lane.	\$70,700
94	Lafayette Street and Agnew Road	Add a second eastbound left-turn lane and a second southbound left-turn lane.	\$954,200
96	Lafayette St and Montague Expwy WB Ramps	Add a second westbound right-turn lane with an overlap phase and a second southbound left-turn lane.	\$1,241,700
98**	Lafayette Street & Central Expwy*	Construct grade separation between Central & Lafayette. (City's share of \$49 M cost is 50% or \$24,500,000.)	\$1,862,000
102**	Lafayette Street & El Camino Real*	Add a second eastbound left-turn lane	\$78,750
114	Calle Del Sol and Calle De Luna	Signalize intersection.	\$392,900
119**	De La Cruz Blvd and Aldo Avenue	Add an eastbound overlap phase.	\$42,359
120	De La Cruz Blvd and Laurelwood Road	Reconfigure the northbound and southbound approaches to include one left-turn lane, one through, and one through-right lane. Change phasing.	\$375,900
121**	De La Cruz Blvd & Central Expwy*	Install second southbound right-turn lane. Convert HOV lane to mixed flow lane.	\$28,566
124**	Scott Blvd & Central Expwy*	Convert HOV lane to mixed-flow lane.	\$1,500
125**	San Tomas Expwy & Stevens Creek Blvd*	Near-term: Widen San Tomas to four lanes in each direction, with exclusive right-turn lanes and HOV lanes	\$131,126
		Long-term: Construct interchange (The City's fair share of cost is \$8.6 million.)	\$172,000

City Place EIR #	Intersection	Proposed Improvement	City Place Responsibility
<u>City of Sunnyvale Intersections</u>			
1**	Fair Oaks Avenue and Tasman Drive	Reconfigure the eastbound approach to include one left-turn lane, one through lane, and one shared through/right-turn lane.	\$2,762
37**	Fair Oaks Avenue and Fair Oaks Way	Add a second eastbound right-turn lane.	\$14,002
43**	Fair Oaks Avenue and Maude Avenue	Add an eastbound right-turn lane	\$796
44**	Fair Oaks Avenue and E.Arquez Avenue	Add a southbound right-turn lane	\$5,132
45**	Fair Oaks Avenue and Evelyn Avenue	Add a southbound right-turn lane	\$9,415
46**	Lawrence Expwy and Sandia Avenue	Signalize Lawrence Expwy and Bridgewood Way-Lakewood Way	\$44,011
48**	Lawrence Expwy and US 101 SB Ramps	Convert eastbound left-turn lane to a shared left/right turn lane	\$13,500
49**	Lawrence Expwy and Oakmead Parkway	Grade separation between Lawrence Expwy and Oakmead Pkway. (City of Santa Clara's fair share is \$12 M)	\$948,000
50**	Lawrence Expwy and Arques Avenue	Construct interchange. (City of Santa Clara's fair share is \$12,189,400.)	\$451,008
<u>City of San Jose Intersections</u>			
15**	Renaissance Drive and Tasman Drive	Off-setting mitigation: Light rail operations capital improvements	\$253,000
17	Rio Robles and Tasman Drive	Widen the southbound approach to include one left-turn lane and one shared through/right-turn lane. Change signal phasing.	\$356,400
18**	N. First Street and Tasman Drive	Off-setting mitigation: A new bus/shuttle stop.	\$56,000
19**	Zanker Road and Tasman Drive	Off-setting mitigation: Light rail operations capital improvements	\$66,000
24**	N. First Street and Montague Expwy*	Off-setting mitigation: Contribute to future interchange, which includes grade separation of the light rail.	\$1,235,000
25**	Zanker Road and Montague Expwy*	Zanker Road Widening project. Intersections 25, 31, and 36 will be part of this project.	\$3,136,000
26**	Montague Expwy and Plumeria Drive - River Oaks Parkway	Install an eastbound right-turn overlap phase and limit northbound U-turns.	\$141,100
29**	De La Cruz Blvd and Trimble Road*	Add a third southbound left-turn lane	\$129,506
30**	N. First Street and Trimble Road*	Add a second eastbound left-turn lane and add an exclusive right-turn lane	\$37,000
31**	Zanker Road and Trimble Road*	City Place's fair share contribution to the Zanker Rd widening is shown under Intersection 25.	
34**	N. First Street and Brokaw Road*	Off-setting mitigation: Contribute to bicycle facilities along N. First St and the sidewalk near the US 101 NB loop on-ramp.	\$1,216

City Place EIR #	Intersection	Proposed Improvement	City Place Responsibility
36**	Zanker Road and Brokaw Road*	City Place's fair share contribution to the Zanker Rd widening is shown under Intersection 25.	
57	Great America Pkwy and SR 237 WB Ramps*	Add a third westbound left-turn lane and associated receiving lane under the underpass. Add a second westbound right-turn lane.	\$2,351,652
84	Gold Street and Gold Street Connector	Convert northbound through lane to a shared left-turn/through lane and add a second eastbound right-turn lane	\$735,100
109	Liberty Street and Lewis Street	Signalize intersection.	\$300,000
123	Great America Pkwy and Gold Street Connector	Add a second northbound right-turn lane (from intersection #57 dual westbound right-turn lanes). Cost in included in #57 cost estimate.	
Freeway Segments			
	Freeway segments on US 101, SR 87, SR 237, I-680, and I-880	Convert express lanes to HOV lanes	\$16,164,220
Total City Place contribution to mitigation measures in EIR			\$35,790,487
			\$16,164,220
			\$51,954,707
Notes: * Denotes CMP intersection ** Denotes intersection for which City Place's required fair share contribution is less than 100%. Intersections without a double asterisk (**) indicate City Place has 100% responsibility.			



City of Santa Clara Multimodal Improvement Plan Update

VTA PAC
April 12, 2018

Presentation Outline

I. Background

- A. Congestion Management Program
- B. Existing Multimodal Improvement Plans (MIPs)

II. Discussion

- A. Santa Clara MIP Overview & Approach
- B. Affected CMP Facilities / MIP Intersections
- C. MIP Approach/Draft Actions
- D. MIP Funding & Potential Impact Fee
- E. MIP Outreach & Coordination

III. Next Steps

IV. VTA Staff Considerations & Interests



Congestion Management Program (CMP)

- **VTA Authority**

VTA oversees designated CMP facilities

- *Freeways/Rural Highways*
- *Arterial Intersections*
- *Transit and Bicycle Networks*

- **Member Agency Requirement**

Member Agencies must maintain the acceptable Level of Service (LOS) standard for CMP facilities, or gas tax may be withheld

- **MIP Trigger**

Multimodal Improvement Plan (formerly “Deficiency Plan”) is required when Member Agency cannot maintain the LOS standard



Multimodal Improvement Plans

- **Requirements**

VTA Board adopted *Deficiency Plan Requirements* (2010)

- **Goals**

- Demonstrate integrative, coordinated, and comprehensive transportation strategies that reinforce community goals
- Provide alternative “offsetting” improvements intended to “trade off” physical capacity improvements to improve system-wide performance and air quality

- **Types**

- “Mini,” “Specific Area,” or “Areawide”

- **Contents**

Include analysis, improvements, action plan, monitoring program, interjurisdictional coordination



Santa Clara MIP Overview

Santa Clara – 7 Mini-Plans

- Trigger: City Place
 - 5.7 million SF - office
 - 1.5 million SF - retail
 - 700 hotel rooms
 - Up to 1,680 residential units
- Intersections below standard: 7
- Pedestrian/bicycle, transit, traffic flow, TDM, site design for new development, land use program
- Total Need:

CITY PLACE MITIGATIONS	\$72.5 M
MIP ACTION LIST	\$51.9 M
	\$20.6 M



Santa Clara MIP Goals & Approach

- **Goals**

- Comply with the CMP
- Comprehensive program of localized and citywide actions addressing pedestrians, bicycles, transit, ridesharing, and off-setting capacity improvements

- **Type**

7 Mini-plans to address 7 intersections below standard

- **Sources**

- *Santa Clara Bicycle Plan*
- *Santa Clara General Plan*
- *City Place Final EIR*
- *Santa Clara County Expressways Plan*
- *Valley Transportation Plan 2040*
- *VTA Countywide Bicycle Plan*
- *Tasman Complete Streets Corridor Study*



MIP Outreach & Coordination Process

Outreach

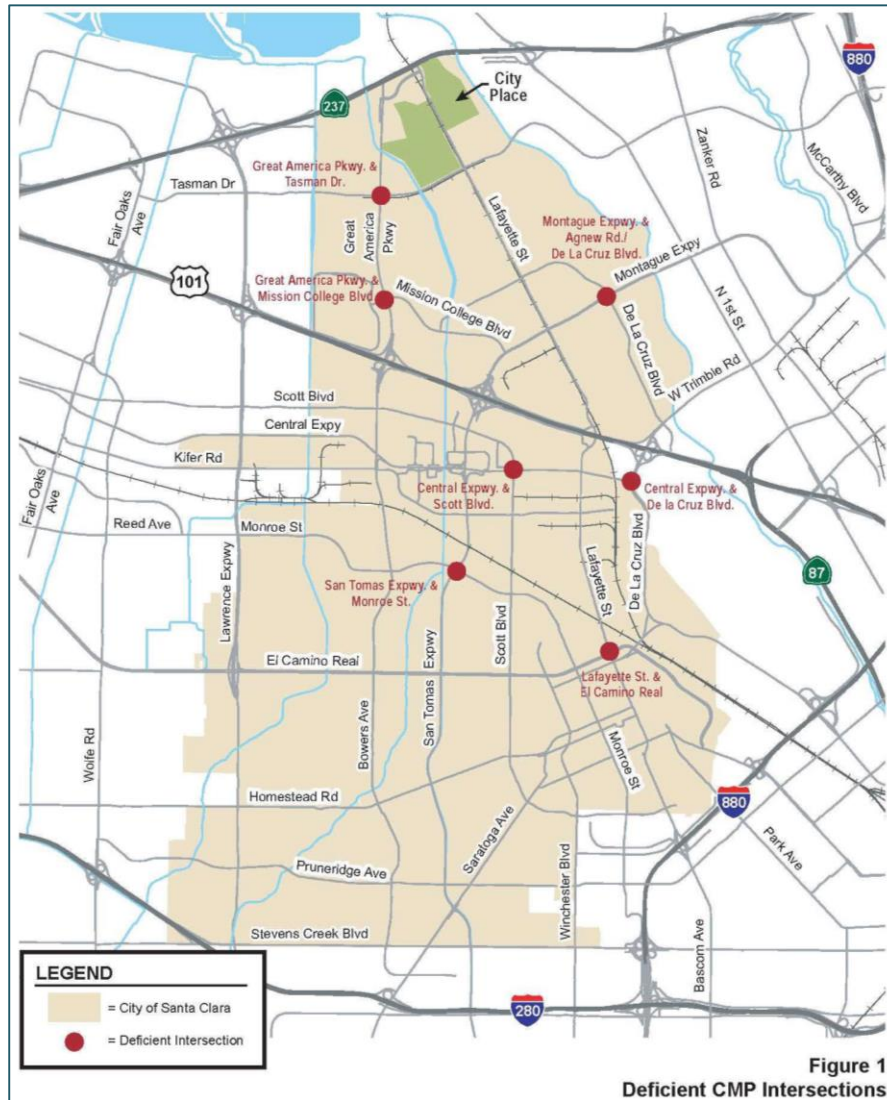
- Actions are based on recent plans (each with significant outreach).

Coordination

- City-VTA staff coordination throughout process
- City-County of Santa Clara coordination on 4 MIP Intersections on County Expressways
- City-Caltrans coordination for physical improvements in State right-of-way, per Caltrans standards and encroachment permit



Santa Clara's Draft Action List & 7 MIP Intersections



Draft Action List

- Transit, bicycle, pedestrian, freeway/arterial operation improvements at MIP Intersections
- Mitigations at intersections identified in the City Place EIR

MIP Intersection	Jurisdiction
Great America/Tasman	City
Great America/Mission College	City
Agnew -De La Cruz/Montague	City/County
San Tomas/Monroe	City/County
De La Cruz/Central	City/County
Scott/Central	City/County
Lafayette/El Camino Real	City/Caltrans

MIP Funding & Potential Traffic Impact Fee

- **Action Plan**

Includes timing, cost, and responsibilities for improvements

- **Potential Traffic Impact Fee (TIF)**

Plan will likely include a TIF, and Nexus for the Fee

- **Funding for Improvements**

TIF would provide funding for localized multimodal improvements at or in vicinity of the 7 MIP Intersections



Santa Clara MIP Next Steps

*We are
here*



Milestone	Status
City Place Approval	June 2016
MIP Process Kickoff	March 2017
Coordination with VTA, County, stakeholders	February 2017, ongoing
MIP Approach at VTA Committees	May 2017
<u>Develop Draft Action List</u>	Spring 2017-Spring 2018
Develop Draft Action Plan <ul style="list-style-type: none">• Timing, Cost, Responsibilities• Funding• Monitoring/Administration	Upcoming - 2018
Potential Nexus Study for Impact Fee	
MIP Council Action-Adoption	
VTA Committees/Board Action-Adoption	



VTA Staff Considerations & Interests

General

- Extent of Local vs. Regional Facilities Addressed
- Interjurisdictional Coordination
- MIP Funding & Implementation

Specific

- Tasman Signal Operations; Light Rail Travel Reliability
- Great America ACE/Capitol Corridor Station
- Transportation Demand Management (TDM), Land Use Changes & Site Design
- Pedestrian/Bicycle Crossing over Tasman



PAC WORK PLAN
April - October 2018

Doc ID	Origin	Short Title	PAC 4/12	BOD 5/3	PAC 5/10	BOD 6/7	PAC 6/14	BOD 6/22	PAC 7/12	BOD 8/2	PAC 8/9	BOD 9/6	PAC 9/13	BOD 10/4
6478	Division - Planning and Programming / Marcella Rensi	VRF Matching Grant programming	A	A										
6271	Division - Engineering and Transportation Program Delivery / Suja Prasad	Measure A Semi-Annual Report ending December 31, 2017	I	I										
6137	Division - Planning and Programming / Chris Augenstein	Google North Bayshore Transportation Access Study - Draft Report	I	I										
6476	Dept - Transportation Planning / Chris Augenstein	City of Santa Clara Multimodal Improvement Plan Update	I	I										
6399	Dept - Transportation Planning / Chris Augenstein	Year-In-Review 2017 - Land Use Transportation Integration Program	I	I										
6460	Dept - Transportation Planning / Jim Unites	Express Bus Performance Report	I	I										
6486	Division - Planning and Programming / Jim Unites	Fast Transit Program	I	I										
6459	Dept - Transportation Planning / John Sighamony	Using Big Data for CMP Monitoring Report	I											
6420	Division - Planning and Programming / Marcella Rensi	FY2018/19 TDA3 Project Priorities			A	A								
6421	Division - Planning and Programming / Marcella Rensi	2018/19 TFCA Program Manager Fund			A	A								
6446	Division - Planning and Programming / Amin Surani	Local Program Reserve Reallocation			A	A								
6506	Dept - Transportation Planning / Chris Augenstein	Countywide Bicycle Plan (Action)			A	A								
6450	Dept - Environmental Program & Resource Management / Keelikolani Ho	Annual Sustainability Report			I	I								
6527	Dept - Technology & Innovation / Gary Miskell	TNC Report					I							
6284	Division - Operations / Lalitha Konanur	Transit Operations Performance Report - Q3 FY 2018					I							
6384	Dept - Project Development / Casey Emoto	Transportation Technology Strategic Plan Development Status Report									I	I		
6272	Division - Engineering and Transportation Program Delivery / Suja Prasad	Measure A Semi-Annual Report ending June 30, 2018											I	I