

City of Lafayette
**Downtown Congestion Reduction
Plan**
Final Report

Final | March 20, 2018

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 243381

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Executive Summary

In 2013, shortly after adopting the Lafayette Downtown Specific Plan (“DSP”), the City Council directed the Circulation Commission to conduct study sessions on how to reduce downtown traffic congestion. Between 2013-2014, the Circulation Commission developed an extensive catalog, or “universe”, of potential solution ideas for further study. This became the basis for a Downtown Congestion Reduction Plan (“Plan”). In 2014, the City secured grant funding from the Contra Costa Transportation Authority (“CCTA”) to study Downtown Lafayette traffic and produce the Plan, which would document study analysis and recommend solution ideas to curtail current and manage future traffic congestion. Subsequently, the City Council authorized formation of the Plan Steering Committee, to oversee staff and consultant’s technical analysis and advise the City Council on traffic congestion reduction strategies. The Steering Committee is comprised of members of various stakeholder groups, including the City Council, Circulation Commission, Planning Commission, Design Review Committee, Lafayette School District, Chamber of Commerce, and Homeowners’ Council. The Steering Committee met publicly 13 times and undertook three major public outreach initiatives in developing the Plan for final adoption by the City Council.



Ultimately, alleviating traffic congestion is about enhancing the quality of life. Traffic congestion is a facet of modern life that almost everyone dislikes as it takes longer to travel places, which keeps us away from home, work, and the enjoyable things in life. It is a significant problem that has come with growth and development in Lafayette, the larger Lamorinda area, and the Bay Area overall.

This Plan takes a comprehensive look at how to deliver solutions that solve Lafayette’s numerous transportation challenges, mainly in the downtown core. Transportation issues in Downtown Lafayette are complex with no “quick-fix” solutions. Therefore, the background analysis focuses on how the street network performs and the various causes behind what generates traffic to, from, and through the Downtown.

Traffic congestion is a multifaceted problem. The nature of this problem, with its many causes and potential solutions, makes it a challenge to capture a single guiding principle or objective for the study. The Steering Committee developed the following statement of purpose for the study:

“Address critical transportation concerns that affect the quality of life in the community.”

Expanding on this statement, the Steering Committee expressed several guiding principles organized around three key themes:

1. Enhance the quality of life
2. Improve existing deficiencies
3. Guide future changes

In addition to identifying solution strategies, the Plan also evaluates when various strategies should be implemented to alleviate congestion associated with future land development. While the Plan provides a long-term vision for Downtown transportation planning, the majority of strategies recommended in the Plan are considered achievable within the next ten years, if and when traffic conditions warrant those applicable actions, and adequate funding and community support are also in place.

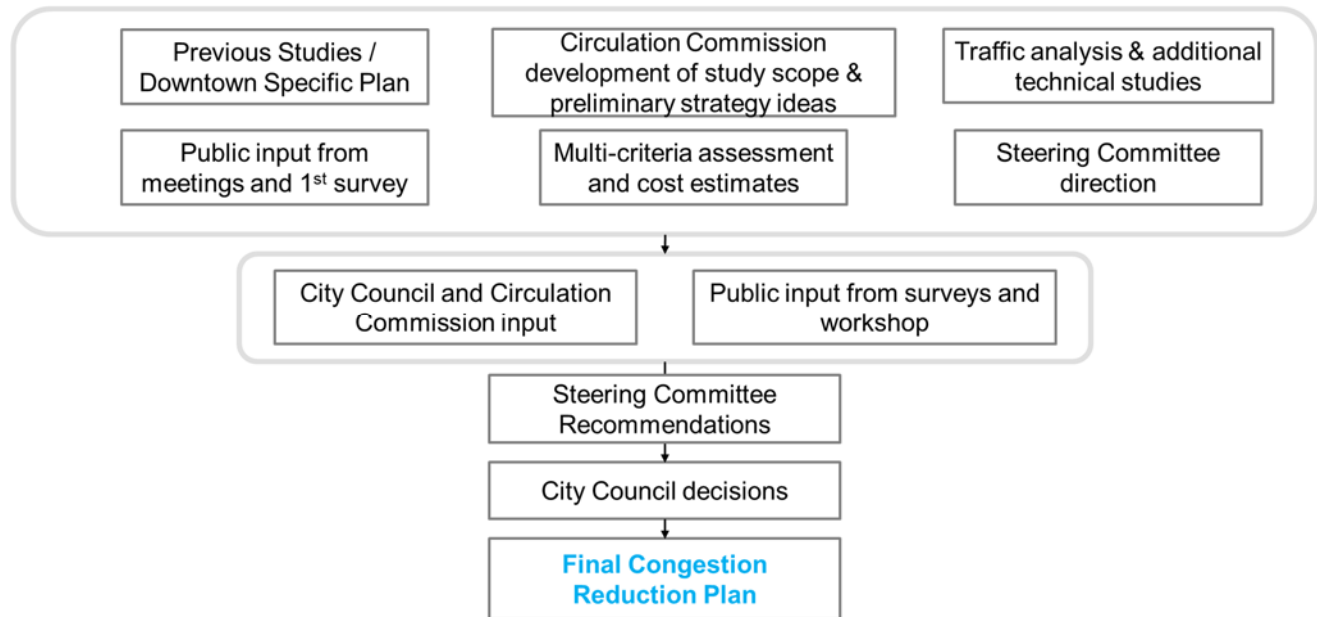
1 Introduction

1.1 Plan Contents

The body of the Plan is comprised of five sections. This introductory section outlines the information included in the Plan. The following sections follow in a sequence that corresponds to the development of the Plan, from gathering and analyzing existing traffic data to providing traffic congestion reduction strategy recommendations. Following the five main body sections, two appendices provide supporting information and data. For further reference, all technical reports reviewed by the Steering Committee are also available at the dedicated Plan website: <https://lafayettecongestion.com/>.

Figure 1 summarizes the various sources supporting the final recommended strategies and implementation plan.



Figure 1: Plan Components

1.2 Plan Objectives and Strategy Development

The following represent the objectives of the recommended strategies in the Plan:

- Reduce congestion in Downtown
- Enhance safety for motorists
- Enhance safety for pedestrians and cyclists
- Minimize parking impacts
- Enhance urban design
- Minimize environmental and utility impacts
- Be cost effective
- Be consistent with established City policies

These guiding principles informed the strategy development process described in the following sections.

The study explored two categories of strategies to address Downtown traffic congestion: 1) strategies that increase capacity or throughput (the number of vehicles that can travel through an intersection), or 2) strategies that reduce vehicle trips (also known as demand management strategies). Table 1 provides some typical strategies for these two categories. Please note that these are not exhaustive lists:

Table 1: Examples of Congestion Reduction Strategies

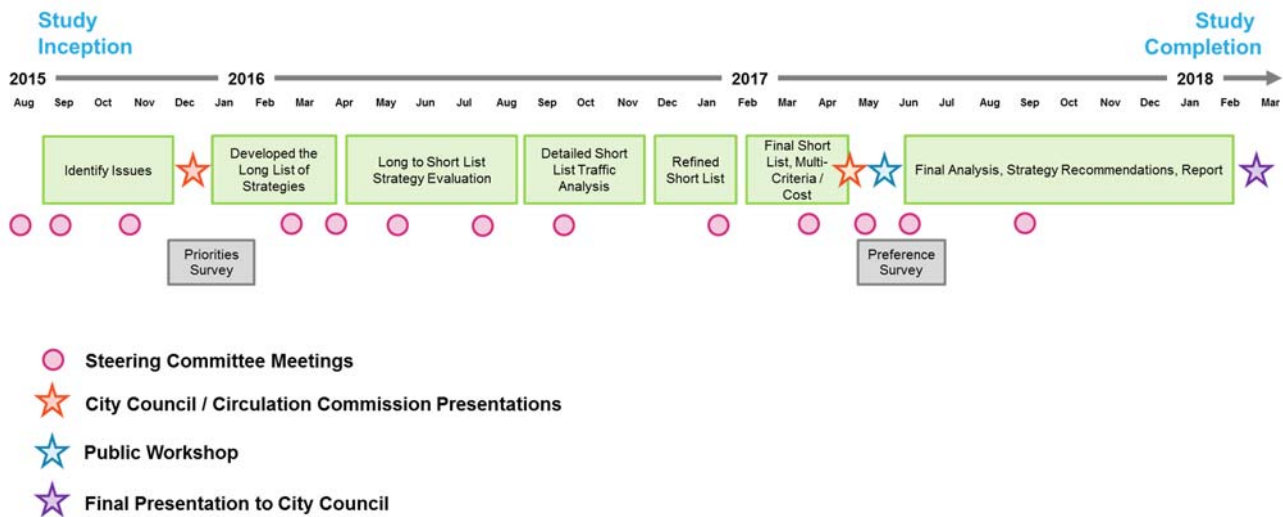
Capacity Enhancing Increase Capacity / Throughput	Vehicle Trip Reduction Promote Walk, Bike, and Transit Modes
Add new streets Widen existing streets Add left or right-turn lanes Improve signal coordination	Add bike lanes Add pedestrian crossings Provide more bus service Improve access to BART

Opportunities for adding new streets or widening existing streets are limited in a developed area such as Downtown Lafayette. However, removing on-street parking to provide additional turn lanes, reconfiguring intersections, and improved traffic signal coordination can all increase capacity and help people travel through key congested segments with less delay. The vehicle trip reduction strategies focus on ways to promote alternative modes of transportation by making it easier to walk and bike to Downtown schools and BART, for example, and possibly remove vehicle trips on congested roadways.

The strategy development process included several key steps:

The Plan is the result of a two-and-a-half-year process, which has incorporated several key analyses. Figure 2 presents the Plan’s timeline.

Figure 2: Plan Timeline

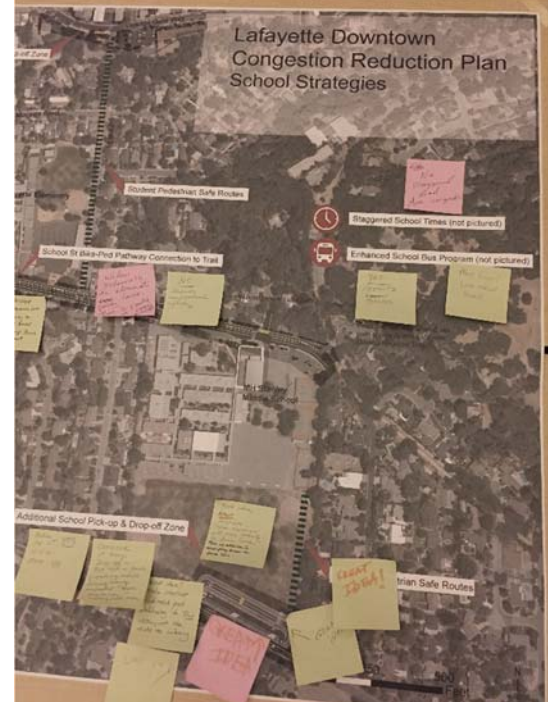


The key milestones in the development of the Plan include:

- Issue Identification:** the key transportation issues in the Downtown were identified and provided in the *Background Conditions Report* (Arup, February 17, 2016). This report also presents the existing conditions traffic model and analysis. A web-based “priorities survey” and “Collaborative Map” were launched in November 2015 and collected over 900 responses. The feedback from this outreach contributed to subsequent strategy development. Additional information and conceptual designs for the strategies are presented in Appendix B.

- **Initial List of Strategies:** the Steering Committee, City staff, and Arup developed an initial list of over 100 strategies from previous Circulation Commission strategy memos, previous studies such as the DSP, results from the first set of surveys (i.e., Collaborative Map and priorities survey, available in Appendix B), as well as analysis and field observations performed early in the Plan process.
- **Long List of Strategies:** The Initial List was used to develop a subsequent “Long List” of 50 strategies. The Long List was presented to the Steering Committee and included a project description, conceptual design options, a qualitative analysis of potential effectiveness, and the projected trade-offs.
- **Long to Short List Strategy Evaluation:** the Steering Committee narrowed the Long List to a Short List of strategies using a more detailed analysis, including estimates of vehicle traffic generation, the potential for shifting trips from auto to alternative modes, traffic operations impacts, and other qualitative measures. The strategy development work was an iterative process that included a range of various analyses and engineering studies to refine the strategies to respond to guidance from the Steering Committee, City staff, and public input. The strategy development process is summarized in the technical memorandum *Long List to Short List of Strategies and Projects* (Arup, June 22, 2016).
- **Detailed Short List Traffic Analysis:** a detailed traffic analysis was conducted on the Short List strategies to identify their effectiveness at serving existing and future traffic. These analyses are summarized in several technical memoranda: *Preliminary Detailed Network Traffic Analysis Work-in-Progress Findings* (Arup, August 26, 2016), *Traffic Analysis: Progress Update* (Arup, November 10, 2016), and *Final Traffic Analysis* (January 19, 2017).
- **Refined Short List:** the detailed traffic analyses and other engineering design studies provided the Steering Committee and City staff with the necessary information to refine the Short List of strategies and the definition of each strategy.
- **Finalized Short List, Multi-Criteria Assessment, and Costs:** Arup developed a multi-criteria analysis to finalize the Short List of strategies. The multi-criteria analysis utilizes a diverse array of qualitative and quantitative measures that consider each strategy’s impact on congestion and traffic operations, safety, connectivity, quality of the environment, cost, and the potential ease of implementation (e.g., regulatory, environmental, and political considerations). The memorandum *Multi-Criteria Analysis – Revised Results* (Arup, April 24, 2017) presents the full multi-criteria analysis. Additional detail on the multi-criteria analysis is presented in Appendix C.
- The Short List was presented to a joint City Council / Circulation Commission meeting on April 24, 2017. City staff and Arup received feedback and launched the second “preference survey”. Over 600 respondents participated in the second survey. The results of the second survey are provided in the memorandum *Lafayette Downtown Congestion Reduction Plan – Public Outreach* (Arup, July 5, 2017).

- A public workshop was held on May 23, 2017 at the Lafayette Veterans Memorial Center and received in-person feedback and additional comments on the Short List of strategies from over 70 attendees.
- The final Steering Committee meeting was held on August 15, 2017 to finalize the strategy recommendations to the City Council. The multi-criteria assessment, preference survey, and public feedback from the workshop all contributed to the final deliberation by the Steering Committee. City staff and Arup responded to a range of comments and held follow up meetings with the School District to address circulation issues around the Downtown schools.
- This draft Plan presents the final set of recommendations and the implementation plan to the City Council. One strategy, the 2nd northbound right-turn (NBR) turning lane at Mt Diablo Boulevard and Moraga Road, requires a City Council determination as the Steering Committee could not reach consensus.



1.3 Recommended Strategies

At its August 15, 2017 meeting the Steering Committee finalized traffic congestion reduction strategy recommendations for inclusion in this Plan. Figure 3 presents a map of the recommended strategies. Strategy numbers correspond to strategy details described in the subsequent Table 2. Additional information and conceptual designs for the strategies are presented in Appendix A. One strategy, the 2nd northbound right-turn (NBR) turn lane at Mt Diablo Boulevard and Moraga Road (#12), requires a City Council determination as the Steering Committee could not reach consensus. The BART Pedestrian Bridge over Oak Hill Road (#10) has been eliminated from consideration by the City Council.

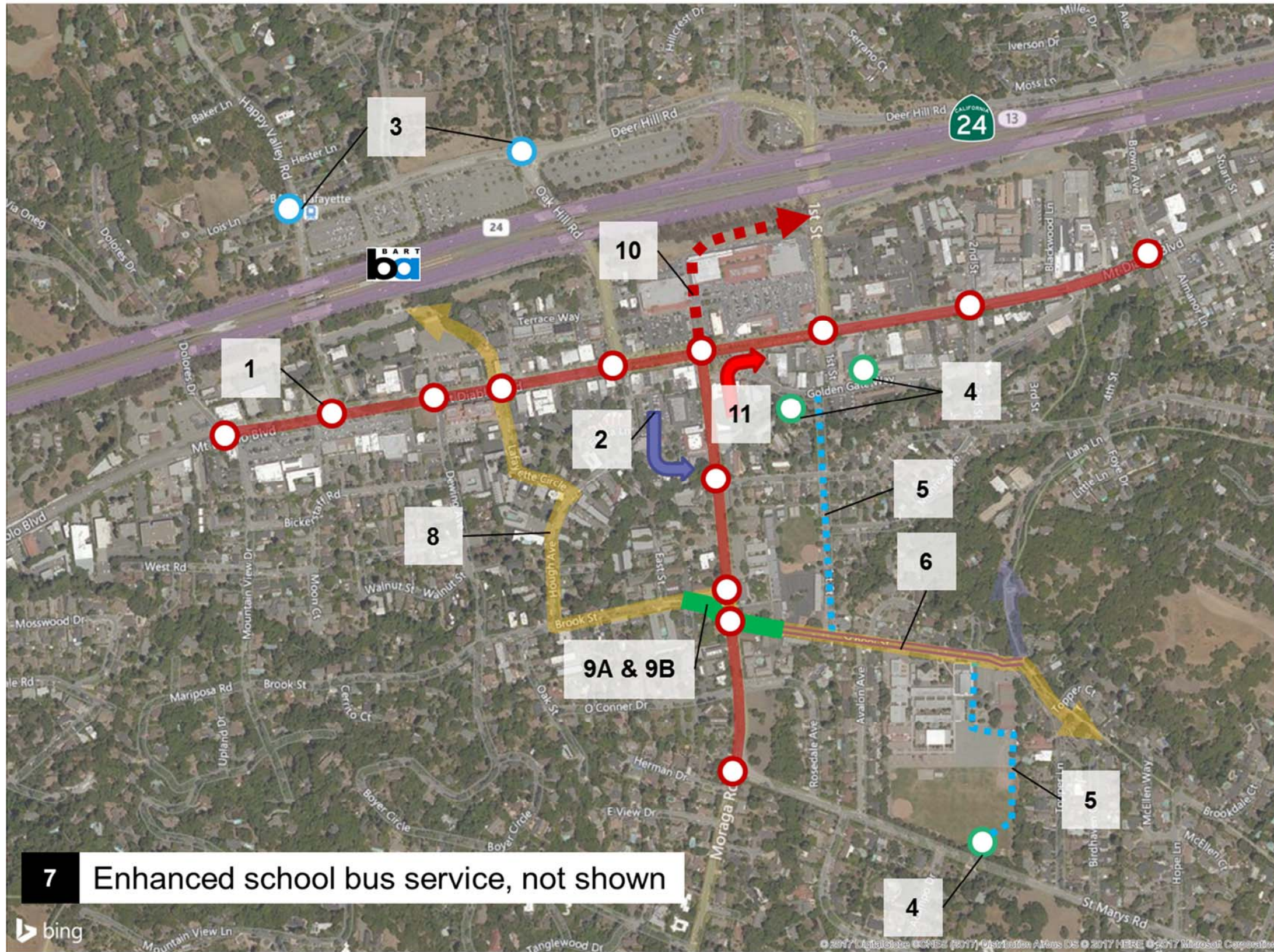
Two timeframes for implementing the strategies have been identified:

- **Short-Term Strategies (1-10 Years):** these strategies are generally lower cost, can be implemented with minimal right-of-way acquisition and coordination with other regional and state agencies, require only minimal environmental analysis under the California Environmental Quality Act (CEQA), and can be designed and constructed in a five-year time period. *These strategies have been shown to provide enough capacity to serve an additional 6% additional traffic in Downtown Lafayette.*
- **Long-Term Strategies (10-20+ Years):** these strategies are much higher cost, will require significant coordination with regional agencies such as EBMUD and Caltrans, and will require a full Environmental Impact Report (EIR) under CEQA. However, these strategies are only necessary if traffic and development growth approaches the higher growth scenario. *These strategies have been shown to provide enough capacity to serve an additional 20% additional traffic in Downtown Lafayette.*
- **Pilot Project:** the City Council has recommended that City staff conduct a pilot of the Mount Diablo Blvd/Moraga Rd 2nd Northbound Right-Turn strategy to test its effectiveness and impact on pedestrians.

Table 3 presents the recommended timing (Short or Long-Term) for each strategy. The cost estimates and reasoning for including each strategy in the Short and Long-Term packages are also provided. It is important to note that these strategies do not represent a strict priority list, but merely represent a way of organizing the strategies according to short and long-term timeframes. The City should remain flexible to implement one or more of the Long-Term strategies if grant funding opportunities arise.

The remainder of this Plan document provides supporting detail for the recommended strategies summarized in the figure and two tables below.

Figure 3: Recommended Strategies



Strategies

Short-Term

1. Coordinated traffic signals on Mount Diablo Boulevard and Moraga Road
2. Southbound left-turn lane at Moraga Road / Moraga Boulevard
3. Signalize the intersections of Deer Hill Road / Oak Hill Road and Deer Hill Road / Happy Valley Road
4. Additional School Pick-up & Drop-off Zones
5. Student-Pedestrian Safe Routes
6. School Street Bike-Ped Pathway Connection to Trail
7. Enhanced School Bus Program
8. Regional Trail Connection to BART/Downtown

Long-Term

- 9A. Brook St-School St Pedestrian Footbridge over Moraga Road
- 9B. Brook St-School St intersection realignment
10. Moraga Rd Extension Behind McCaulou's / Whole Foods To 1st St

Pilot Project

11. 2nd NBR turning lane at Mt Diablo Boulevard / Moraga Road

7 Enhanced school bus service, not shown

Table 2: Recommended Strategy Descriptions

Strategy	Description
1. Coordinated traffic signals on Mount Diablo Boulevard and Moraga Road	Provide a series of traffic signal system upgrades along Mount Diablo Boulevard and Moraga Road. These improvements include: 1) install new traffic signal controllers, 2) extend the traffic signal interconnect system on Mount Diablo Boulevard to include Mountain View Drive, Happy Valley Road, and Dewing Avenue, 2 nd Street, and Brown Avenue, 3) incorporate the Moraga Road / St. Mary’s Road intersection into the Moraga Road coordinated system, 4) install advanced traffic cameras for video data collection and detection, 5) investigate options for implementing advanced adaptive traffic control systems.
2. Southbound left-turn lane at Moraga Road and Moraga Boulevard	Provide a left-turn lane at the southbound approach of the Moraga Road / Moraga Boulevard intersection, while maintaining two southbound and northbound travel lanes. The turn lane would remove 6-7 on-street parking spaces on the west side of Moraga Road. The turn lane will provide an area for vehicles to line up and not block southbound traffic as they wait to make a left-turn. This will increase capacity and improve traffic operations on Moraga Road.
3. Signalize the intersections of Deer Hill Road and Oak Hill Road and Deer Hill Road and Happy Valley Road	Traffic signals at these intersections will improve traffic operations and provide an enhanced environment for pedestrians using the crosswalks. Roundabouts were also evaluated but eliminated from consideration because they would not likely provide sufficient traffic capacity.
4. Additional School Pick-up & Drop-off Zones	Introduce two new pick-up and drop-off zones at Golden Gate Way and St Mary’s Road. The new zones provide additional options for parents to drop-off children, which could divert some vehicle trips from critical segments of Moraga Road and help reduce congestion. The St Mary’s Road zone is designed to minimize the impact on the Stanley Middle School playing fields.
5. Student-Pedestrian Safe Routes	Create a seamless pedestrian network with new paths and enhanced facilities on existing streets. This network would include the School Street Bike-Ped Connection to Trail concept, with enhanced safety measures at other key intersections. These Safe Routes provide a seamless network for children and other pedestrians to travel between the schools and the new pick-up and drop-off zones, the Regional Trail, and Moraga Road. These improvements are necessary to support the pick-up and drop-off zones and promote additional walking and cycling around the schools.
6. School Street Bike-Ped Pathway Connection to Trail	The School Street Bike-Ped Pathway Connection to Trail includes a redesign of the street to provide a wide path for pedestrians and cyclists on the north side of the street that connects the Downtown schools and the Lafayette-Moraga Regional Trail. The proposed design would remove some on-street parking. However, parking could be added with a redesign of School Street in front of the Middle School. This proposed design would integrate well with the Brook St-School St Intersection Realignment strategy.
7. Enhanced School Bus Program	Expand the school bus program by increasing the contracted service by four buses and extending the service to Lafayette Elementary.
8. Regional Trail Connection to BART/Downtown	Improve bicycle and pedestrian facilities and signage between the Lafayette-Moraga Regional Trail and BART and Downtown. This would include the School Street Bike-Ped Connection to Trail, improvements on Brook Street, Hough Avenue, and Lafayette Circle.
9A. Brook St-School St Pedestrian Footbridge over Moraga Rd	Construct a pedestrian and bicycle bridge over Moraga Rd to connect Brook St and School St and remove the existing crosswalks on Moraga Rd at both Brook and School Streets. This strategy would eliminate the at-grade pedestrian crossing phases and pedestrian conflicts on Moraga Rd, which will provide traffic operations benefits along Moraga Rd and enhance safety.
9B. Brook St-School St Intersection Realignment	Realign Brook and School Streets to create a single intersection at Moraga Road with a southbound left-turn pocket. Consolidating the two intersections at Brook and School Street to one and providing the left-turn pocket improves traffic operations on Moraga Road, Brook Street, and School Street. The Masonic Lodge property would need to be acquired and the building demolished. Also, a few on-street parking spaces on the south side of School Street would need to be removed.
10. Moraga Rd Extension Behind McCaulou’s / Whole Foods To 1st St	Extend Moraga Road north of Mount Diablo Boulevard through the shopping center, between Safeway and McCaulou’s, to connect with 1st Street opposite the State Route 24 eastbound on-ramp. This connector would operate one-way northbound only. This project would provide a direct connection for traffic heading to the freeway, which redistributes traffic from key segments of Mount Diablo Boulevard and 1st Street. This would improve traffic operations through the Downtown “Y”. This project is only required in the long-term if population and employment growth exceed certain targets and if the redevelopment of the shopping center presents an opportunity.
Pilot Project	
11. 2nd NBR turning lane at Mt Diablo Boulevard and Moraga Road (No North-South Crosswalk at the east leg)	Provide a second northbound right-turn from the middle lane at the Moraga Road / Mount Diablo Boulevard intersection and remove the north-south crosswalk on the eastern leg of the intersection. These changes would increase capacity for the critical northbound right-turn, which would reduce queuing and improve traffic operations along Moraga Road. The crosswalk needs to be removed to avoid conflicts between turning drivers and pedestrians. Several alternatives that considered other lane configurations, signal phasing, and crossing options were evaluated but eliminated from consideration during Steering Committee review.

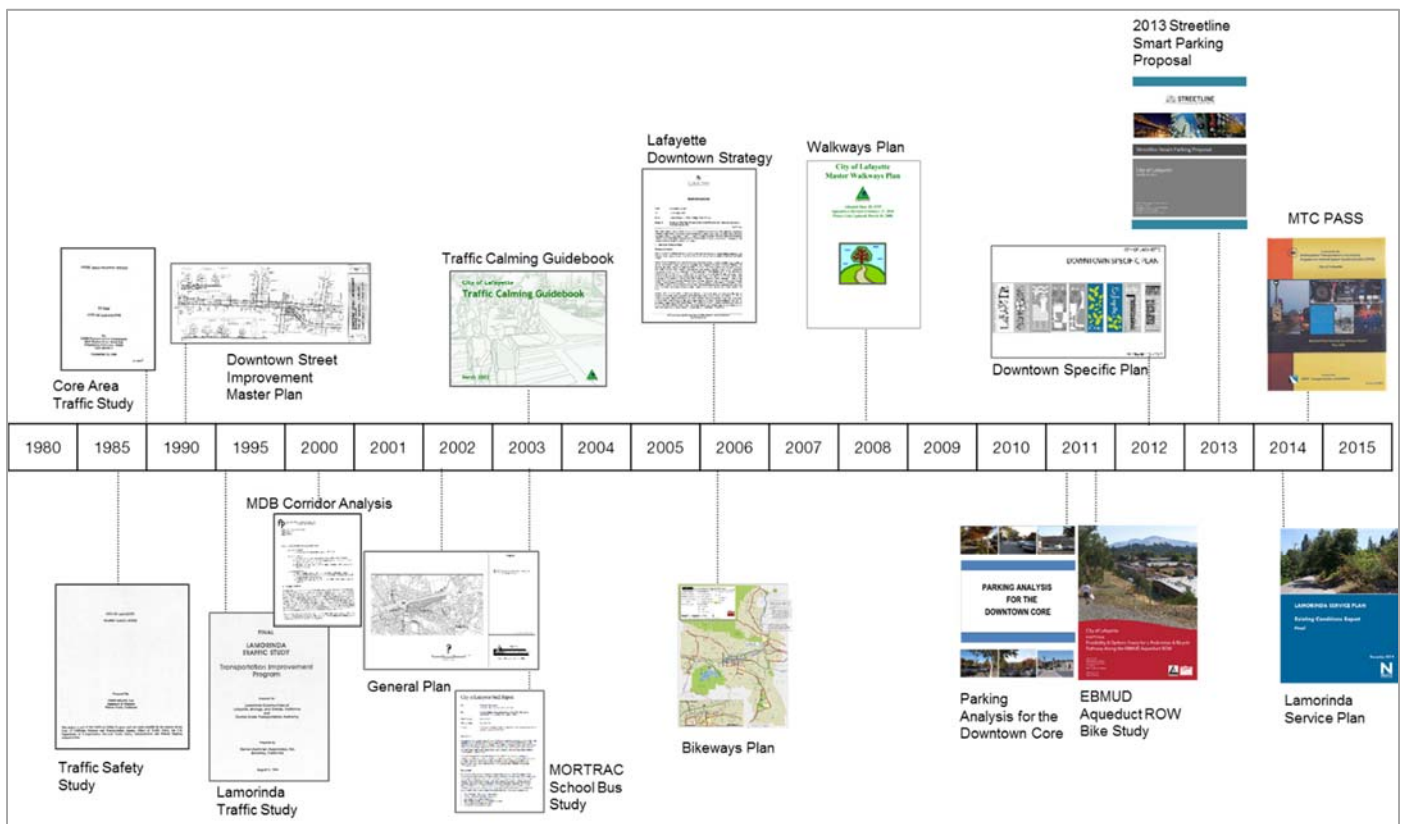
Table 3: Recommended Strategies by Implementation Timeframe

Strategy	Cost	Reasoning
Short-Term (1-10 years): Relatively Low Cost Investments to Increase Capacity and Reduce Trip Demand		
Coordinated Traffic Signals	\$1-1.5M	Extending the coordinated traffic control system to additional signals will provide a small increase in capacity with minimal physical or environmental impacts. It also scored first in the preference survey, by a significant margin. However, it scored last on the multi-criteria assessment and it is an expensive strategy to implement. Despite these drawbacks, this project could qualify for regional and/or federal funds, such as MTC's IDEA grant program.
Southbound left-turn lane at Moraga Road and Moraga Boulevard	\$75-100k	Providing a dedicated left-turn pocket is a relatively low-cost measure to increase capacity on Moraga Rd. This strategy also scored reasonably high on the preference survey (#3 or #4).
Signalize Deer Hill Rd/Oak Hill Rd and Deer Hill Rd/Happy Valley Rd	\$500-750k	These traffic signals provide additional capacity and pedestrian safety benefits. These signals scored high in the multi-criteria assessment, they have a relatively modest financial cost, and they can be constructed without significant physical impacts. However, they did score low in the survey.
Additional School Pick-up & Drop-off Zones	\$200-400k	These formal zones will help divert some school-related traffic from Moraga Rd. The St Mary's zone should be designed to minimize the impact on the Stanley Middle School playing fields. These additional zones scored high in the multi-criteria assessment and in the top third of the preference survey.
Student Pedestrian Safe Routes / Priority Streets	\$50-100k	These Safe Routes are the key connections from the additional pick-up and drop-off zones to the schools. For the zones to be effective and safe, these additional routes are needed. This strategy scored high in the multi-criteria assessment but in the middle to the bottom third of the survey. However, Arup and City staff still consider this is a critical complement to the pick-up/drop-off zones.
School Street Bike-Ped Pathway Connection to Trail	\$500k-1.5M	This project is also a critical complement to the pick-up/drop-off zones and the Student Pedestrian Safe Routes, as it forms a key connection between the two Downtown schools and the Lafayette-Moraga Regional Trail. With the Brook St-School St Realignment project, it also provides a direct and safe pedestrian and bicycle connection to the west side of Moraga Rd. The proposed design removes 9 on-street parking spaces. However, the public spaces are all on the south side of the street and impact spaces only near two houses; there is also excess on-street parking capacity on Avalon Ave. This strategy does score low in both the multi-criteria analysis (last) and in the bottom third of the survey. This strategy will likely take additional design and outreach with the neighbors prior to implementation.
Enhanced School Bus Program	\$320k (per year)	Providing additional school buses at Stanley Middle School and new service at Lafayette Elementary will reduce school-related trips during peak times. This strategy scored reasonably high in the multi-criteria assessment and near the top in the preference survey. It is relatively expensive to implement, at approximately \$320,000 per year to the current contractor operating the school buses. This program will likely take additional time to identify and acquire funds.
Regional Trail Connection to BART/Downtown	\$50-100k	This project helps create a cohesive bicycle and pedestrian network across Downtown, to reach key destinations such as BART and nearby commercial establishments. It also helps tie together the Safe Routes and the other school-related projects. It scored high in the multi-criteria analysis and it is relatively low-cost. However, it did score in the bottom third of the survey.
Long-Term (10-20+ Years): Long-Term Projects to Consider if Needed		
Brook St-School St Pedestrian Footbridge over Moraga Rd	\$2-3M	This strategy will require significant engineering design and coordination with the Masonic Lodge and Lafayette School District, as part of the bridge will be located on respective properties. It will also likely require purchasing some land or otherwise obtaining a special access agreement from the Masonic Lodge and the School District to allow for some of the ramp structures to be built.
Brook St-School St Intersection Realignment	\$4-5M	This strategy enhances traffic capacity and helps provide a better east-west bicycle connection across Moraga Rd. It scored high in the multi-criteria assessment, but in the middle of the pack in the survey. There are still concerns that this strategy would encourage cut-through traffic on Brook St. However, the congestion relief associated with the Short and Medium-Term strategies should improve conditions along Moraga Road to the point that it would reduce the attractiveness of using Brook St as a cut-through route. But additional traffic calming measures on Brook St could be explored. This strategy will likely take at least five years to implement.
Moraga Rd Extension to SR 24 and 1st St Behind McCaulou's/Whole Foods	\$20-30M	This project is only required if the City experiences traffic growth at the "higher 20% growth" forecast shown in the earlier section. To achieve this growth, sites such as McCaulou's/Whole Foods would need to redevelop. If this redevelopment occurs, the connection from Moraga Rd to SR 24 and 1 st St should be constructed as part of the site plan. This roadway will provide a direct connection and was shown to be the most effective at improving queuing along Moraga Rd.
Pilot Project		
Mount Diablo Blvd/Moraga Rd 2nd Northbound Right-Turn	\$100-200k	While this strategy scored high in the multi-criteria assessment and the survey, it would require the removal of the north-south crosswalk on the east leg of the intersection. Arup and City staff have considered that this is too significant of an impact on pedestrian circulation. This strategy would also contradict established City policies promoting pedestrian mobility and Complete Streets principles, especially in the downtown core. However, the strategy does provide significant congestion reduction benefits for a modest cost.

2 Background Conditions

To prepare for studying ways to reduce current and future traffic congestion, it is necessary to understand historical efforts to date and to validate traffic trends. Since its incorporation in 1968, the City of Lafayette has conducted numerous traffic congestion-related studies, focused primarily in the Downtown core area. These studies have considered ways to alleviate traffic congestion and parking issues, provide better transit service, improve the pedestrian and bicycle network, and enhance safety. Figure 4 presents a timeline and lists some of the key studies. Most of these studies have focused on specific modes, “hot spots”, or design recommendations. This Plan advances decades of prior study shown below and also leverages more recent industry research and best practices.

Figure 4: Previous Lafayette Transportation Studies



Each of the studies noted above contribute foundational information for this Plan. Of particular influence are the *Downtown Specific Plan* (2012) and the corresponding *Environmental Impact Report* (EIR) (2012). Upon adopting the DSP, the City Council recognized a need to develop a traffic plan that could supplement the DSP. To achieve this, in 2013 the Council directed the Circulation Commission to conduct study sessions on how to reduce downtown traffic congestion. Between 2013-2014, the Circulation Commission developed an extensive catalog, or “universe, of potential solution ideas for further study. The Downtown Congestion Reduction Plan is the culmination of the Council-directed traffic study.

The DSP provides comprehensive guidance for land use growth and development in the Downtown. The DSP identified four downtown districts and defined their unique characteristics. For each district, the plan developed policies on land use, building density and height, parking, the pedestrian experience, and other important elements.

In addition to district-specific policies, the DSP developed a range of policies to apply to Downtown as a whole. The circulation policies were organized under these six priorities:

- Circulation: Balance downtown vehicular circulation with providing a bicycle and pedestrian system;
- Pedestrians: Ensure a continuous and accessible pedestrian network with appropriate pedestrian infrastructure;
- Bicycles: Develop a bicycle network and associated facilities to serve the Downtown;
- Transit: Support a transit network to serve the Downtown;
- Transportation Demand Management (TDM): Improve downtown circulation through TDM strategies;
- Parking: Support adequate parking in the Downtown.

Some projects have been successfully implemented, which have increased capacity and made bicycling and walking more attractive. The following lists some recently completed transportation projects:

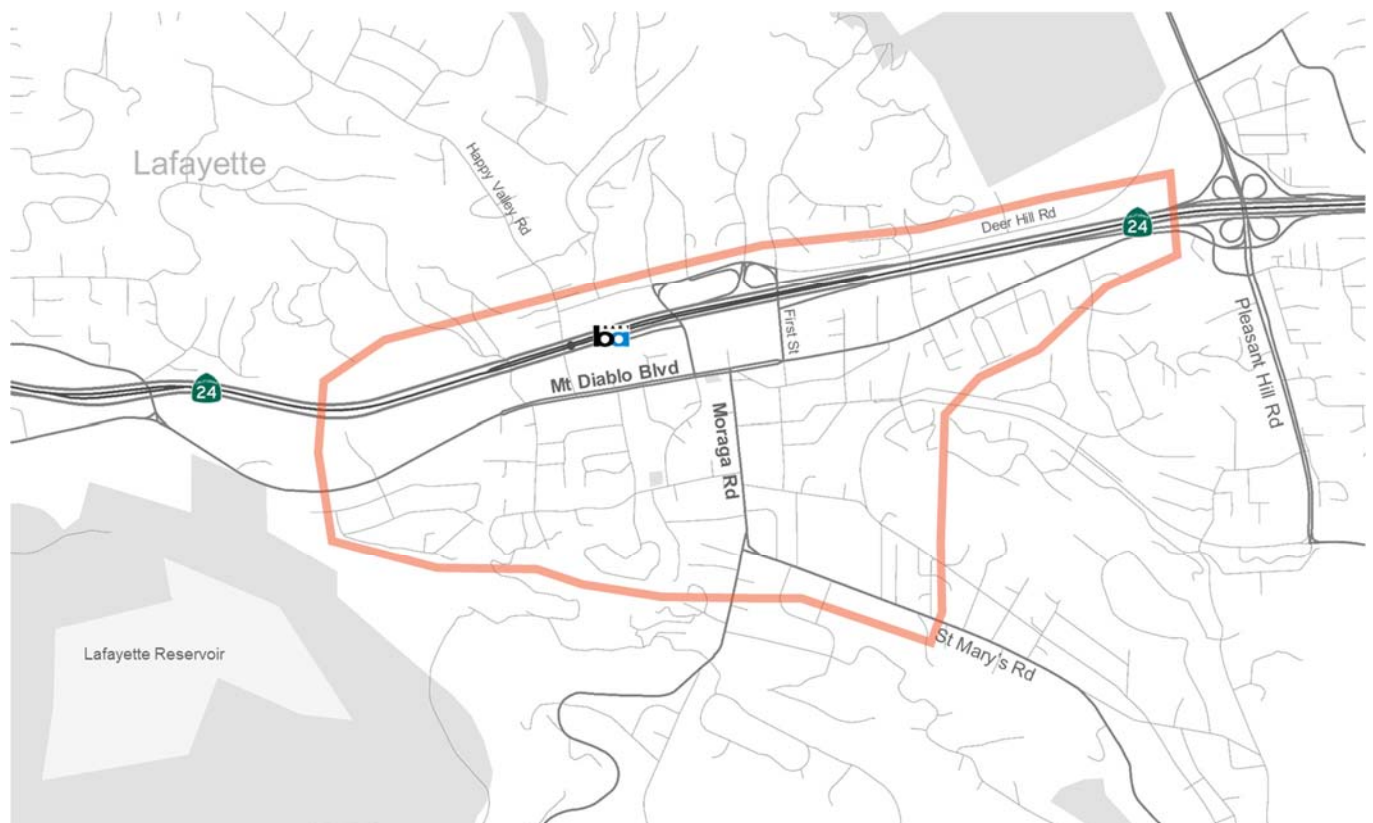
- Downtown signal timing optimization
- New third eastbound lane on Mount Diablo Boulevard (Moraga Road to 1st Street)
- Reconfigured plaza (Moraga Road to 1st Street south of Mount Diablo Boulevard)
- Improved eastbound SR 24 on-ramp at 1st Street
- Improved bike and pedestrian facilities in Downtown
- Wider sidewalks on Mount Diablo Boulevard
- Multi-use path on Moraga Road (connecting schools)
- Crossing enhancements
- Bike sharrows
- Downtown bike bypass and route signage

However, many previously studied projects have not been implemented because of high costs, unattractive trade-offs, and/or a lack of community consensus.

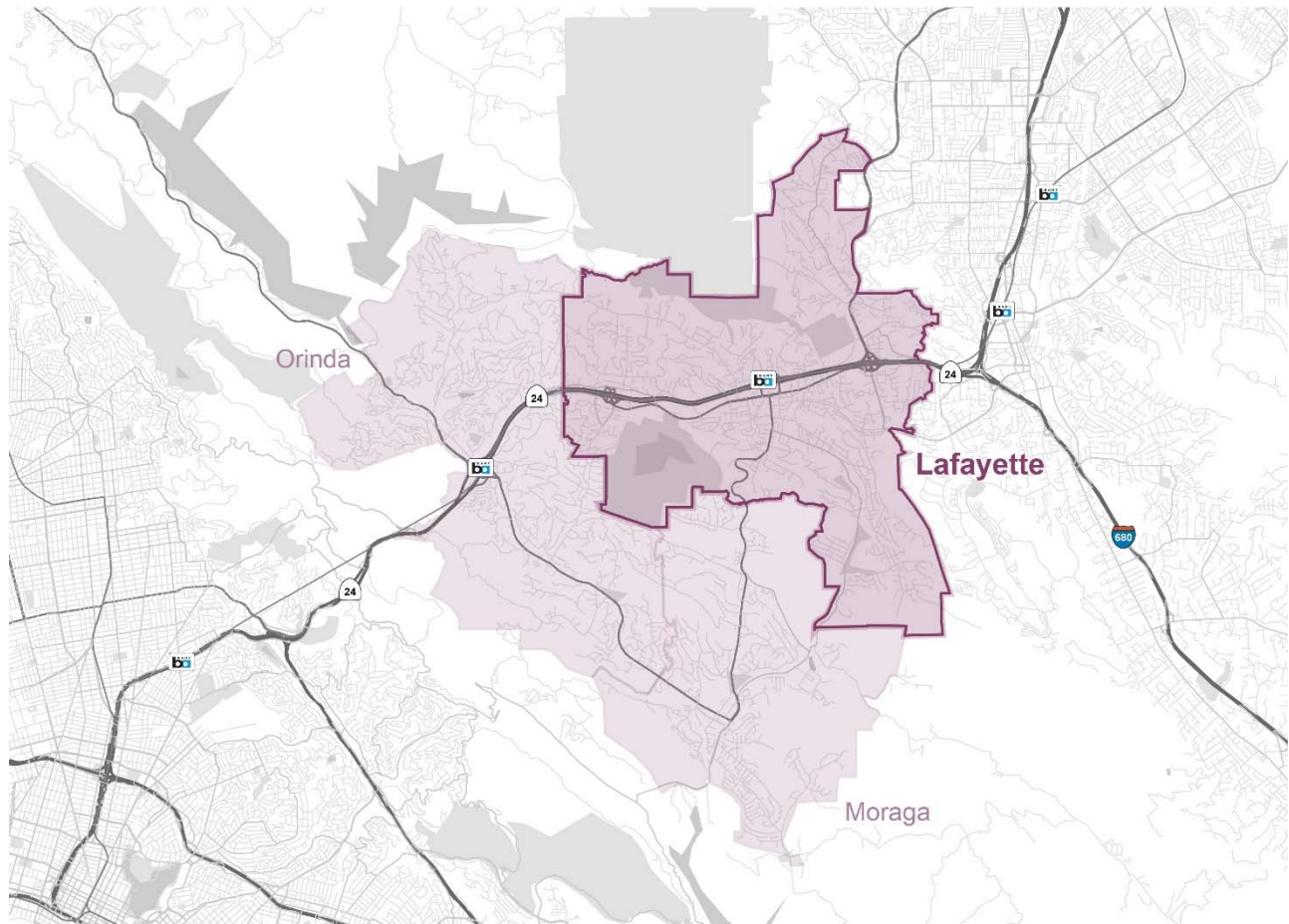
2.1 Plan Study Area

The Plan study area mimics the part of the City included in the DSP. Lafayette’s downtown has a wide range of land uses including residential, office, shopping, entertainment, recreation, education, and civic buildings such as the Lafayette Library and Learning Center. The Plan also considers regional transportation facilities that extend beyond study area and City boundaries, such as Bay Area Rapid Transit (BART) and State Route 24 (SR 24), shown in Figure 5 below. Incorporating these regional transportation facilities during the study phase contributed to the intentional holistic approach to strategy development in this Plan.

Figure 5: Project Study Area



In the context of this Plan, the term “region” is interchangeable between the greater San Francisco Bay Area and Contra Costa County. Whereas, as depicted in Figure 6, Lafayette is part of the Lamorinda “sub-region”, comprised of the three municipalities of Lafayette, Moraga, and Orinda. Providing a unique mix of both rural and urban characteristics, Lamorinda is situated near major urban areas yet is immediately surrounded by miles of open space. San Francisco and Oakland to the west and the Interstate 680 (I-680) corridor to the east provide jobs, housing, shopping, and other destinations to people who live and work in Lamorinda. North and south of the sub-region, regional parks and wilderness areas free of development give the area a semi-rural environment, despite its relative proximity to urban areas.

Figure 6: Lamorinda Study Area

2.2 Transportation Context

The *Lamorinda Action Plan* (2014), prepared by CCTA, assesses the transportation issues within the Lamorinda area and outlines a package of policies, objectives, and actions to address those issues. The Action Plan also identifies Routes of Regional Significance and Interjurisdictional Routes within Lamorinda that represent the key elements of the transportation system. Especially important to Downtown Lafayette, State Route 24 (SR 24) and a Bay Area Rapid Transit (BART) line together form the only prominent regional connection within Lamorinda to the wider Bay Area. SR 24, which runs through the heart of Lafayette and Orinda, connects to I-680, I-580, and I-880, all three major north-south interstates. SR 24 serves Downtown Lafayette with multiple freeway interchanges, including (from east to west), at Pleasant Hill Road, Laurel Drive (“Central Lafayette” exit) and Acalanes Road.

BART is the primary regional rail transit operator in the East Bay with a network of stations throughout the Bay Area. Lamorinda has BART stations in Lafayette and Orinda. The Lafayette station has served Lamorinda since 1973. Below are sample statistics related to use of the Lafayette BART station:

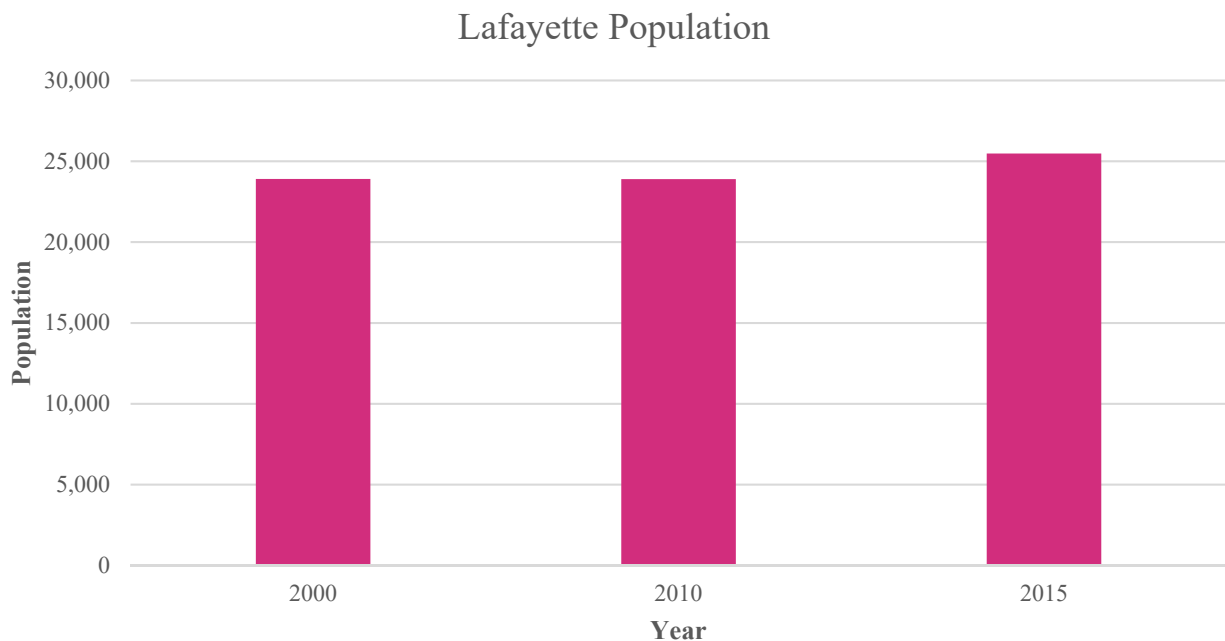
- Average daily passenger exits (at fare gates) in 2015: 3,900
- Parking spaces: 1,526
- County Connection bus lines servicing station: 6, 25, 250 (late evening service during the school year)

In Lamorinda, there are a limited number of roads that access the parallel SR 24 and BART corridors. In Orinda, Moraga Way is the primary arterial providing access the Orinda BART station and SR 24. In Lafayette, Moraga Road is the primary arterial providing access to the Lafayette BART station and SR 24. Most streets in the region funnel traffic to this limited number of north-south roads. For Lafayette, this pattern of traffic funneling to Moraga Road is one of the root causes of congestion in the Downtown.

2.3 Socioeconomic Factors

Demographics and social indicators are critical to understanding travel behavior, vehicle trip generation, and traffic trends. The population of Lafayette has remained steady over the years with a small increase since 2000. Figure 7 shows the Census population trends from 2000 through 2015. The average growth rate over these 15 years is approximately 0.4 percent per year.

Figure 7: Lafayette Population Trends, Source: US Census Bureau

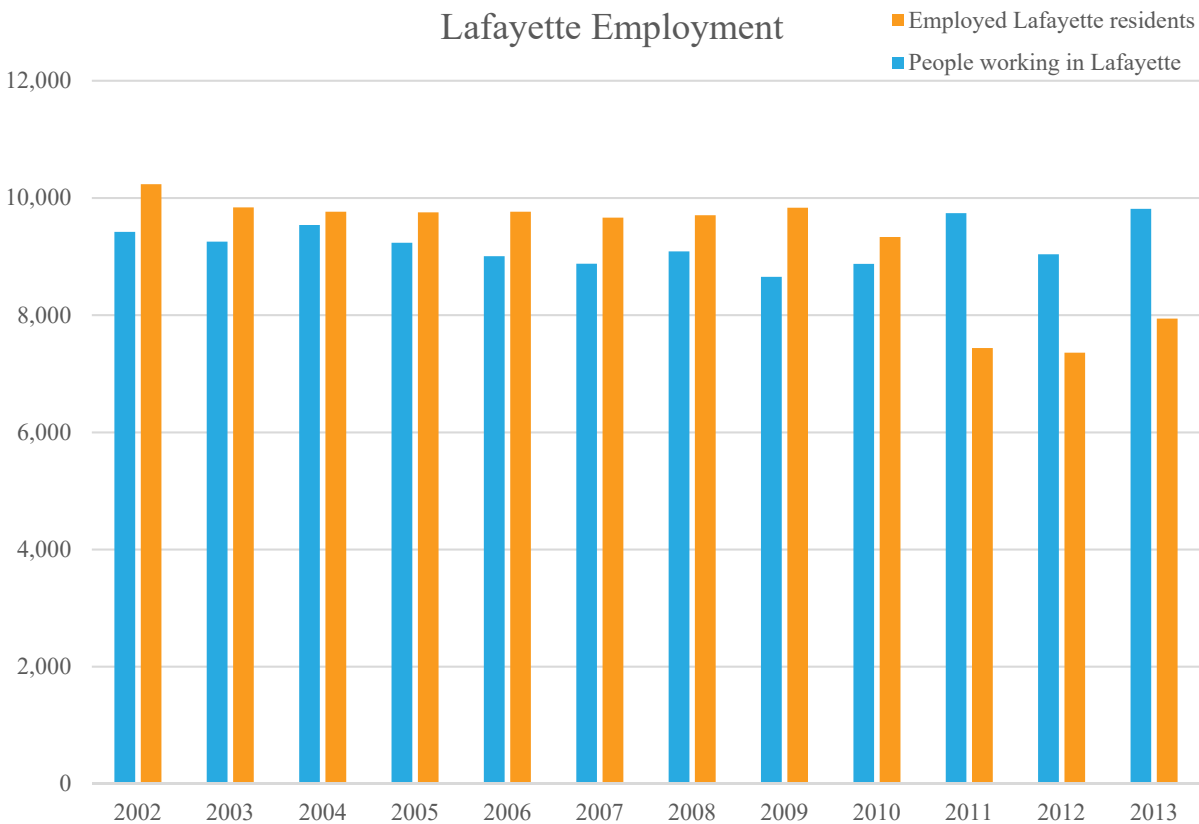


The population over 65 years of age has grown 32 percent since 2000, while the population under 18 has declined 5 percent. Enrollment in the Lafayette School District, which includes four elementary schools and one middle school, has remained relatively steady over the decade. Overall, the median age has risen slightly from 42 in 2000 to 45 in 2013.

Although Lafayette has a high median income, the socioeconomic details of the community are complex. Lafayette’s median household income has risen 9 percent since 2009, reaching \$136,000 in 2013. Already a highly educated population, the percentage of residents with a Bachelor’s degree increased to 75 percent of the population, an 8 percent increase from 2007 to 2013.

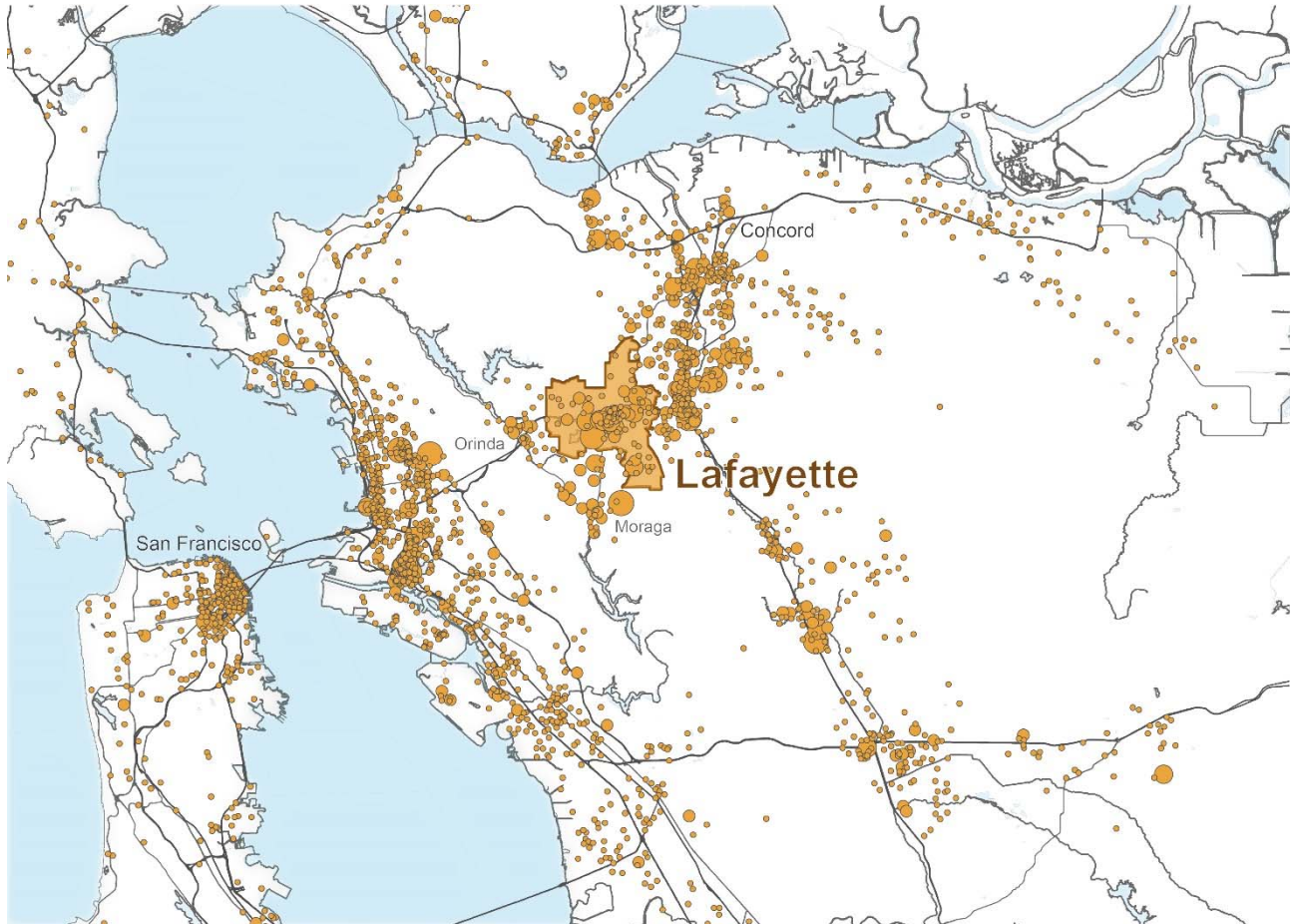
The number of jobs in Lafayette has recovered since the latest recession of 2008-2011 and has slightly surpassed ten-year totals. Overall, jobs have increased 4% from 9,419 in 2002 to 9,813 in 2013. The local labor force declined 22 percent from 10,234 in 2002 to 7,941 in 2013, the last year for which figures were available for this Plan. Figure 8 shows labor employment trends in Lafayette.

Figure 8: Lafayette Employment Data, Source: Longitudinal Employer-Household Dynamics Survey, US Census Bureau



Lafayette residents in the workforce are employed all over the Bay Area, as shown in Figure 9. The most common cities for Lafayette residents to be employed include Oakland, Walnut Creek, San Francisco, Lafayette, Berkeley, and Concord, in that order. Approximately 50 percent of Lafayette residents travel west of Lamorinda for work (e.g., San Francisco and Oakland), 35 percent travel east of Lamorinda (e.g. Walnut Creek and Concord), and 15 percent stay within the Lamorinda area.

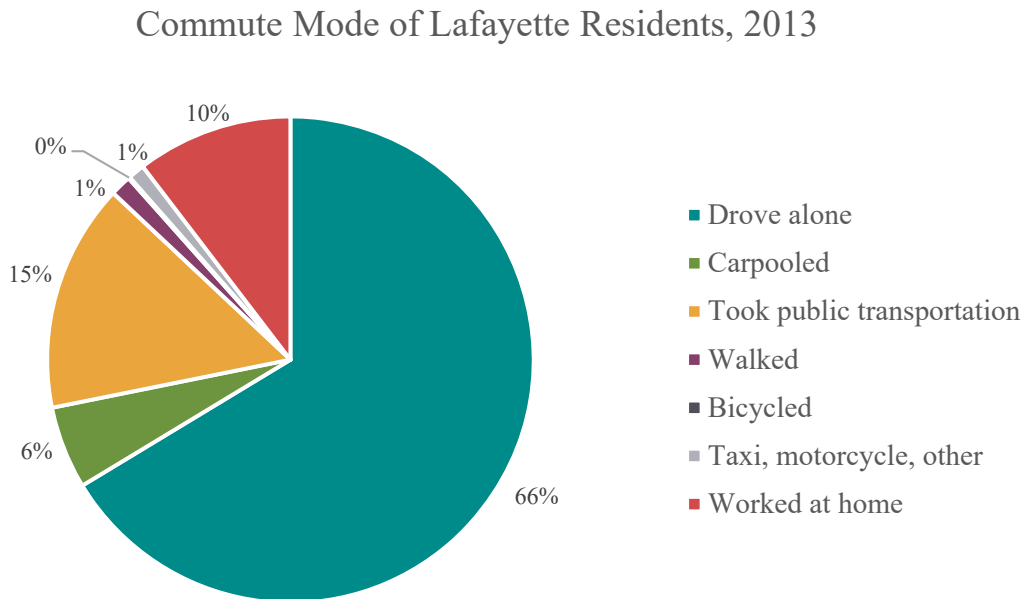
Figure 9: Where Lafayette Residents Work (2013), Source: US Census, Longitudinal Employer-Household Dynamics Survey, US Census



2.4 Transportation Mode Share

Mode share describes the relative popularity of certain travel methods. These travel methods include driving personal automobiles, riding transit, bicycling, and walking. As is the case for this Plan, mode share is often analyzed in terms of travel method to and from jobs. Population-wide travel to work data is available from the Census Bureau's annual *American Community Survey (ACS)*. Figure 10 shows the most recent 2013 ACS data for how Lafayette residents travel to work. Between 2009 and 2013, commuters who drove alone fell from 70 percent to 66 percent. Simultaneously, transit commuting increased 63 percent, while walking and bicycling remained steady. Across all modes, travel time to work has increased eight percent, from a median 26.5 minutes in 2009 to 28.6 minutes in 2013, and the percentage of people traveling for more than 45 minutes to work has increased 26 percent.

Figure 10: Commute (Journey-to-Work) Mode Share (2013), Source: US Census American Community Survey



2.5 Lafayette in the Future

Both *Plan Bay Area* (2013) and the City of Lafayette's DSP identify Downtown Lafayette as the center for much of the community's projected population growth. *Plan Bay Area 2040*, created by the Metropolitan Transportation Commission (MTC), is a state-mandated, integrated long-range transportation, land use, and housing plan to help Bay Area cities and counties plan for transportation needs and preserve the character of its numerous, diverse communities while adapting to the challenges of future population growth. The DSP builds on the Lafayette General Plan and other policy documents to provide a detailed land use and design framework to guide private development and public investment in the downtown.

For Lafayette, *Plan Bay Area* forecasts a 15 percent increase in housing units and households by 2040 with approximately 50 percent of that growth occurring in the Downtown. Figure 11 provides a summary of the projected growth for Lafayette and Moraga. The *Plan Bay Area* forecasts are included for Moraga for comparative purposes.

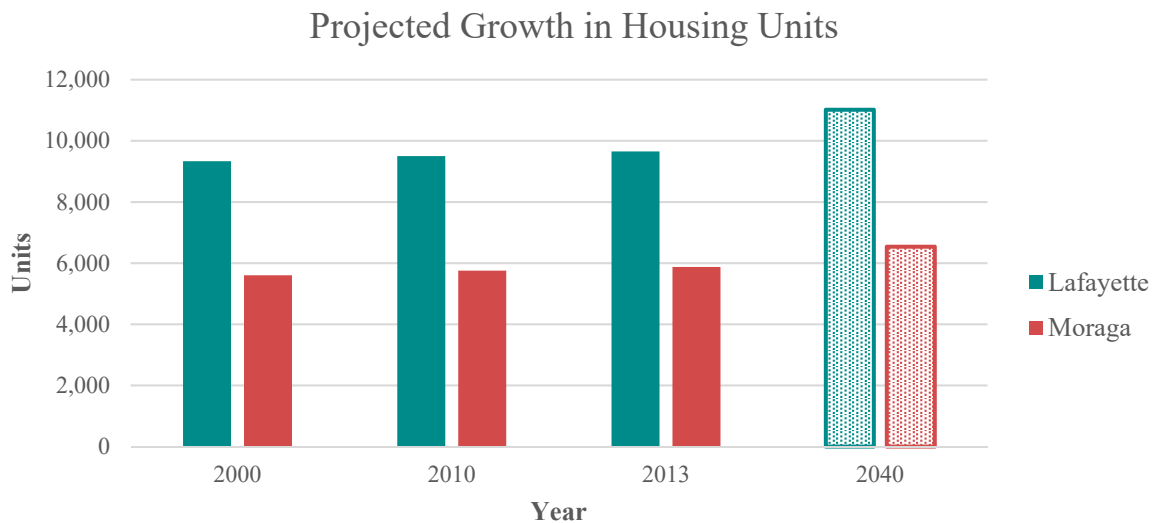
The DSP and DSP EIR provide detail for local growth in the Plan study area, including:

- Downtown will increase housing units in addition to office and retail square footage. The EIR traffic study included 1,765 additional housing units and 180,000 square feet of both office and retail space. The EIR estimated an increase of an additional 1,900 peak hour vehicle trips in Downtown by 2040.
- BART will not add more parking spaces to its current 1,526.

- Traffic on SR 24 will increase as population and jobs increase in the I-680 corridor and in the San Francisco and Oakland urban areas.
- Local housing dynamics will impact enrollment in Lafayette schools.

The CCTA regional travel demand model estimates similar growth rates of 15-20 percent for areas in and around the Downtown.

Figure 11: Lafayette and Moraga Housing Projections, Source: ABAG



In addition to ongoing demographic changes, future societal trends are likely to also impact travel behavior and auto trip-making. Recent evidence indicates that Boomers (ages 50-65) and Millennials (ages 21-34) prefer more walkable, transit-oriented communities.¹ These preferences are shaping travel behavior in communities around California. Biking, walking, and riding transit continue to rise in popularity, while driving is decreasing.²

Technological trends will also impact Lafayette. Vehicles, and the goods and services that support them, are likely to evolve along with the demand for more energy efficient and self-driving features. The Internet of Things (IoT) is expanding and producing smarter devices with more complex and real-time data. As data becomes more prevalent and integrated seamlessly into transportation services, travel options will increase and could begin to favor connected and shared mobility services such as those offered by technology network companies like Uber and

¹ American Planning Association, *Investing in Place: Two Generations' Views on the Future of Communities*, May 2014: <https://www.planning.org/policy/polls/investing/pdf/pollinvestingreport.pdf>.

² Brian McKenzie, "Modes Less Traveled – Bicycling and Walking to Work in the United States: 2008-2012." *American Community Survey Reports*, United States Census Bureau, May 2014: <http://www.census.gov/prod/2014pubs/acs-25.pdf>; American Public Transportation Association, "Public Transportation Use Is Growing – Here Are the Facts," March 2014: <http://www.apta.com/mediacenter/ptbenefits/Pages/Public-Transportation-Use-is-Growing-.aspx>.

Lyft. However, the impacts of these technology trends on travel behavior, auto trip-making, and ultimately traffic congestion in Lafayette is uncertain.

2.6 Measuring and Understanding Traffic Congestion

Congestion occurs when the traffic demand on a roadway exceeds the available capacity, which results in slower speeds, increased delays, and long queues. There are two types of congestion:

- **Typical (Recurring):** this is congestion that occurs on a regular basis when demand exceeds capacity;
- **Incident-based (Non-Recurring):** this is when an accident or another incident (e.g., downed power lines) blocks one or more lanes of traffic.

Congestion is caused by the popularity of destinations and various activities. The more people want to travel to similar locations at similar times, the more likely the roadway network that connects people with these locations will become congested. Congestion can also result from incidents, such as collisions, inclement weather, special events, and construction or other work zones. Typical congestion is something that transportation planners can address through managing demand and designing solutions that increase capacity. While incidents are impossible to predict, there can be policies in place to clear accidents more efficiently and communicate information to travelers faster if they do occur.

2.7 Traffic Congestion Data Sources

To measure travel and congestion for this study, we drew from a variety of traditional count sources as well as new probe data from GPS and navigations systems. These are summarized below:

- **Program for Arterial System Synchronization (PASS):** The study utilized peak period vehicle, pedestrian, and bicycle counts collected by TJKM in 2013 for the ongoing Program for Arterial System Synchronization (PASS) traffic signal project in Downtown. These counts included: weekday AM, mid-day, afternoon, PM and weekend mid-day periods for 13 of the highest volume intersections on Mount Diablo Boulevard and Moraga Road. This study also collected hourly traffic counts for seven days using machine “tube” counters at five locations. Machine counts provided an indication of the daily and hourly traffic variation on local streets.
- **Downtown Specific Plan (2012):** The DSP analysis utilized counts collected in 2009 for the DSP EIR. The EIR was also a source of intersection “level-of-service” (LOS) calculations, which provided an indication of vehicular traffic operations across the City.
- **New traffic counts:** For this study, updated traffic counts were collected in May 2015 for three locations on Mount Diablo Boulevard at the intersections of Moraga Road, 1st Street, and Oak Hill Road-Lafayette Circle East. These counts were used as a check on the previous data sources.
- **Caltrans PeMS:** To understand conditions on SR 24, the study utilized freeway volume and speed data from Caltrans’ Freeway Performance Management System (PeMS). The

data were downloaded for several years to understand the variability in traffic conditions and how long congestion persists on SR 24. The Caltrans Count Book was used to check and supplement the data.

- **Incident data:** Traffic incident data was compiled from the California Statewide Integrated Traffic Records System (SWITRS) and accessed through the University of California at Berkeley's Transportation Injury Mapping System (TIMS).
- **Parking data:** The City provided parking data from 2011 and 2014 that were analyzed to understand parking utilization and turnover.
- **Field observations:** The consultant team collected queuing information, identified pedestrian and bicycle conditions, and reported on the general condition of the transportation system during routine field work.
- **GPS, cell phone, navigation systems data:** The consultant team utilized mobility data provided by the data vendors INRIX and StreetLight. This data offers a tremendous opportunity to better understand how people travel through a study area. Traditional traffic data does not provide insight into where trips are coming from and going to. Autonomous GPS and mobile phone data is an emerging data source that can provide this level of detail and help us to identify local travel markets.

These data sources were used to understand existing congestion in Downtown and to develop the traffic model, which is described later in the report.

2.8 The Where and When of Traffic Congestion

Traffic congestion in the Downtown occurs at various places and throughout the day. Figure 12 presents the location of typical traffic congestion using INRIX GPS/navigation system data during the morning and evening peak periods. The shading of segments indicates the relative level of congestion on that particular link, and is defined as the ratio of actual speed to the typical "uncongested" or "free flow" travel speeds. For example, green segments show links where travel speeds are over 85% of what they would be with no other vehicle traffic; whereas dark red segments indicate heavily congested links during gridlock conditions.

Sections on Moraga Road, Mount Diablo Boulevard, and SR 24 are the most congested segments, which reflects field observations. The severity and causes of congestion are detailed in the following sections.

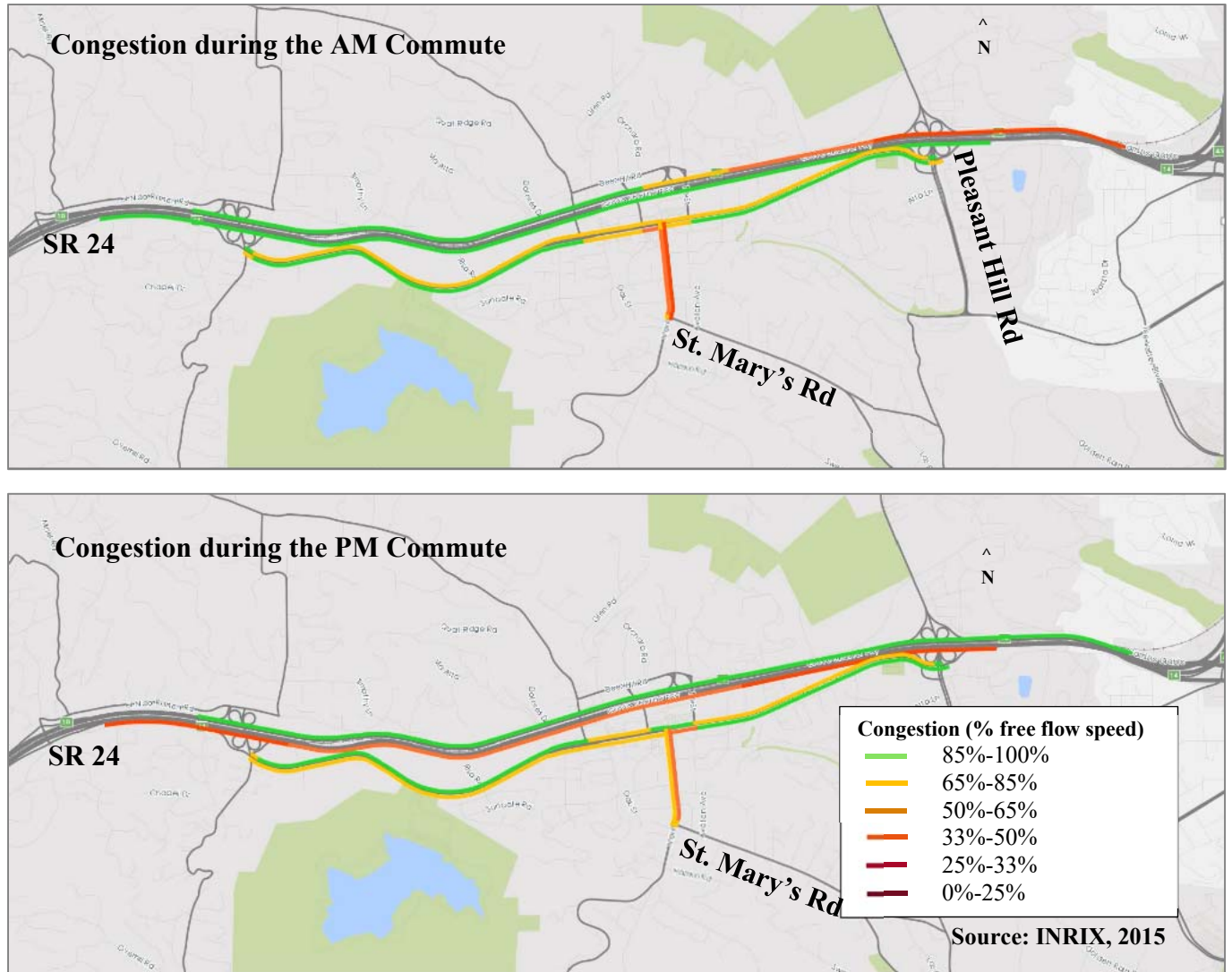


Figure 12: Typical Congestion at 8 AM and 5 PM (2015)

For Downtown Lafayette, the temporal distribution of congestion is somewhat unique. Figure 13 presents hourly traffic count data collected over several days on Moraga Road at School Street. Figure 14 shows total intersection traffic volumes at the Mount Diablo Boulevard / Moraga Road intersection for four different hours of the day. These two figures indicate that traffic volumes in Downtown typically begin peaking mid-afternoon – around 2:30 to 3:00 PM – and volumes remain at a sustained level for a longer period – from three to four hours – compared to most roadways in the Bay Area; most streets in the Bay Area experience the beginning of an afternoon/evening peak hour between 4:00 and 5:00 PM with a peak period lasting two hours. Thus, in Downtown Lafayette, the earlier mid-afternoon peak leading to a longer evening peak period is a unique phenomenon. This reflects the numerous activities that are focused along the two main Downtown arterials of Mount Diablo Boulevard and Moraga Road, and the strong influence of proximate school and shopping trips, which typically peak at this time of the day.

Figure 13: Hourly traffic volumes on Moraga Rd at School St, Source: Downtown Specific Plan (2012)

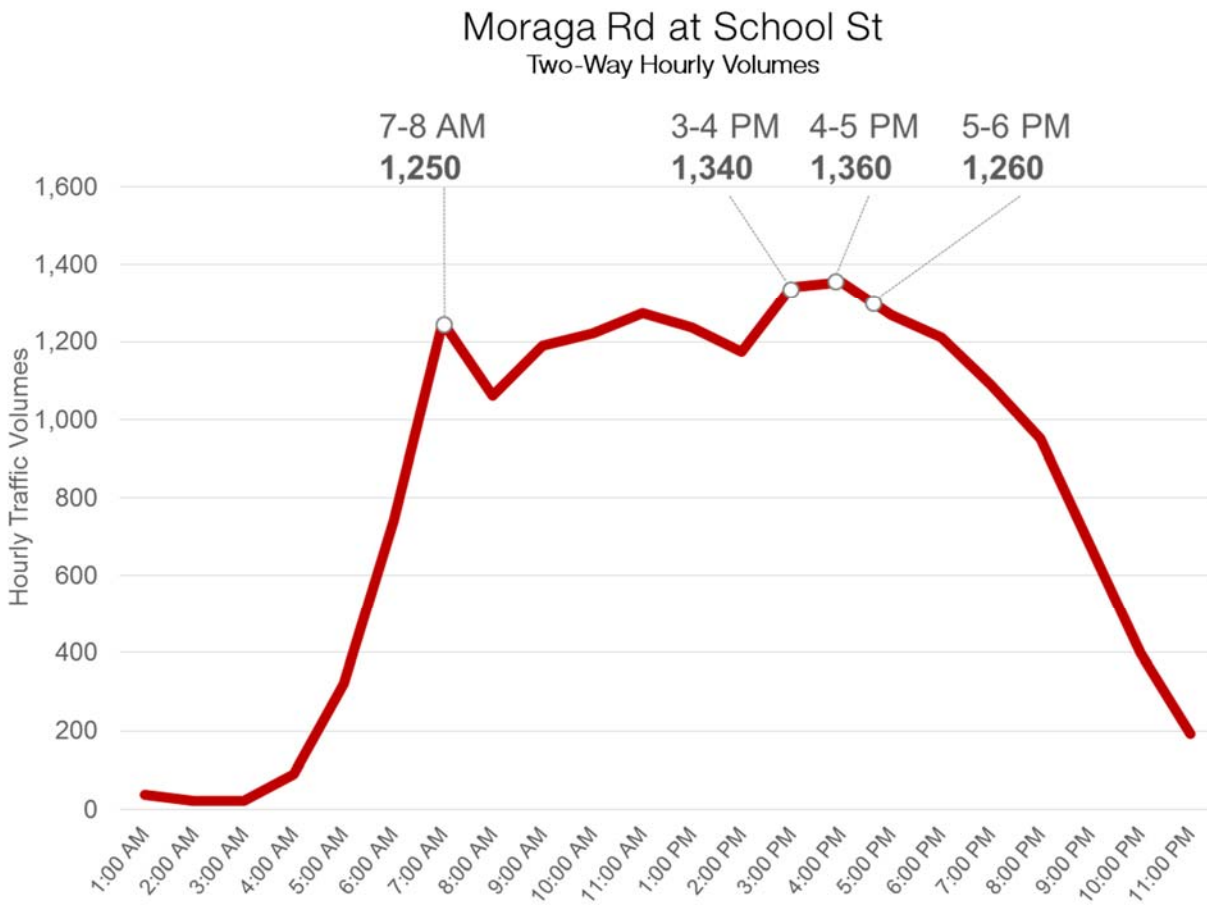
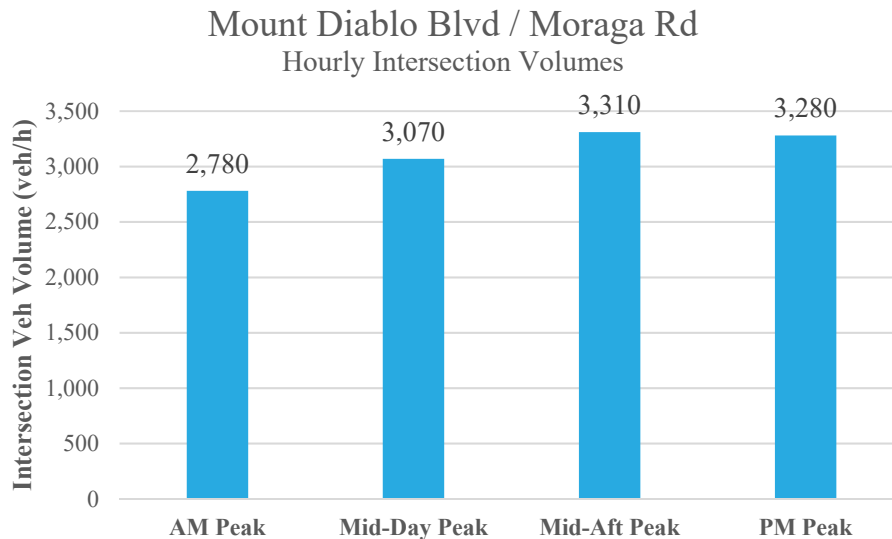


Figure 14: Hourly intersection volumes at Mount Diablo Blvd/Moraga Rd, Source: MTC PASS Study (2015)



2.9 Traffic Congestion Across Downtown

The traffic analysis conducted for this Plan utilized a number of recent studies that evaluated traffic congestion in Downtown Lafayette. The following bullet points summarize these findings by focus area:

- The DSP EIR reported LOS D conditions at Mount Diablo Boulevard / Moraga Road and Mount Diablo Boulevard / 1st Street.
- Localized delay (LOS F conditions) reported in the DSP EIR at the Moraga Road / School Street / Brook Street intersection during the school peak.
- Downtown has several significant core destinations that are major traffic generators: the Whole Foods and Safeway block between Oak Hill Road and 1st Street, La Fiesta Square, and the Trader Joes block between Mountain View Drive and Dewing Avenue.
- The “Downtown Y” intersection layout, which links Mount Diablo Boulevard, Moraga Road, Oak Hill Road, and First Street, forces traffic from Moraga Road and heading to/from SR 24 or the BART station to use a circuitous path that includes various turning movements on Mount Diablo Boulevard, First Street, and Oak Hill Road to reach the freeway. This causes congestion at multiple intersections.
- Eight traffic signals in 0.8 miles on Mount Diablo Boulevard between Mountain View Drive and 2nd Street. This close spacing of signals makes coordination between intersections challenging.
- Driveways and on-street parking along Mount Diablo Boulevard create additional friction as vehicles decelerate to access these parking lots or to parallel park at on-street spaces.
- Close signal spacing and lack of dedicated left-turn lanes on Moraga Road contribute to queuing and congestion.

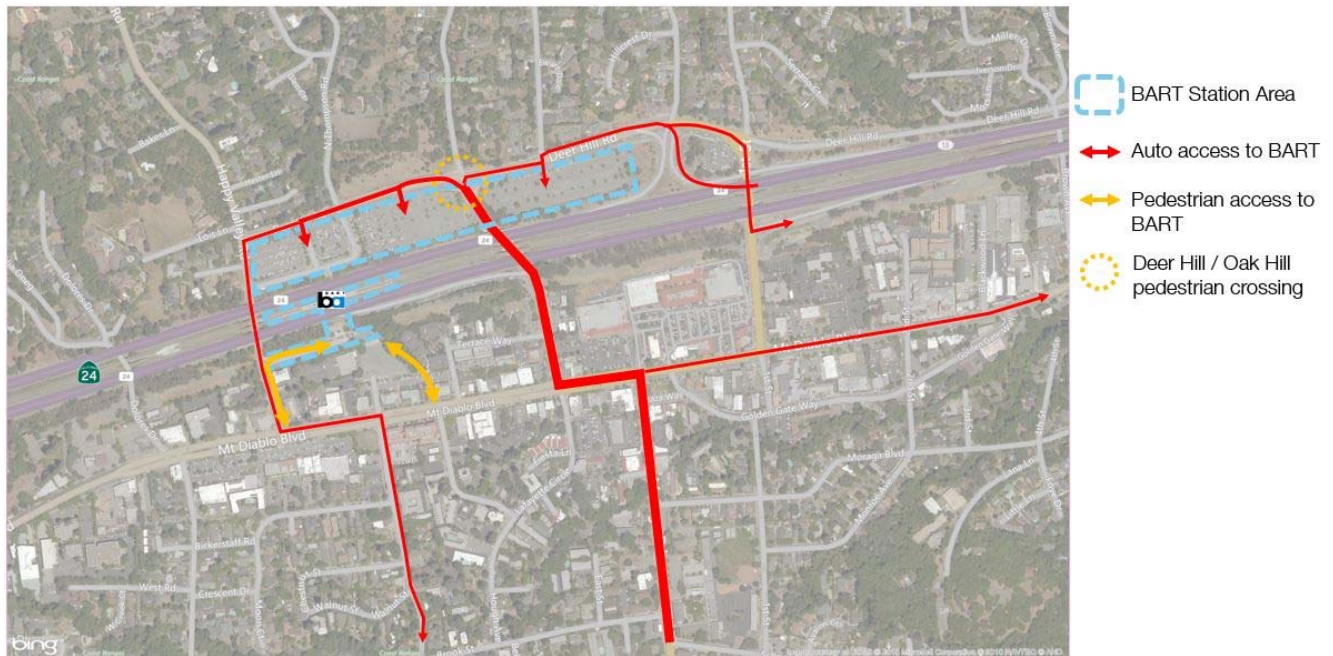
Figure 15 illustrates the major issues around the Downtown.

Figure 15: Downtown Issues



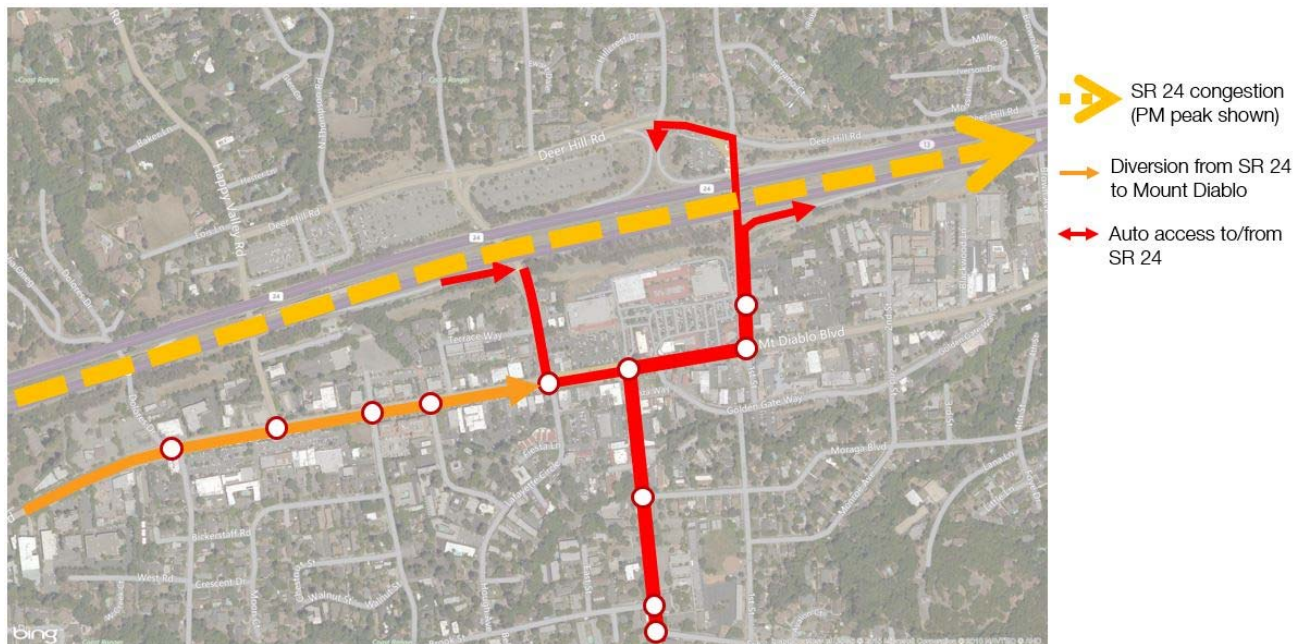
The BART station is a valuable transportation asset as it provides high-speed commuter rail service across the core of the Bay Area. However, the station precinct has access and parking issues similar to those of the Downtown. Figure 16 illustrates the issues summarized below:

- A primary route to the BART station, 1st Street, requires drivers to use segments of the congested Downtown “Y”.
- Parking fills up fast in the morning (often before 8 AM), which then results in drivers circulating looking for other options or leaving Lafayette altogether.
- BART patrons parking west of Oak Hill Road have to cross the Deer Hill Road / Oak Hill Road intersection (all way stop) to access the BART station.
- Wayfinding does not clearly highlight pedestrian pathways between BART and Mount Diablo Boulevard.

Figure 16: BART Issues

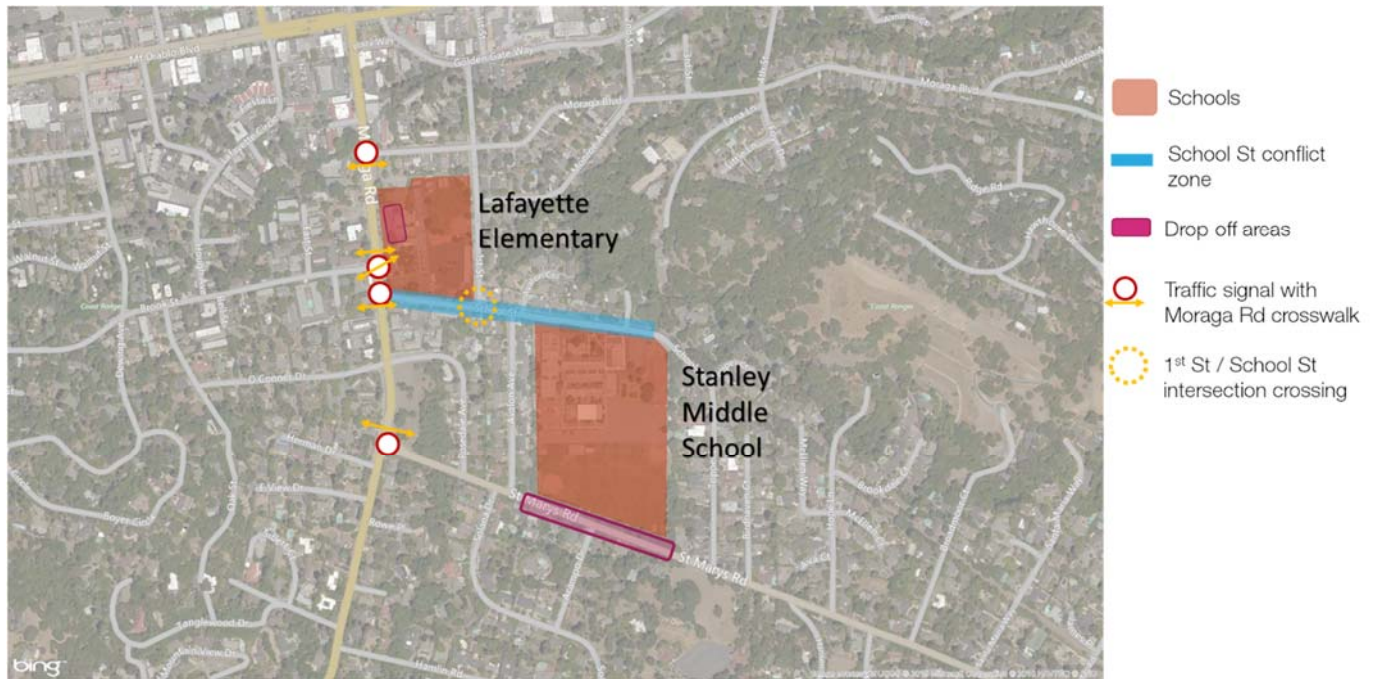
Traffic congestion on SR 24 and the access to and from the ramps at Deer Hill Road, 1st Street, and Oak Hill Road also affect downtown conditions. Figure 17 illustrates these issues, which are summarized below:

- SR 24 is congested during the AM and PM peak travel periods. The afternoon congestion can sometimes result in traffic exiting the freeway at Acalanes Road to use Mount Diablo Boulevard to bypass the traffic.
- For downtown traffic, the “Y” is the primary route to access the SR 24 on- and off-ramps.

Figure 17: SR 24 Issues

Traffic congestion around the downtown school locations (Lafayette Elementary and Stanley Middle School) is caused by pick-up and drop-off activities around the schools combined with other traffic using Moraga Road during the mid-afternoon. Figure 18 illustrates the issues around the downtown school locations. These issues are summarized below:

- Pick-up and drop-off activities around the schools contribute to congestion on Moraga Road and St Mary's Road
- School Street has issues related to narrow sidewalks, drop-off/pick-up activity, and residential on-street parking
- There are safety concerns for pedestrians at crossings around the schools, particularly at Moraga Road and St Mary's Road
- The pedestrian crossing times contribute to traffic delay on Moraga Road

Figure 18: School Issues

2.10 Traffic Congestion Trends in Lafayette

It is important to reflect on recent historical trends in traffic volumes to understand how conditions have changed over time. Figure 19 and Figure 20 compare the AM and PM peak hour traffic volumes for the Mount Diablo Boulevard / Moraga Road and Mount Diablo Boulevard / First Street intersections since the year 2000.

Between 2000 and 2015, traffic volumes decreased at both intersections. Comparing 2015 to 2000, peak hour volumes at Mount Diablo / Moraga Road were 14% lower in the AM and 10% lower in the PM. The 2015 counts were slightly higher than 2013, which reflects the ongoing economic recovery, but in general, traffic volumes appear to have remained largely steady or slightly lower compared with 2007 levels, which represents the data taken just prior to the Great Recession period.

Figure 19: AM Peak Hour Traffic on Mount Diablo Blvd at Moraga Rd and 1st St

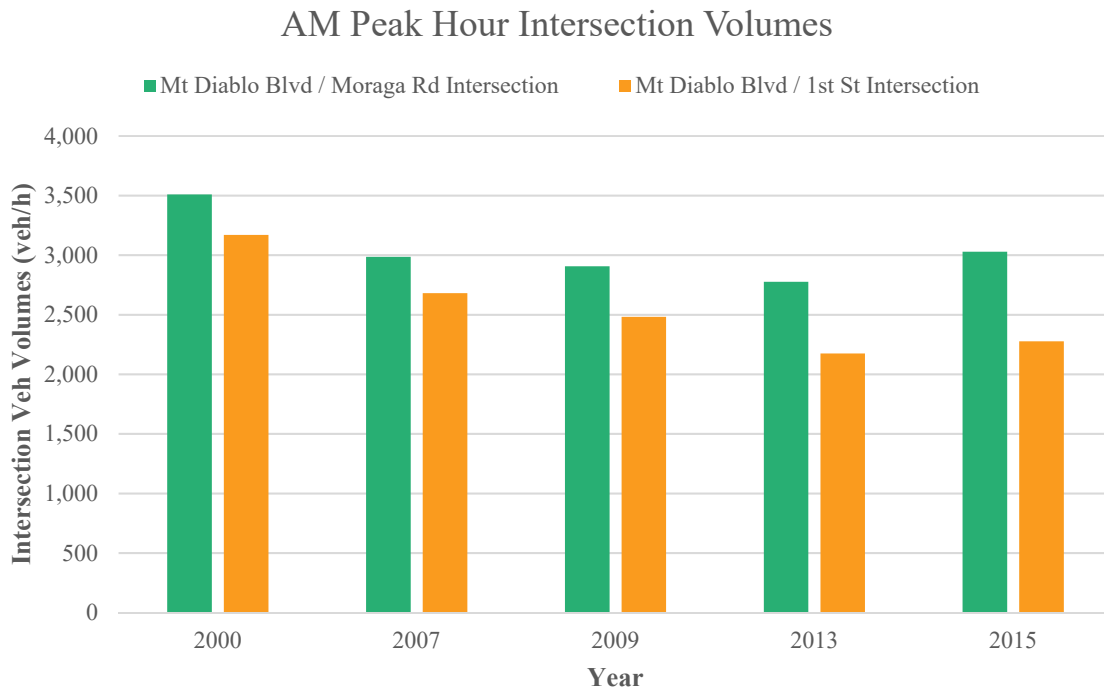
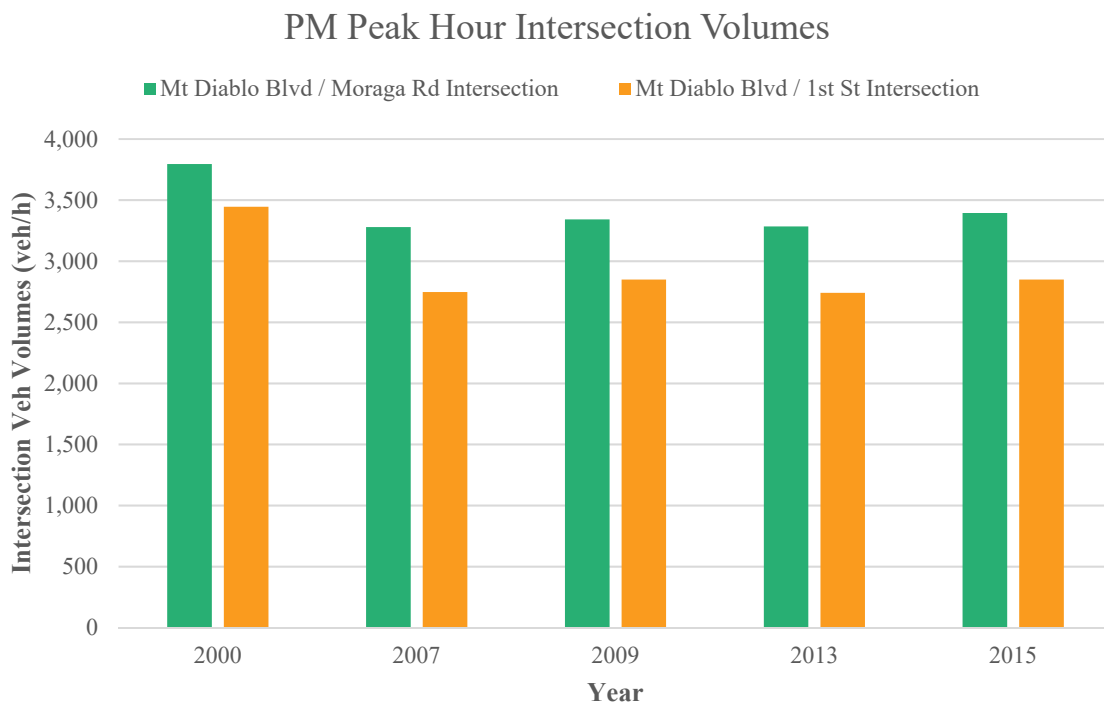
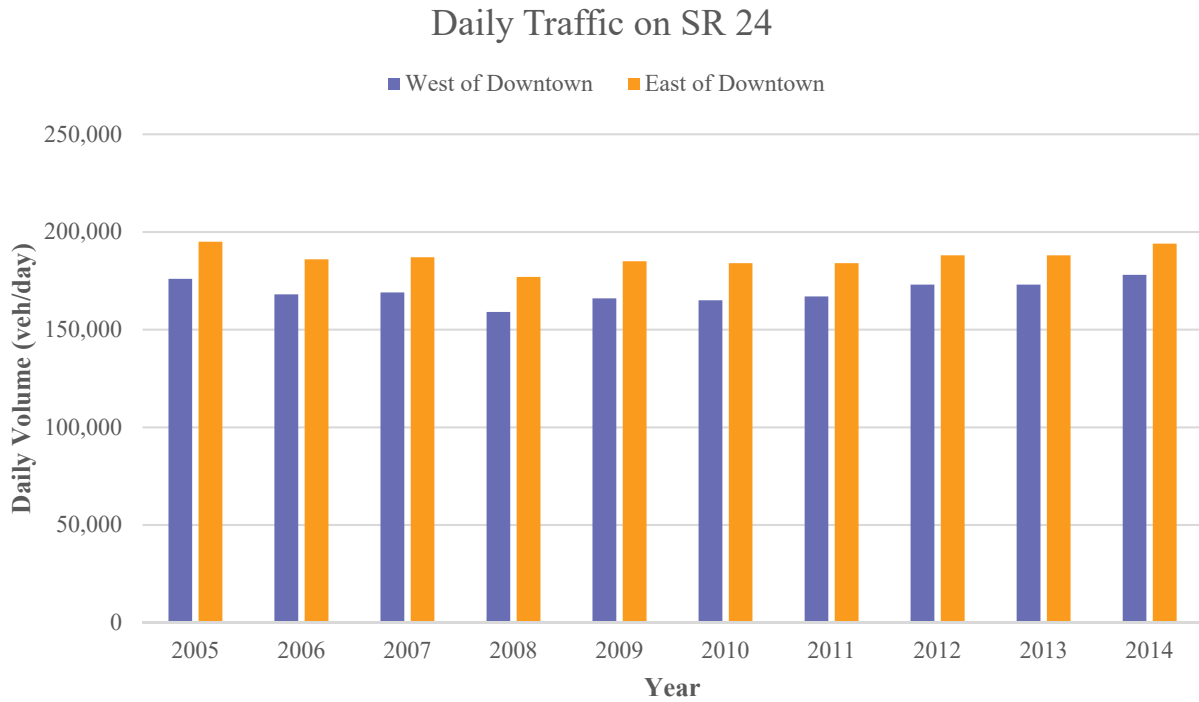


Figure 20: PM Peak Hour Traffic on Mount Diablo Blvd at Moraga Rd and 1st St



Traffic on SR 24 has remained consistently congested. In its 2015 report on congestion in the Bay Area, the Metropolitan Transportation Commission listed the evening commute on SR 24 from Oakland to Orinda as the ninth most congested route in the Bay Area.³ A bit farther east towards Lafayette, total traffic and peak period traffic has remained relatively consistent over the past decade. After a dip in 2008, daily traffic on SR 24 has returned to pre-recession levels with traffic east of Downtown remaining heavier overall than traffic west of Downtown, as shown in Figure 21. An evaluation of peak period traffic volumes on SR 24 show similar patterns.

Figure 21: Average Daily Traffic on SR 24 in Lafayette, Caltrans Count Book



³ Metropolitan Transportation Commission, “Fresh Data on Bay Area’s Vital Signs Include New Top 10 List for Freeway Congestion,” Vital Signs, December 17, 2015. <http://www.mtc.ca.gov/whats-happening/news/fresh-data-bay-areas-vital-signs-include-new-top-10-list-freeway-congestion>.

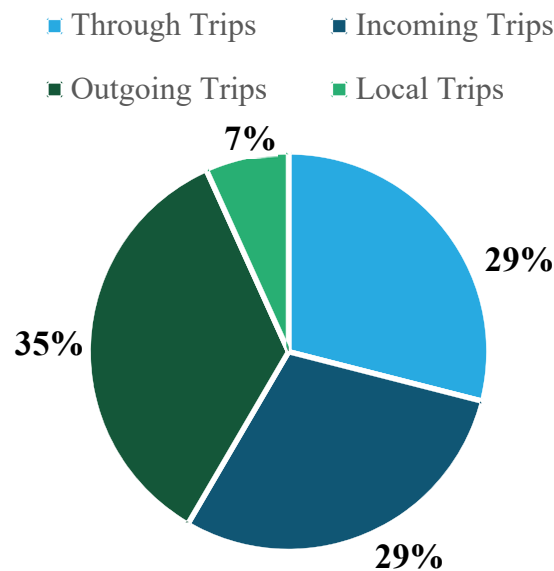
2.11 Origin and Destination Travel Patterns for Traffic

Data from in-vehicle GPS navigation systems and mobile phone devices have been provided by the mobility data vendor StreetLight. These data provide insight into the origin and destination (O-D) travel patterns for drivers traveling through Lafayette. **Figure 22** summarizes four vehicle trip “types” observed on Lafayette streets from the StreetLight data. The four trip types include:

- **“Through” trips** only pass through Lafayette – they do not have an origin or destination within the City. These trips do not include highway trips on SR 24, as these trips are unlikely to impact the local road network.
- **“Incoming” trips** have an origin outside of Lafayette but a destination inside the City.
- **“Outgoing” trips** originate within Lafayette but have a destination outside of the City.
- **“Local” trips** have both an origin and destination within the Lafayette.

Figure 22: Type of Vehicle Trips Observed from StreetLight Data

Trip Types: City of Lafayette



The analysis indicates there are a significant number of through trips (29%) traveling through Lafayette in comparison to local trips (7%). There are a high level of incoming and outgoing trips (64% of all trips), which can be attributed to work commute and shopping trips.

Other key findings from the StreetLight data include:

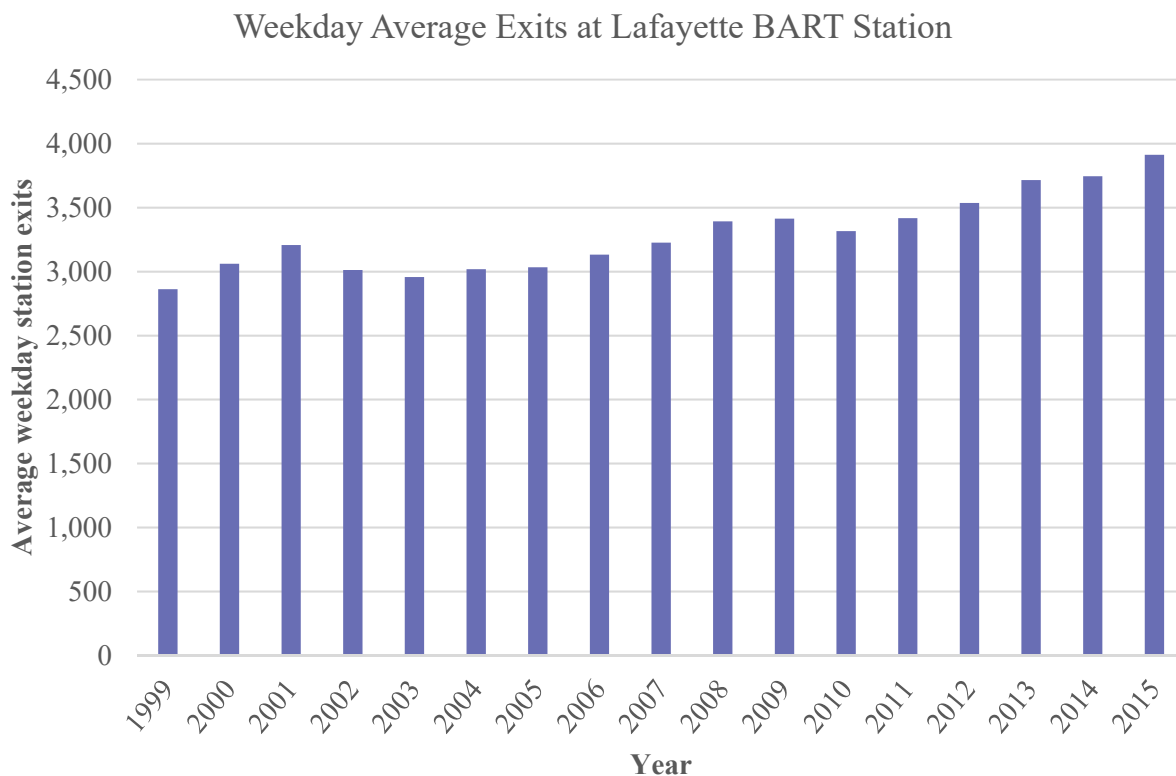
- The largest share of through trips (39%) were observed traveling between Moraga Road south of St Mary’s and SR 24 to/from the east. All of these trips would use Moraga Road and parts of the Downtown “Y” to reach Mount Diablo Boulevard and the freeway.

- Of the vehicle trips observed on Moraga Road at Moraga Boulevard, approximately 60 percent are through trips traveling to/from destination to the east (e.g., Pleasant Hill or Walnut Creek) using either SR 24 or Mount Diablo Boulevard.
- The trip analysis indicates that the majority of vehicle trips from Moraga using Moraga Road are using it to access SR 24 to head to/from the east (towards Pleasant Hill and Walnut Creek). Trips from Moraga heading to/from the west (towards Oakland and San Francisco) use Moraga Way to access SR 24 in Orinda.
- Over 70 percent of trips accessing downtown retail sites are traveling from SR 24 and are likely traveling from outside of the City. Therefore, only 30 percent of trips are from local zones within Lafayette or Moraga.

2.12 Transit

Transit ridership in Lafayette has grown significantly in a relatively short span of time. BART ridership at Lafayette BART Station has increased 37% from 2,900 daily riders in 1999 to 3,900 in 2015, as shown in Figure 23. System-wide growth over this period was 54%.

Figure 23: Data from BART Ridership Reports for April 1999-2015



Two County Connection bus routes, the 6 and 25, serve Downtown Lafayette and the BART station. Route 6 (Figure 24) serves both the Lafayette and Orinda BART stations, running along Moraga Road in Lafayette and Moraga Way in Orinda. Route 25 (Figure 25) similarly serves both the Lafayette and Walnut Creek BART stations along Mount Diablo Boulevard and Olympic Boulevard.

Figure 24: County Connection Route 6 map, source: countyconnection.com

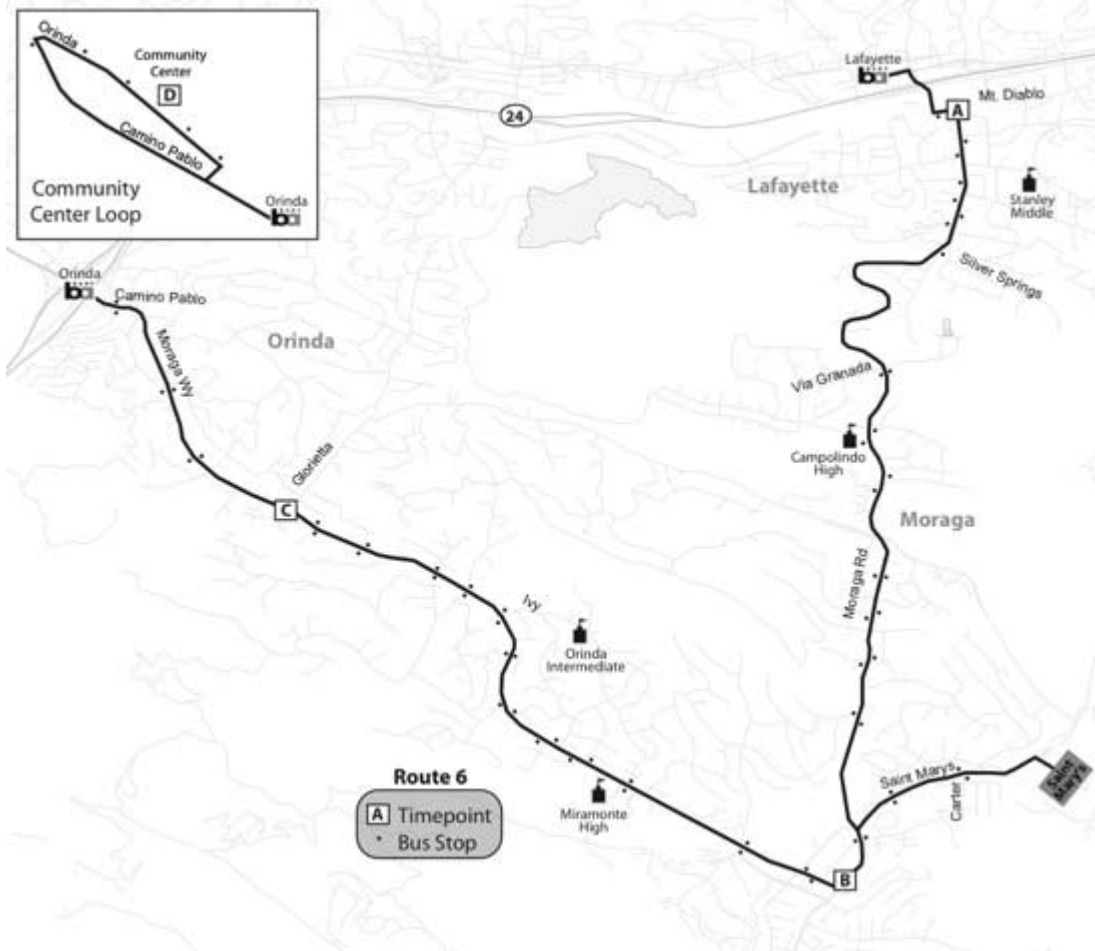
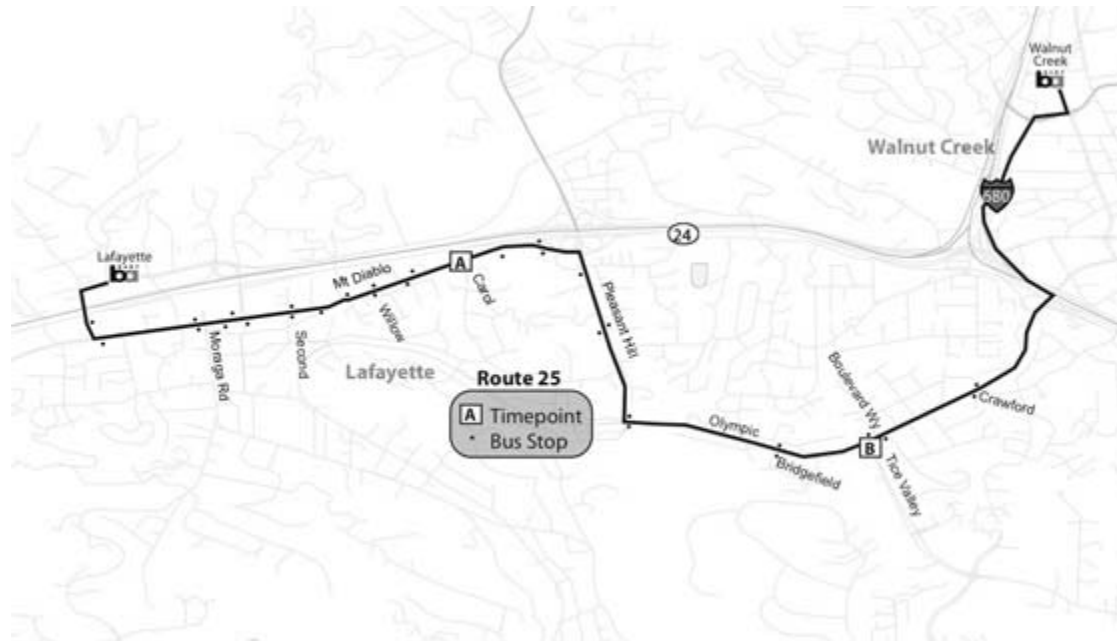


Figure 25: County Connection Route 25 map, source: countyconnection.com

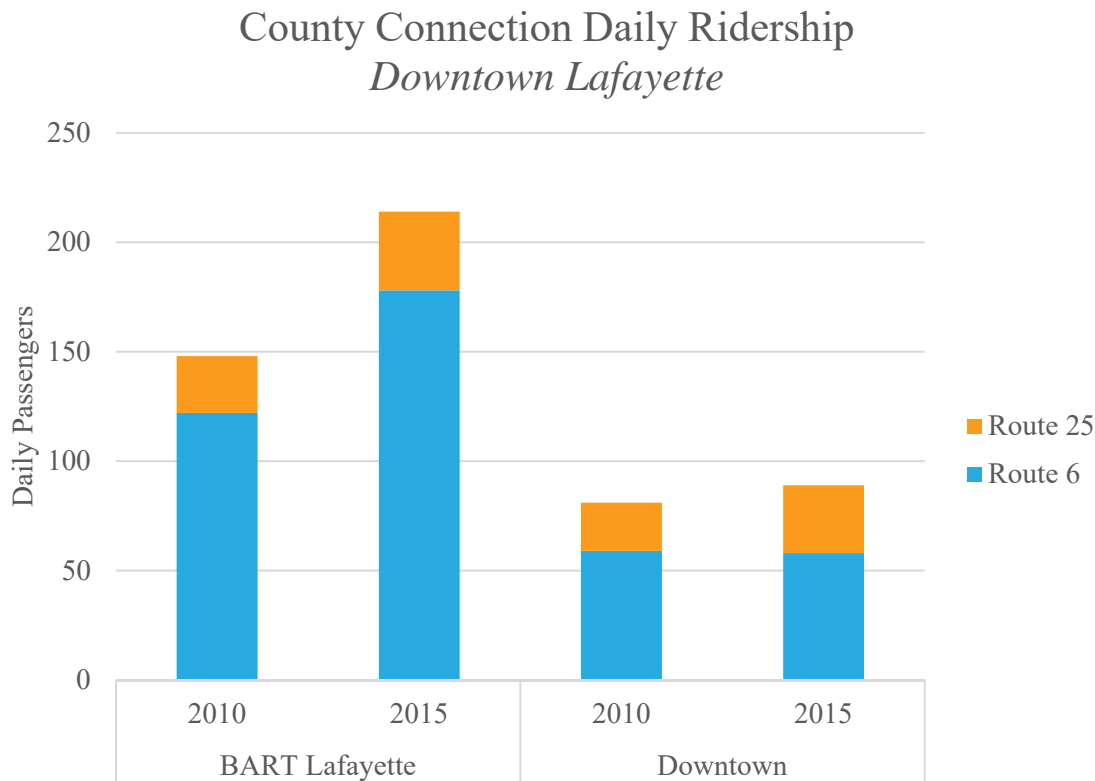
According to the Central Contra Costa Transit Authority's *Mini Short Range Transit Plan (FY 2013-14 through FY 2022-23)*, both of these routes underperform compared to other County Connection routes. Route 6 is 43rd of 63 of County Connection's routes with 13.7 passengers per revenue hour. Route 25 ranks even lower with 5.3 passengers per revenue hour, putting it at 62nd of 63 routes.

The cost per passenger is high for each route. Route 6 again performs better than Route 25, but worse than most County Connection routes. Route 6 costs \$4.65 per passenger, 46th of the 63 County Connection Routes, while Route 25 is second to last at \$12.79 per passenger.

Lamorinda is the least densely populated incorporated area in County Connection's service area, according to the Central Contra Costa Transit Authority's *Short Range Transit Plan 2016-2025*. In large part because of this low density pattern, Route 25 does not meet County Connection's performance standards of 15 passengers per revenue hour and \$8.50 per passenger. Route 6 is just shy of the passengers per revenue hour standard and surpasses the cost per passenger standard.

Figure 26 shows that despite low ridership trends overall, both routes have experienced small ridership increases to downtown destinations in the last five years. In total, both routes have added approximately 130 daily riders.

Figure 26: County Connection Ridecheck Plus, Ridership by Route and Stop for Routes 6 and 25 provided by County Connection



2.13 Parking

The parking analysis conducted for this Plan is summarized in the *Background Conditions Report* (Arup, February 11, 2016), which is available on the Plan website. In 2016-2017, the Lafayette Planning Department completed a Downtown parking inventory and occupancy study on behalf of the City's Parking Ordinance Update Committee (POC). Data and findings from this study supersede the previously-available parking data. Key findings from the 2016-2017 parking study are summarized below:

- There are a total of 11,408 on- and off-street spaces in the study area. Private parking represents 96% of the available parking stock, comprising 10,946 spaces while the 462 public spaces comprise 4% of the parking stock. On-street parking is predominantly unmetered, with 79%, or 1,368 spaces unmetered while 21% or 364 spaces are metered.
- Though certain parcels with off-street parking may consistently achieve or exceed 85% occupancy it is important to view all parcels in conjunction with the surrounding parcels in order to understand data trends and gain a better understanding of how parking is used. In order to better analyze the data staff divided the total study into seven different areas or "Blocks." The only block that exceeded 85% was the block on the North side of

Mount Diablo between Oak Hill Road and First Street⁴, which reached 86% occupancy on Wednesday at noon. The findings demonstrate that within each area there is consistently available parking. However, within each of those areas there is typically one or two more impacted lots.

- On-street parking is considered underutilized, particularly on Mt. Diablo Boulevard adjacent to the most impacted off-street parking, like the Trader Joes Parking lot. Some potential reasons for this:
 - People may not prefer to park on Mt. Diablo Boulevard or Oak Hill Road because of the relative speed of passing traffic
 - People may prefer to wait in a parking lot for a free space rather than paying a nominal fee for an available space, particularly if free parking is closer to their intended destination
- Public parking is considered underutilized. Some potential causes:
 - Directing signage is ineffective
 - Public parking is not immediately next to the busiest destinations
 - The public is generally unaware of the extent of public parking
- Private parking is considered underutilized. Some potential causes:
 - Businesses restrict their parking such that only their patrons can use the lot, even when the business is not open
 - Businesses have many parking spaces for uses that are not parking intensive
 - Lots are gated

Based on the above summary findings, the following recommendations have been put forth to the POC:

1. Incorporate better signage to direct drivers towards public parking
2. Meter parking and enforce time limits for public and private parking to increase turnover
3. Remove physical barriers between parking lots to improve parking availability as well as ingress and egress from downtown lots
4. Make downtown streets and shortcuts between parking lots and commercial areas more pedestrian friendly in order to encourage parking further from more impacted areas
5. Increase sharing for parking, particularly in underutilized lots and lots where utilization decreases in the evening or on weekends.

2.14 Traffic Safety

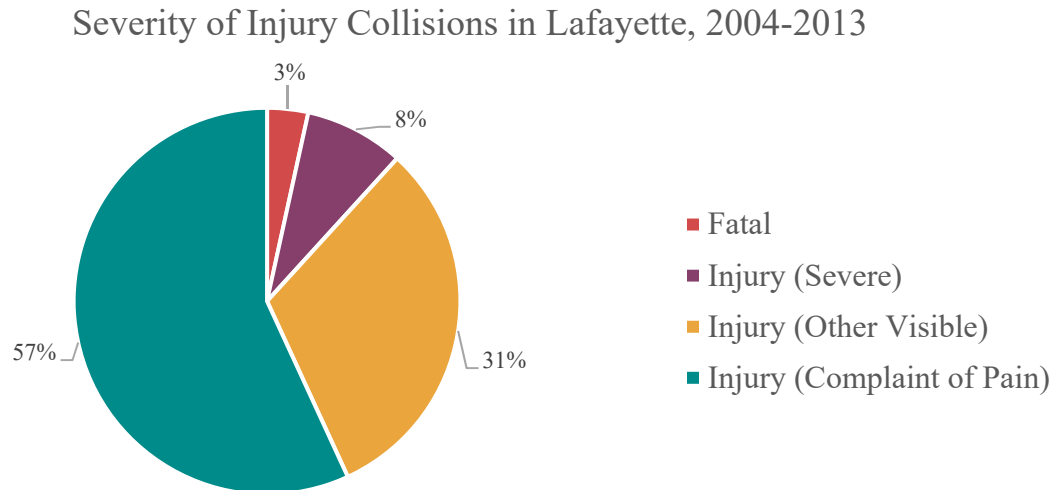
According to SWITRS data, over a ten-year period from early 2004 to late 2013, 204 traffic injury collisions were reported within Lafayette city boundaries, excluding collisions on SR 24.⁵ While most of these injury collisions involved no severe injuries or fatalities, seventeen were

⁴ This lot encompasses the Safeway, McCaulous and Wholefoods lots.

⁵ Collisions involving property damage only and no injuries are not reported in the SWITRS database.

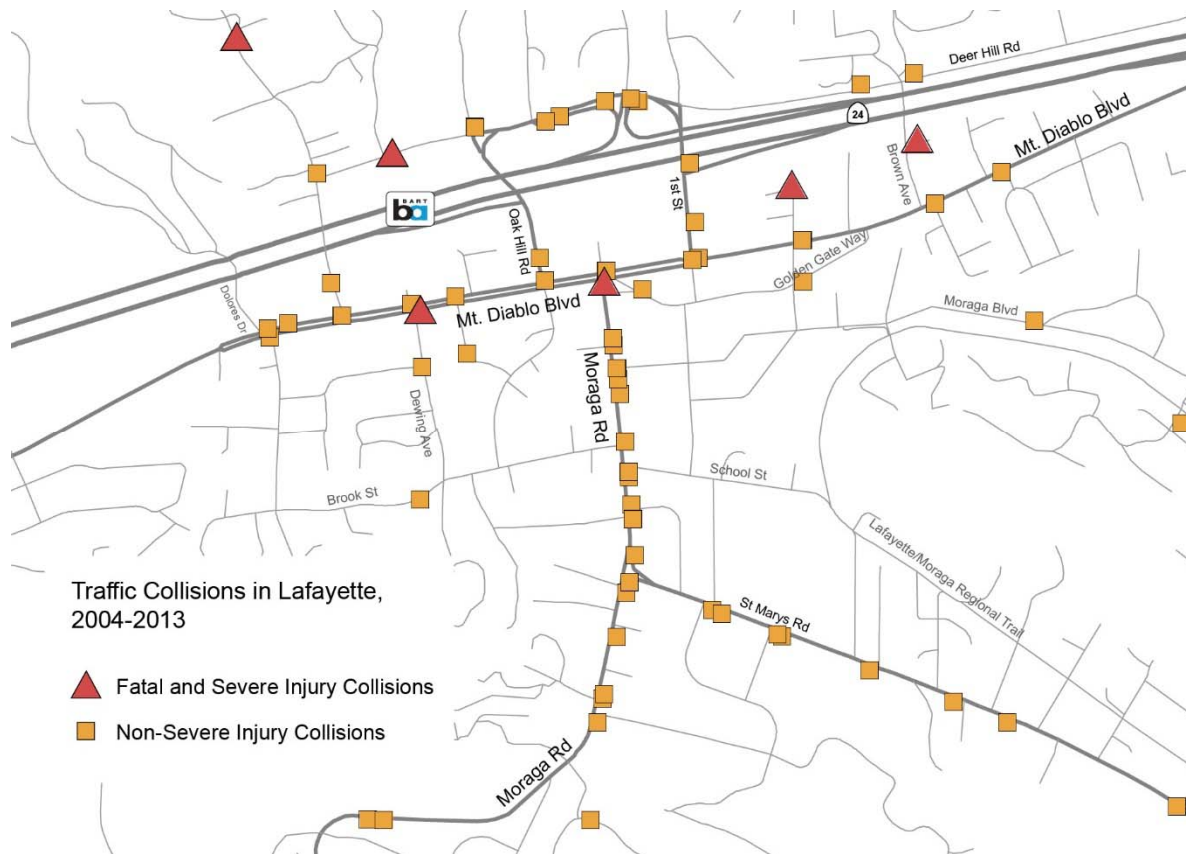
severe injury collisions and seven involved traffic fatalities. Figure 27 shows the severity of injury collisions in Lafayette during this ten-year study period.

Figure 27: Severity of Collisions, SWITRS



All the collisions that involved fatalities or severe injuries in the Downtown area involved a vulnerable road user – i.e., a pedestrian or cyclist. Of the seven traffic fatalities in Lafayette during this ten-year period, two were in the Downtown area. The first fatality occurred in 2007 when a speeding driver hit a pedestrian at Brown Street and Hall Lane. In the other traffic fatality, a motorcyclist died just north of the BART station parking lots at the intersection of Deer Hill Road and North Thompson Road. The citation issued for both fatalities was “Automobile Right of Way.”

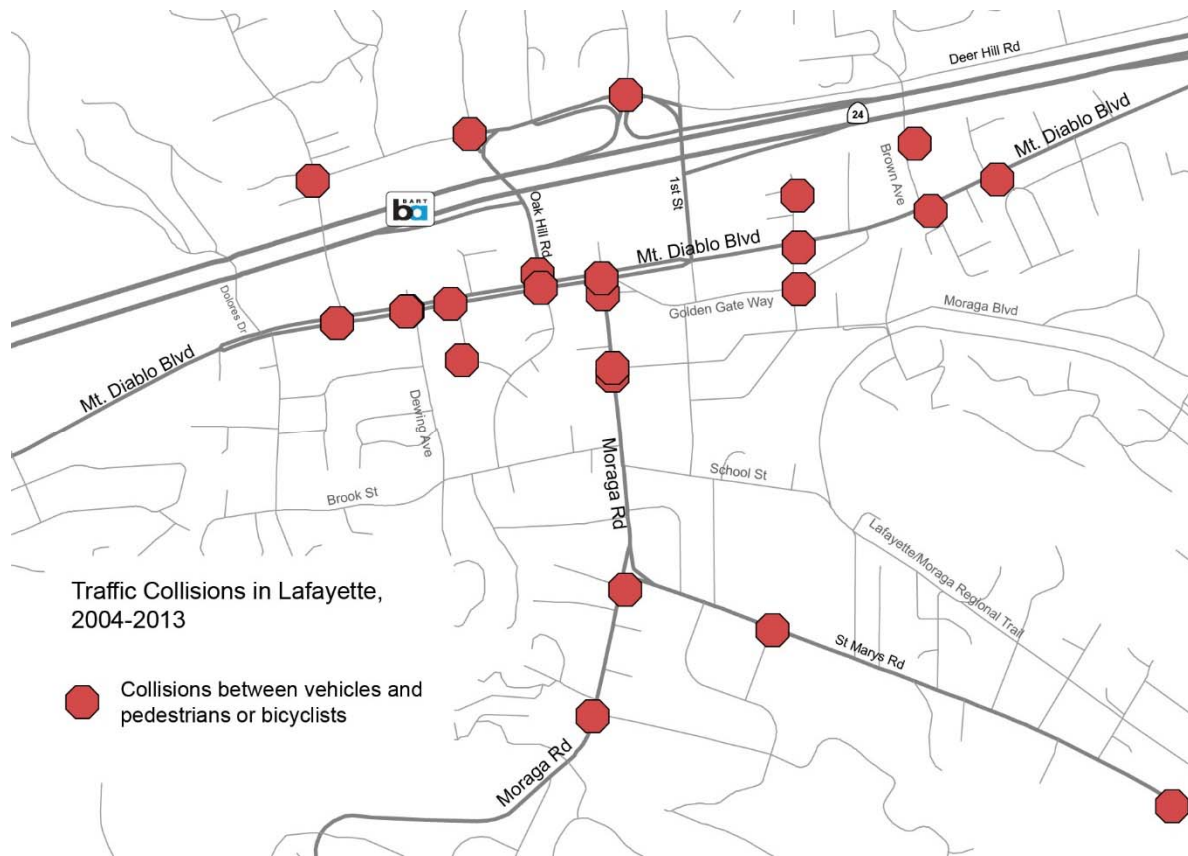
Four of seventeen collisions that resulted in severe injuries occurred in the Downtown area. Two pedestrians were injured in 2005 due to unsafe backing on 2nd Street and in 2007 due to improper passing at Mount Diablo Boulevard and Dewing Avenue. The other two severe injuries involved bicyclists. Figure 28 plots the fatal/severe and non-severe accidents across Downtown.

Figure 28: Traffic Collisions in Lafayette, 2004-2013 (SWITRS)

Vulnerable road users are significantly overrepresented in injury collision statistics. First, SWITRS data show that vulnerable road users involved in an injury collision tend to be located in the Downtown area. Citywide, there were 46 injury collisions involving bicyclists or pedestrians during the ten-year timeframe. Two-thirds, or 29, of these collisions occurred in the Downtown area, as shown in Figure 29. Just over half of the collisions were pedestrians, and the rest were bicyclists.

Second, within the Downtown area, vulnerable road users are overrepresented in injury collision data. Of all injury collisions in the ten-year period, 32 percent of all incidents involving bicyclists or pedestrians. By comparison, traffic counts at the Mount Diablo Boulevard and Moraga Road intersection show 89 bicyclists and pedestrians and 3,394 vehicles in the evening peak period. In other words, 97 percent of traffic are vehicles and only 3 percent are bicyclists or pedestrians, yet bicyclists and pedestrians are involved in a large portion of injury collisions.

Figure 29: Collisions between Vehicles with Pedestrian/Bicyclists (SWITRS)



In a third of the injury collisions in Lafayette over the ten-year period, a violation for driving at an unsafe speed was issued. Following this violation, three other violations were common. Drivers who violated the right of way were involved in 12 percent of the collisions, drivers who turned improperly made up 10 percent of the collisions, and violations at traffic signals or traffic signs were also 10 percent of the incidents. A more complete list of violation categories is detailed in Figure 30.

Figure 30: Collision Violation by Category, SWITRS

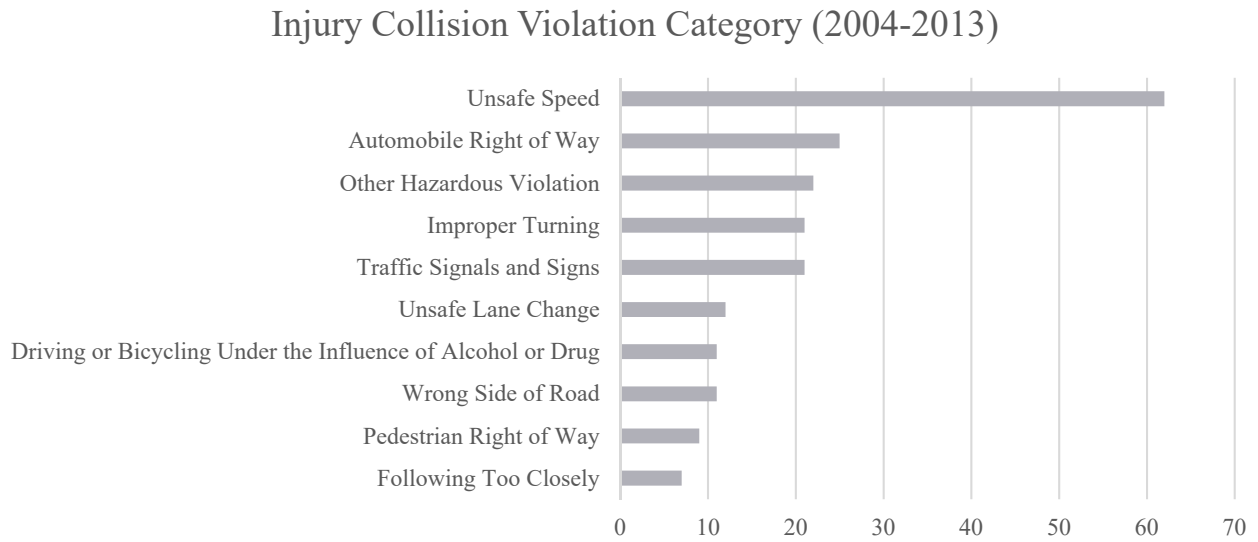
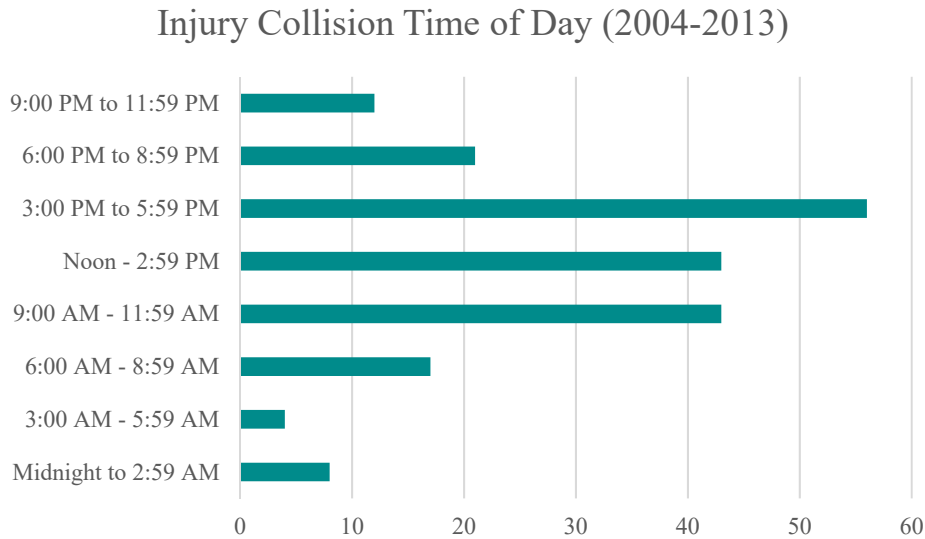
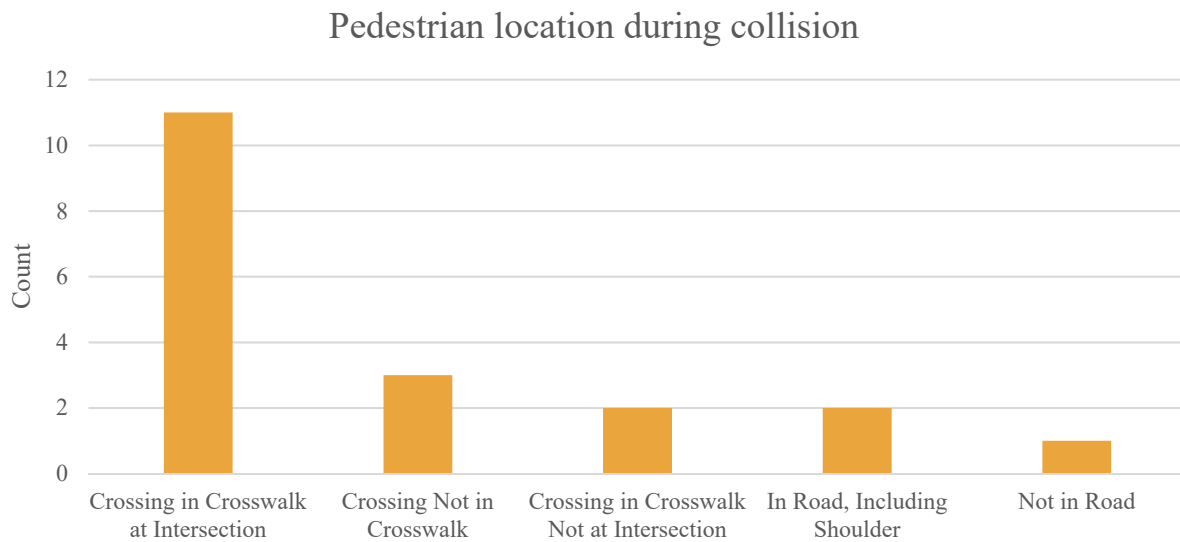


Figure 31 shows injury collisions by time-of-day. The largest share of injury collisions, 27 percent, occurred in the evening peak period. By contrast, relatively few collisions occurred in the morning peak period.

Figure 31: Collision by Time of Day, SWITRS



Citywide, most pedestrians who are involved in a collision were in a crosswalk. Only three of the nineteen collisions involved a pedestrian who was crossing the street not in a crosswalk. Full information is shown in Figure 32. These data show the need for safer conditions for pedestrians.

Figure 32: Pedestrian Location During Collision (SWITRS)

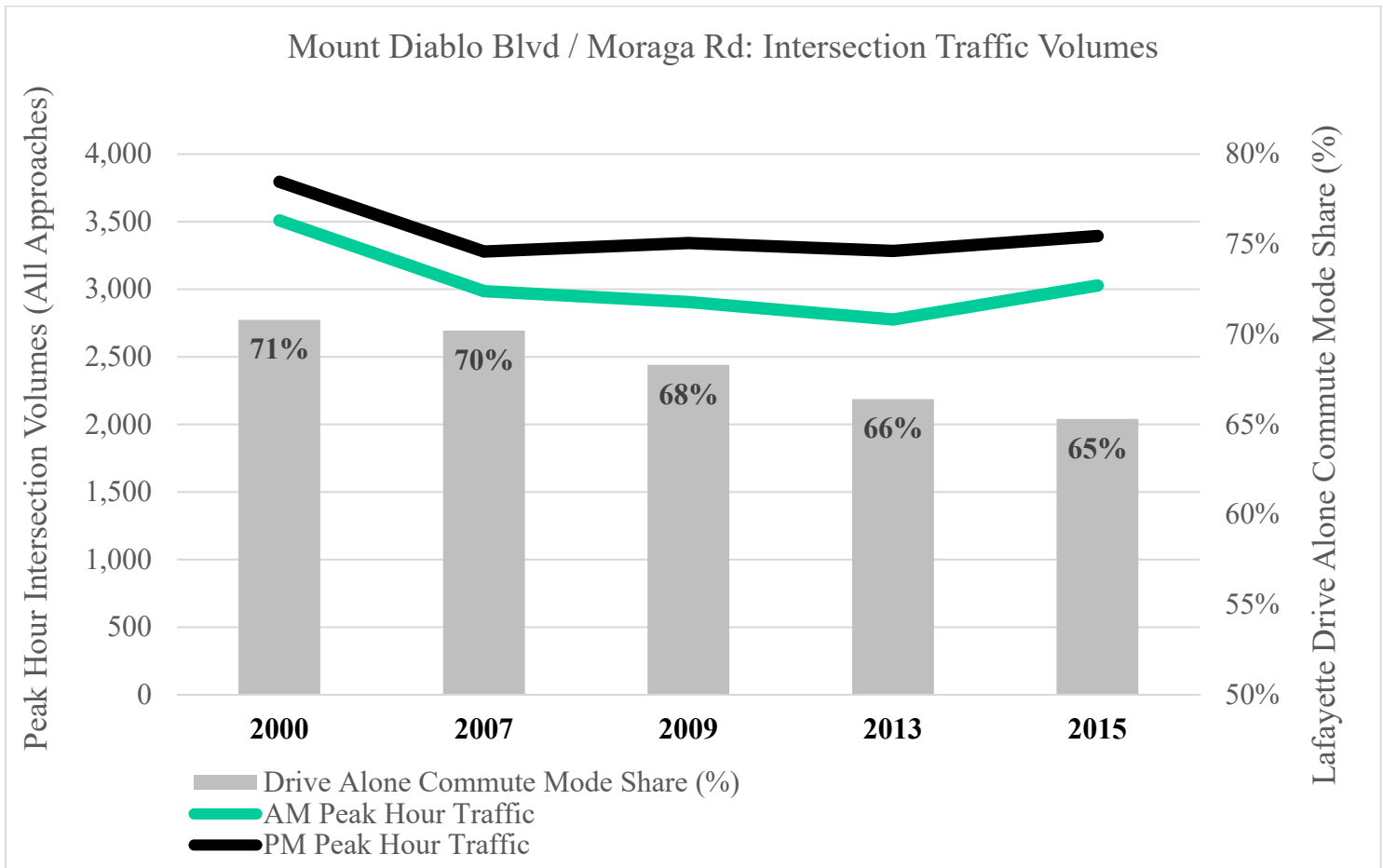
2.15 Summary of Background Conditions

The background conditions summarized in this chapter provide context for the causes of congestion and how traffic volumes in Downtown Lafayette have changed since the turn of this century. Traffic levels generally trend upwards as population, jobs, and economic growth increases. However, economic downturns, such as those experienced in 2001 and 2008-2009, can often lead to a short-term decrease in traffic growth. In addition, the Bay Area is experiencing a long-term shift to alternative modes such as transit, walking, and biking that can slow the rate of single-occupancy automobile traffic growth. For example, from 2000 to 2014, the share of auto commute trips in the Bay Area has decreased from 81 percent to 76 percent.

Traffic trends in the City have fluctuated over the years. Figure 33 presents several datasets:

- The AM and PM peak hour traffic volumes (left axis) at the Mount Diablo Blvd / Moraga Rd intersection from 2000, 2007, 2009, 2013, and 2015. This intersection is featured because it facilitates the highest peak hour traffic volumes among all Downtown Lafayette intersections. AM and PM traffic peaked in 2000 then declined in ensuing years through 2007. After 2007, PM peak hour volumes stayed flat and have increased between 2013 and 2015. AM peak hour volumes have followed the same general trends, albeit with a slightly steeper decline between 2007 – 2013. While traffic volumes can fluctuate daily and vary by intersection, counts at other Downtown intersections show the same general trends.
- The drive alone “Journey-to-Work” Commute Mode Share (right-axis) for the City of Lafayette is from the US Census. This is the share of drive alone commute work trips made by Lafayette residents. This share has decreased from 71 percent to 65 percent since 2000, which is lower than the Bay Area average of 76 percent. This tracks closely with trends across the Bay Area.

Figure 33: Traffic Trends



Current traffic volumes are slightly lower than in year 2000; more recent traffic growth since 2010 has stayed relatively flat. One reason for this is that the percentage of drive alone work commute trips has decreased over the same period from 2000 to 2015. However, these numbers do not provide a complete picture as the commute mode share focuses on work trips and not on other types of travel.

Table 4 provides a summary of key socioeconomic indicators for the City of Lafayette from US Census and other City sources. Many of the indicators decreased between 2000 and 2010, but have increased over the last five years. Population and job growth have increased since 2010, while the labor force (the number of employed residents in Lafayette) has decreased over the same period. These metrics provide evidence of why traffic volumes decreased after 2000 and why traffic growth has been slower over the last few years.

Table 4: City of Lafayette Economic Indicators

Economic and Traffic Data	% Change				
	2000	2010	2015	2000-2010 (10 Yrs)	2010-2015 (5 Yrs)
Population	23,908	23,893	25,843	-0.1%	8.2%
Labor Force	9,603	8,741	7,474	-9.0%	-14.5%
Employment	8,560	8,109	9,363	-5.3%	15.5%
Housing Units	9,334	9,651	9,750	3.4%	1.0%
Commercial sf	n/a	2,126,587	2,170,338	n/a	2.1%
School Enrollment (K-5)	2,292	2,138	2,351	-6.7%	10.0%
School Enrollment (6-8)	1,214	1,073	1,181	-11.6%	10.1%
Drive Alone Mode Share	71%	68%	64%	-3%	-5.9%
% Aged 65+	14%	17%	18%	3%	5.9%
Traffic Volumes: Mount Diablo Blvd/Moraga Rd	3,795	3,327	3,394	-12.3%	2.0%

Source: Arup, US Census, City of Lafayette

These data indicate that there has been a change in the type of travel and a shift in the composition of traffic. The number of Lafayette residents commuting to work has decreased along with the drive alone commute mode share. However, local employment (workers commuting to Lafayette) and school enrollments have increased over the last five years. Commercial space, which includes office and retail, has increased slightly (2%) in the last five years.

Even though traffic volume growth has been flat over the last several years, congestion, especially along Moraga Road, appears to have stayed steady. This is likely due to the concentration of multiple activities and driveways along the segment from St. Mary's Road to Mount Diablo Boulevard. Increased drop-off and pick-up activity at Lafayette Elementary and Stanley Middle School (though enrollments have not changed significantly), retail activity at Fiesta Square, and the Lafayette Library and Learning Center, which are all accessed from Moraga Road.

3 Growth Scenarios and Traffic Analysis

This chapter summarizes the development growth scenarios, traffic forecasting assumptions, and the traffic analysis results.

3.1 Development Growth Scenarios

The Plan considers two land use / development future growth scenarios. The traffic forecasts and analysis models were used to assess future traffic congestion, develop and refine proposed congestion reduction strategies, and test their effectiveness. Section 3.2 describes the process of generating the future year traffic forecasts and the traffic analysis models based on these development growth scenarios.

Generally, trips are made by residents, workers, shoppers, and school parents to accomplish activities. The number of trips generated within the City of Lafayette and Lamorinda region are a function of the size of the population and labor force, number of jobs, number of housing units, amount of commercial space and school enrollment. For any trip, the decision to use an automobile is determined by economic factors, like the cost and convenience of driving, compared to other options such as walking, cycling, or riding transit. The decision to make an auto trip using a certain route and at a specific time is determined by the type of activity, the perceived level of congestion, and personal preference.

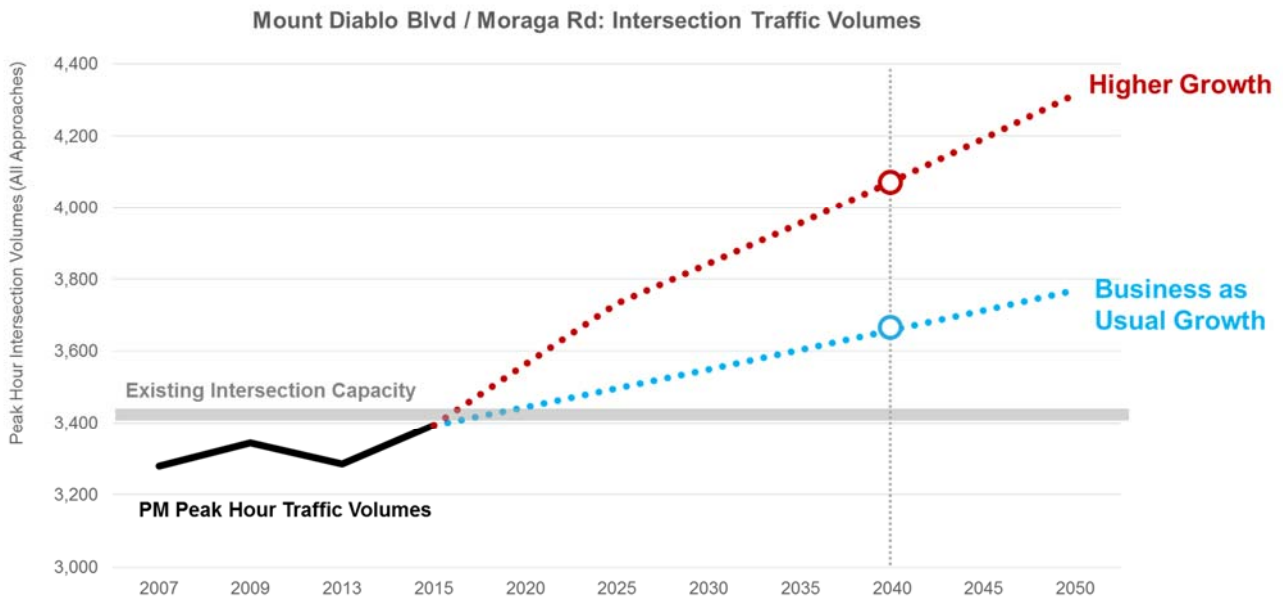
These factors all influence why trips occur, where they go, when they occur, and what travel mode is used. This determines the amount of traffic on a road during peak times and the resultant level of congestion.

The two land use development scenarios modeled for this Plan assume varying degrees of development growth within Lafayette and Moraga. The two future scenarios are summarized below:

- **Business as Usual:** the “Business as Usual” forecast assumes historical Lafayette development and traffic volume growth consistent with the existing General Plan and the DSP development scenario approved by the City Council. This growth scenario assumes approximately 8 percent higher development and traffic by 2040. This represents average annual growth of 0.3 percent. The Business as Usual scenario is shown as it represents historical growth patterns, a relatively lower level of development growth, and reduced trip making.
- **Higher Growth:** the “Higher Growth” or “worst case” scenario assumes greater relative development and traffic volume growth in Lafayette that would be consistent with projected development totals from ABAG’s Plan Bay Area and assumed in CCTA’s regional travel demand model. This scenario assumes 20 percent growth in population and jobs by 2040. This represents average annual growth of nearly 1 percent. This represents a “worst case” scenario, which assumes steady population and employment growth and no major changes in travel behavior or transportation technology. It should be noted that this growth scenario exceeds Lafayette’s own projections in all of its approved long-range planning documents, including the DSP and General Plan.

Figure 34 illustrates how the two development growth forecasts applied to intersection volumes at the Mount Diablo Boulevard / Moraga Road intersection. As alluded in section 2.14, above, this intersection experiences the most peak hour traffic in Downtown Lafayette.

Figure 34: Traffic Growth Scenarios



The Higher Growth scenario was used for the traffic analysis presented in the next section and to assess the congestion reduction potential of proposed Short List strategies. The traffic analysis utilized the Higher Growth scenario to develop traffic forecasts for both the near-term (year 2025) and long-term (year 2040) future conditions.

The projected development increases in the Higher Growth scenario would translate into a 20 percent increase in traffic across the Downtown study area. This increase is a “weighted average” and incorporates both residential and commercial growth. For example, in the travel analysis model, zones along Mount Diablo Boulevard would likely generate more traffic because a greater intensity and mix of development is projected along that corridor, while other areas not adjacent to Mount Diablo Boulevard are projected to have less intense development growth. Under long-term conditions in the Higher Growth scenario, zones along Mount Diablo Boulevard could generate traffic growth closer to 30 percent, while residential areas in other parts of the study area generate growth closer to 5 percent. The traffic growth rates were incorporated into the detailed traffic analysis used to evaluate the strategies. The 20 percent traffic growth rate represents an average across the wider Downtown study area. Table 5 below shows the corresponding population and employment growth forecasts from the CCTA Development Forecasts for areas in Downtown Lafayette and for other areas of Lamorinda (2010-2040), along with the combined total growth rate proposed to develop the future baseline volume scenario.

Table 5: Population and employment forecasts (2010-2040)

Area	Population Growth	Employment Growth	Total Weighted Growth (Population+Employment)
Downtown Lafayette	32%	15%	24%
Lamorinda	14%	14%	14%
Source: CCTA, City of Lafayette, MTC			

The increment of new additional PM peak hour traffic in the future scenario is approximately 1,750 vehicle trips within the Downtown area. This is very close to the Cumulative With Specific Plan vehicle trip generation estimate of 1,900 PM peak hour trips presented in the DSP EIR.

The next section presents the traffic analysis methodology and results for three distinct scenarios: “Existing Condition” (year 2015), “Near-Term” (year 2025) and “Long-Term” (year 2040).

3.2 Traffic Analysis

The traffic analysis methodology for this study incorporates a series of tools to evaluate traffic capacity, intersection performance, travel time, and queuing within Downtown. Arup utilized traffic microscopic simulation (“microsimulation”) models of Downtown for the morning (AM) peak hour and the two-hour afternoon peak periods, which include the mid-day (MD) and evening (PM). Microsimulation software tools such as Synchro/SimTraffic and VISSIM were used to simulate individual vehicle and pedestrian movements on the street network. These models utilize assumptions on how drivers accelerate, change lanes, and interact with pedestrians. These tools generate metrics such as travel time, delay, and queuing. Traffic microsimulation models analyze how individual users (e.g., drivers, pedestrians, and buses) interact on the transportation system. Section 4.4, below, discusses a more qualitative traffic analysis methodology which also contributes to strategy recommendations in this Plan.

The DSP EIR conducted a comprehensive traffic analysis that identified the potential impacts of future development in Downtown. The EIR traffic analysis provides a strong basis for understanding existing and future traffic conditions. The traffic analysis presented in this report builds on this earlier work and is largely consistent with the previous findings.

The Higher Growth development scenario described in the previous section was used to generate traffic forecasts for the following traffic analysis scenarios:

- Existing Conditions (2015): the traffic models were developed and calibrated using a combination of 2015 counts and travel time measurements with earlier data.
- Near-Term Year (2025): this represents an approximate mid-point forecast year for traffic growth and is half of the year 2040 growth.
- Long-Term Year (2040): this applies the 20% growth rate over existing volumes described above.

These three future scenarios were modeled using the calibrated existing conditions model and adding in the future traffic forecasts. Figure 35 presents the extents of the analysis study area.

Figure 35: Traffic Analysis Model Extents



The traffic analysis summarizes intersection delay and “level of service” (LOS) as well as travel time on key corridors. LOS is a qualitative rating describing conditions experienced by drivers at a signalized intersection. Intersection delay was calculated using the traffic simulation model, with LOS determined using criteria from the *Highway Capacity Manual* (HCM, Transportation Research Board, 2010). Table 6 presents the LOS criteria.

Table 6: LOS Criteria

LOS	Description
A	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase and do not stop at all.
B	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do
C	not have to stop.
D	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
E	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Source: Transportation Research Board

LOS and delay is only measured for an individual intersection, and does not fully account for the effects of queuing at upstream and downstream locations.

Table 7 presents the traffic analysis results for Existing Conditions and the future year 2025 and 2040 scenarios. Both of the future year scenarios represent “baseline” conditions – i.e., they assume no changes to the roadway network or implementation of strategies.

Table 7: Traffic Analysis Results

Study Location	Existing (2015)	Near-Term (2025)	Long-Term (2040)
Intersection LOS / Delay (sec)			
MDB/Oak Hill Rd	C / 29	C / 30	C / 31
MDB/1st St	C / 29	C / 31	D / 51
MDB/Moraga Rd	D / 49	D / 50	F / 94
Moraga Rd/Moraga Blvd	C / 34	D / 49	D / 54
Moraga Rd/Brook/School	C / 27	F / 94	F / 102
Moraga Rd/St Marys	B / 16	E / 60	E / 70
Travel Time (mm:ss)			
NB Moraga Rd – St Mary’s to MDB	03:24	04:27	05:41
SB Moraga Rd – MDB to St Mary’s	01:27	03:12	04:15
Total System Delay (average delay per vehicle, mm:ss)			
Total System	01:30	02:17	03:19

The future year baseline analysis, which assumes the “worst case” conditions, indicates the following:

- The future traffic increases will cause delay and congestion to worsen. In the Long-Term (2040) scenario, the 20 percent increase in traffic projected under the Higher Growth forecast will result in a 36 percent increase in vehicle hours of delay.
- Moraga Road, including the intersections at Mount Diablo Boulevard, Brook Street, and School Street, remains the most critical segment, followed by First Street between Mount Diablo Boulevard and SR 24.
- Other intersections of Mount Diablo Boulevard outside of the “Y” appear to have sufficient capacity and should continue to operate acceptably in the future. However, under the Higher Growth scenario, projected traffic growth of 20 percent on SR 24 could lead to greater diversion to Mount Diablo Boulevard if freeway conditions worsen.
- 60% of vehicles travelling north on Moraga Road turn right onto Mount Diablo Boulevard. With only one short right turning lane on this approach there is insufficient capacity for these vehicles to queue and the right turning queue spills into the middle lane and into upstream intersections that are located south of this intersection.
- Vehicles travelling southbound on Moraga Road and turning left into Moraga Boulevard block through traffic on this approach which increases the delay of southbound vehicles. These queues have been observed to extend back to Mount Diablo Boulevard and block east and westbound traffic on Mount Diablo Boulevard. This is expected to worsen in the future.

The traffic modeling indicates that significant changes to the roadway network and intersection capacity are needed to support future traffic volumes if the worst-case scenario of 20 percent growth materializes by year 2040. These traffic modeling tools were used to help define and

evaluate the strategies described in the next section. The detailed traffic analysis for the complete set of strategies are provided in the technical memorandums referenced at the beginning of the report.

4 Strategy Development

Chapters 1 and 2 briefly discuss the process by which congestion reduction strategies have been developed for this Plan. This chapter delves into the details. In the first study phase for this Plan, Arup drew from the following sources to generate the initial list, called the “universe”, of congestion reduction strategies:

1. Previous City of Lafayette plans and studies, in addition to other public agency and School District documents, that presented a range of proposed transportation projects and programs across the Downtown study area.
2. The web-based survey and Collaborative Map tool conducted in fall 2015, which generated hundreds of responses from local residents representing a broad spectrum of their personal experiences and ideas for transportation-related improvements.
3. Arup’s background conditions analysis and numerous site visits.
4. Input from the Steering Committee, Circulation Commission, City Council, School District, and City staff.

From these sources, the Initial List of over 100 possible strategies were documented. This was refined to a more manageable Long List of 50 by combining several duplicates or related projects. Arup conducted an initial qualitative assessment of the potential congestion reduction benefits and cost/implementation challenges for each solution idea and then documented this in the *Lafayette Downtown Congestion Long List Strategies Matrix* (March 22, 2016). The benefit and cost assessment utilized a qualitative scoring of 1 (low) to 5 (high). Arup staff developed these benefit and cost scores using engineering judgment, past experience, and their understanding of the background data and traffic modeling completed to date. While the assessment was qualitative, it was deemed a helpful guide for the Steering Committee to evaluate the relative merits of individual projects. Additional quantitative analysis was then conducted to generate and eventually finalize a refined Short List of eleven strategies recommended in this draft Plan.

The study explored two categories of strategies to address Downtown traffic congestion: 1) strategies that increase capacity or throughput (the number of vehicles that can travel through an intersection), or 2) strategies that reduce vehicle trips (also known as demand management strategies). Table 8 provides some typical strategies for these two categories. Please note that these examples are not exhaustive:

Table 8: Examples of Congestion Reduction Strategies

Capacity Enhancing Increase Capacity / Throughput	Vehicle Trip Reduction Promote Walk, Bike, and Transit Modes
Add new streets Widen existing streets Add left or right-turn lanes Improve signal coordination	Add bike lanes Add pedestrian crossings Provide more bus service Improve access to BART

Opportunities for adding new streets and widening streets are limited in a developed area such as Downtown Lafayette. However, additional turn lanes, reconfiguring intersections, and improved traffic signal coordination can all increase capacity, which would allow for more people to travel through particular intersections and segments within the local transportation network. The vehicle trip reduction strategies focus on ways to promote alternative modes of transportation by making it easier to walk and bike to Downtown schools and BART, and possibly remove vehicle trips on congested roadways.

The strategy development process included several steps, which encapsulate input from more than a dozen publicly-noticed meetings, including at the Steering Committee, joint City Council and Circulation Commission, and a public workshop. These steps are described in the following sections.

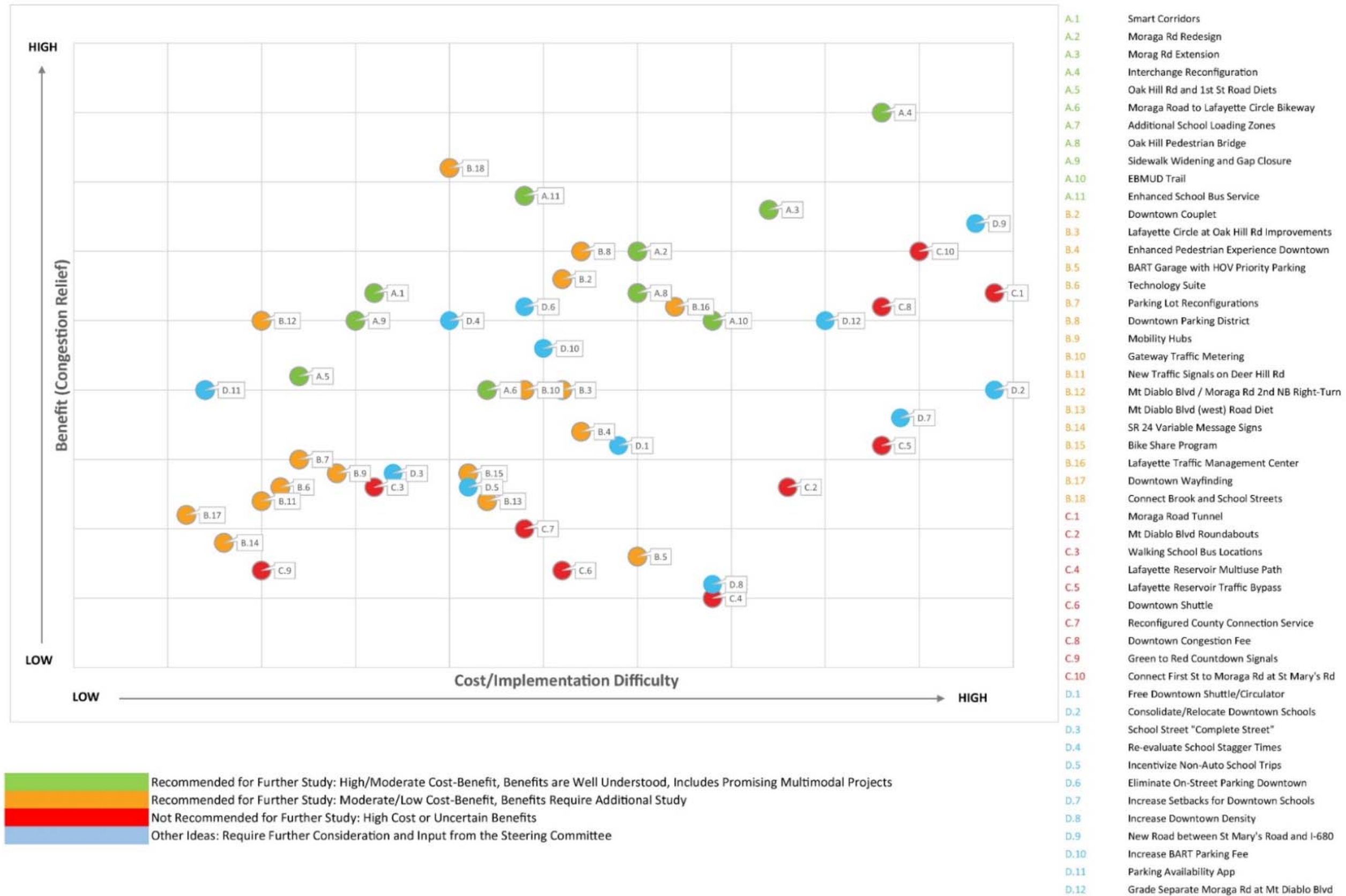
4.1 Initial List of Strategies

The Steering Committee, City staff, and Arup developed an initial list of over 100 strategies from previous Circulation Commission strategy memos, previous studies such as the DSP, results from the first set of surveys (i.e., Collaborative Map and priorities survey), and our own early analysis and field observations.

4.2 Long List of Strategies

The Initial List was used to develop a “Long List” of 50 strategies. Figure 36 presents the Long List plotted on an x-y axis: the y-axis shows the scale of the congestion reduction benefits, while the x-axis shows the scale of the ease of implementation. Arup developed a detailed table for the Steering Committee that included a project description, options, a qualitative analysis of the effectiveness, and the potential trade-offs. The Steering Committee weighed these factors and trimmed the Long List down to an initial Short List of 19 strategies.

Figure 36: Long List of Strategies



4.3 Short List of Strategies & Refinement

The 19 strategies on the initial Short List are shown in Figure 37. Arup conducted a more detailed analysis of these strategies, including estimates of vehicle traffic generation, the potential for shifting trips from auto to alternative modes, and traffic operations impacts. Arup developed a series of traffic microsimulation models to test how each strategy would impact traffic “level-of-service”, travel time, and vehicle queuing under existing conditions and two future analysis scenarios (year 2025 and 2040). The Steering Committee evaluated the detailed traffic analysis and further refined the Short List to 15 recommended strategies. This Short List edition then underwent extensive public review. From April 24 – June 1, 2017 over 600 community members submitted feedback on the strategies featured in the Short List. Feedback was submitted via a web-based Preference Survey as well as during a public workshop on May 23rd at the Lafayette Veterans’ Memorial Hall. Subsequent to that outreach period, on August 15, 2017, the Steering Committee approved a recommended Short List of 11 strategies and draft Implementation Plan. These recommendations have been incorporated into this draft Plan in Chapter 4.

The traffic analyses, combined with a multi-criteria assessment, were used to refine the Short List from 19 to 15 strategies. The multi-criteria assessment considered a broad range of transportation and societal factors, as well as order-of-magnitude cost estimates.

Figure 37: Short List of Strategies



4.4 Multi-Criteria Analysis

To further assess the refined Short List of 15 strategies, the Steering Committee guided development of a multi-criteria analysis tool. This method was employed to gauge the qualitative performance measures for each of the Short List strategies, and achieve one of the original study objectives: to apply holistic traffic evaluation of traffic congestion reduction strategies. The multi-criteria analysis considered a range of performance measures, including congestion reduction (weighted 3x the other variables), safety, connectivity, parking, environmental, ease of implementation, cost, and urban design. Table 9 summarizes the results of the multi-criteria assessment and cost estimate. The detailed multi-criteria assessment results are presented in Appendix C.

Table 9: Multi-Criteria Analysis Summary

Capacity Enhancing Strategies	Composite Score	Ease of Implementation	Cost
New Traffic Signals on Deer Hill Rd	29	2	\$500-750k
Brook St-School St Intersection Realignment	27	1	\$4-5M
MDB/Moraga Rd 2nd NBR	26	5	\$100-200k
Moraga Rd Extension Behind McCaulou's/Whole Foods to First St	26	1	\$20-30M
School Street One-Way Westbound	26	3	\$100-200k
BART Pedestrian Bridge Over Oak Hill Road	26	1	\$6-8M
Moraga Rd/Moraga Blvd SBL lane	24	5	\$75-100k
Coordinated Traffic Signals	24	5	\$1-1.5M
Brook-School St Pedestrian Footbridge over Moraga Rd ¹	n/a	n/a	\$2-3M
Vehicle Trip Reduction Strategies	Composite Score	Ease of Implementation	Cost
Regional Trail Connection to BART/Downtown	27	5	\$50-100k
Additional School Loading Zones	26	2	\$200-400k
Student Pedestrian Safe Routes Priority Streets	26	5	\$50-100k
Enhance School Bus Program	25	2	\$320k (per year)
Staggered School Times	25	1	Unknown
Mt Diablo Boulevard Bike-Ped Pathway Expansion	22	3	\$1-2M
School Street Bike-Ped Connection to Trail	21	3	\$500k-1.5M
Notes:			
¹ MCA analysis task completed prior to introduction and approval of footbridge strategy at City Council.			

The technical studies, multi-criteria analysis, public feedback from the preference survey and public workshop, and direction from the Steering Committee generated critical input for developing a recommended strategy plan and when each strategy should be implemented. Chapter 4 describes the recommended implementation timing for certain strategies.

5 Recommended Traffic Congestion Reduction Strategies

The Steering Committee considered a wide range of factors to develop a final list of recommended strategies for inclusion in the Plan, as described in Chapter 3 and 4, above. Figure 38 presents the final recommended traffic congestion reduction strategies. Additional information and conceptual designs for the strategies are presented in Appendix A.

The analyses indicate that implementing combinations of the recommended strategies could effectively reduce or alleviate existing and future Downtown traffic congestion under the “worst-case” Higher Growth development scenario. Modeling the recommended strategies under this scenario allows for better understanding of the estimated effectiveness and potential implementation timing of strategy combinations.

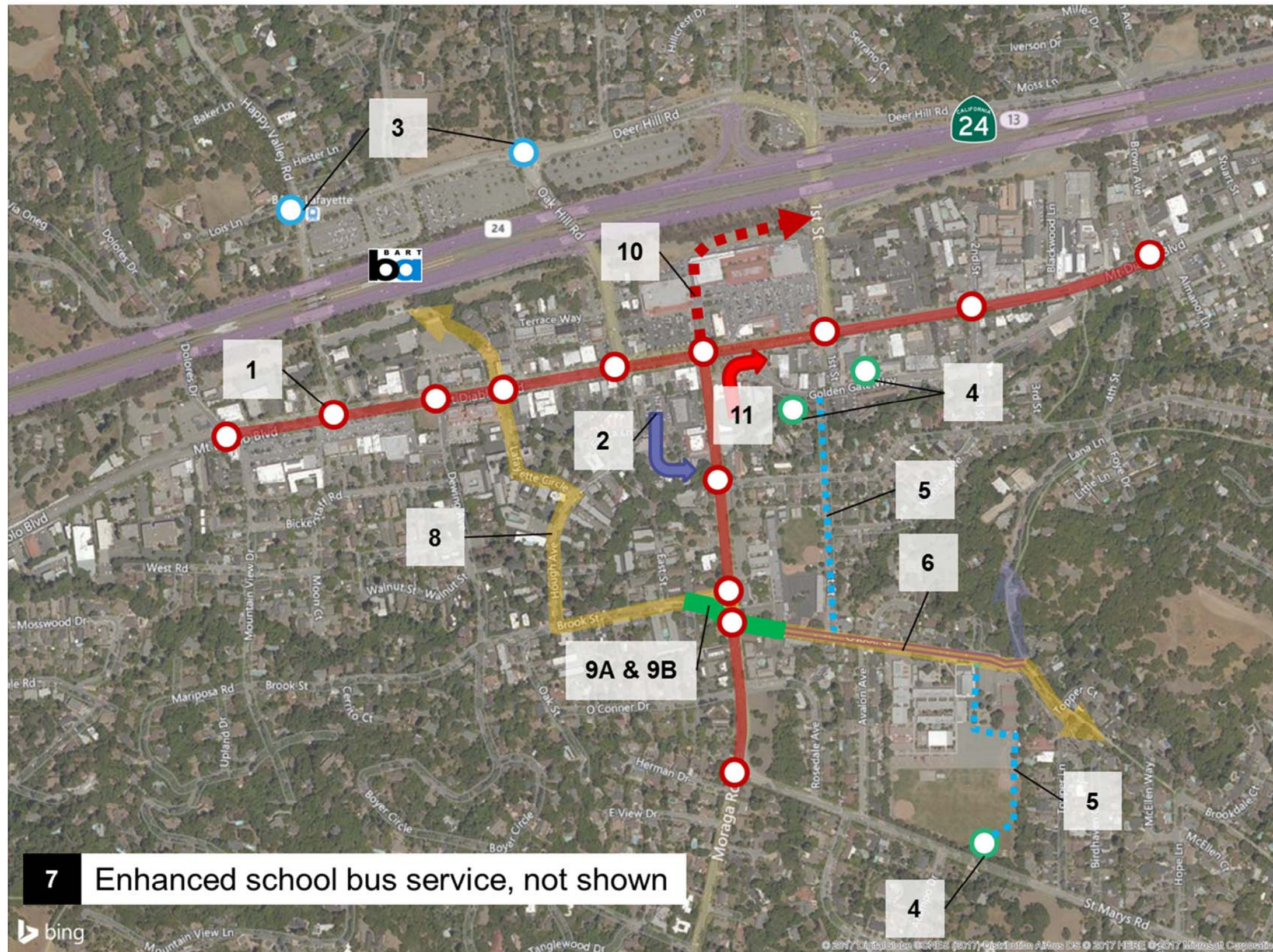
Timing is critical because not all strategies can be implemented immediately. Strategies such as the Brook-School Intersection Realignment (#9), would require land acquisition, design and environmental studies, and would require additional funding sources. Other strategies, such as the Enhanced School Bus Program (#7), could be implemented sooner by increasing the number of buses leased from the existing operator.

The two growth scenarios described in Chapter 3 provide a useful high and low target to examine when to implement the proposed strategies over the next 15 to 20 years. It is possible that development patterns and travel behavioral trends will result in future growth somewhere between the two forecast lines.

Two timeframes for implementing strategies have been identified:

- **Short-Term Strategies (1-10 Years):** these strategies generally have lower relative costs, can be implemented with relatively minimal right-of-way acquisition and coordination with other regional and state agencies, likely require only minimal environmental analysis under the California Environmental Quality Act (CEQA), and can probably be designed and constructed in a five-year time period. *These strategies have been estimated to provide up to 6% additional roadway capacity.*
- **Long-Term Strategies (10-20+ Years):** these strategies generally have much higher relative costs, will require more significant coordination with regional agencies such as EBMUD and Caltrans, and will likely require a full Environmental Impact Report (EIR) under CEQA. However, these strategies are only necessary if traffic and development growth approaches the Higher Growth scenario. *These strategies have been estimated to provide up to 20% additional roadway capacity.*

Figure 38: Final Recommended Strategies



Strategies

Short-Term

1. Coordinated traffic signals on Mount Diablo Boulevard and Moraga Road
2. Southbound left-turn lane at Moraga Road / Moraga Boulevard
3. Signalize the intersections of Deer Hill Road / Oak Hill Road and Deer Hill Road / Happy Valley Road
4. Additional School Pick-up & Drop-off Zones
5. Student-Pedestrian Safe Routes
6. School Street Bike-Ped Pathway Connection to Trail
7. Enhanced School Bus Program
8. Regional Trail Connection to BART/Downtown

Long-Term

- 9A. Brook St-School St Pedestrian Footbridge over Moraga Road
- 9B. Brook St-School St intersection realignment
10. Moraga Rd Extension Behind McCaulou's / Whole Foods To 1st St

Pilot Project

11. 2nd NBR turning lane at Mt Diablo Boulevard / Moraga Road

The Short and Long-Term Strategy timeframes for strategy implementation are presented in Figure 39 within the context of the two development growth scenarios presented in Chapter 3. The horizontal gray line shows the existing intersection capacity at Mount Diablo Boulevard / Moraga Road. As traffic volumes from the Business as Usual and Higher Growth scenarios begin to exceed the capacity, congestion worsens and LOS E/F conditions are reached. The Short and Long-Term Strategy implementation packages each provide a “step increase” in capacity over the existing condition.

Figure 39: Short and Long-Term Implementation Timing

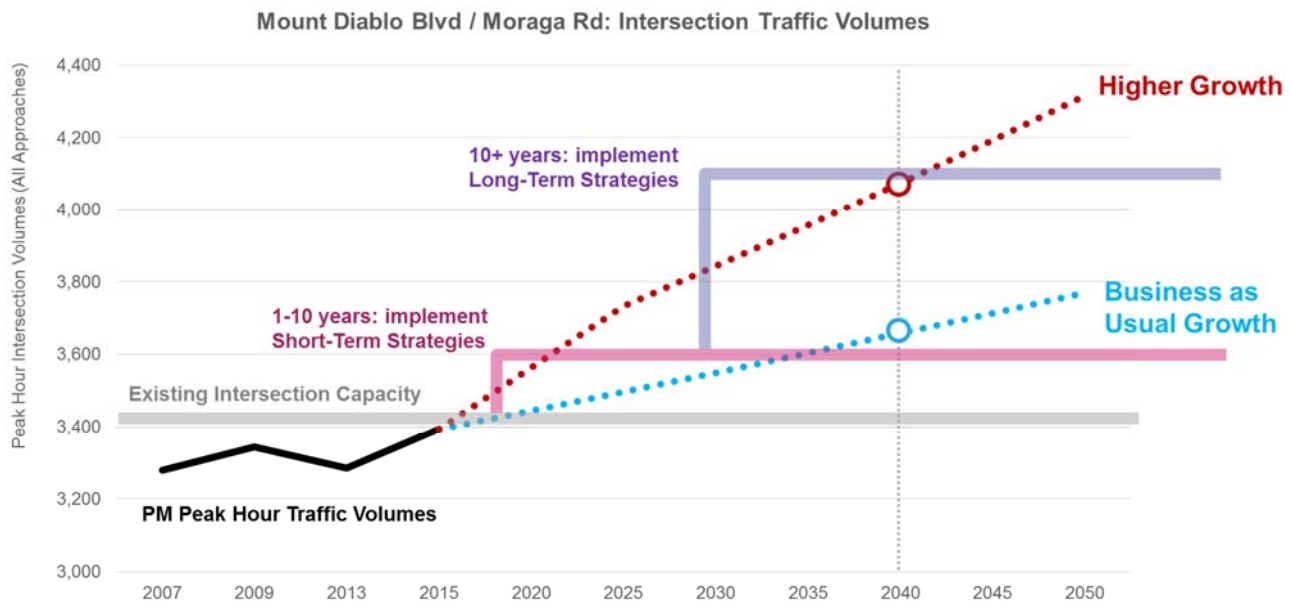


Table 10 presents the recommended strategies that are included in the Short and Long-Term Strategy implementation packages. It is important to note that these recommended strategies do not represent a strict priority list, but merely represent a way of organizing the strategies according to short and long-term timeframes. The City should remain flexible to implement one or more of the Long-Term strategies sooner than estimated if corresponding traffic conditions and grant funding opportunities arise.

Table 10: Recommended Strategies by Implementation Timeframe

Strategy	Cost	Reasoning
Short-Term (1-10 years): Relatively Low Cost Investments to Increase Capacity and Reduce Trip Demand		
Coordinated Traffic Signals	\$1-1.5M	Extending the coordinated traffic control system to additional signals will provide a small increase in capacity with minimal physical or environmental impacts. It also scored first in the preference survey, by a significant margin. However, it scored last on the multi-criteria assessment and it is an expensive strategy to implement. Despite these drawbacks, this project could qualify for regional and/or federal funds, such as MTC's IDEA grant program.
Southbound left-turn lane at Moraga Road and Moraga Boulevard	\$75-100k	Providing a dedicated left-turn pocket is a relatively low-cost measure to increase capacity on Moraga Rd. This strategy also scored reasonably high on the preference survey (#3 or #4).
Signalize Deer Hill Rd/Oak Hill Rd and Deer Hill Rd/Happy Valley Rd	\$500-750k	These traffic signals provide additional capacity and pedestrian safety benefits. These signals scored high in the multi-criteria assessment, they have a relatively modest financial cost, and they can be constructed without significant physical impacts. However, they did score low in the survey.
Additional School Pick-up & Drop-off Zones	\$200-400k	These formal zones will help divert some school-related traffic from Moraga Rd. The St Mary's zone should be designed to minimize the impact on the Stanley Middle School playing fields. These additional zones scored high in the multi-criteria assessment and in the top third of the preference survey.
Student Pedestrian Safe Routes / Priority Streets	\$50-100k	These Safe Routes are the key connections from the additional pick-up and drop-off zones to the schools. For the zones to be effective and safe, these additional routes are needed. This strategy scored high in the multi-criteria assessment but in the middle to the bottom third of the survey. However, Arup and City staff still consider this is a critical complement to the pick-up/drop-off zones.
School Street Bike-Ped Pathway Connection to Trail	\$500k-1.5M	This project is also a critical complement to the pick-up/drop-off zones and the Student Pedestrian Safe Routes, as it forms a key connection between the two Downtown schools and the Lafayette-Moraga Regional Trail. With the Brook St-School St Realignment project, it also provides a direct and safe pedestrian and bicycle connection to the west side of Moraga Rd. The proposed design removes 9 on-street parking spaces. However, the public spaces are all on the south side of the street and impact spaces only near two houses; there is also excess on-street parking capacity on Avalon Ave. This strategy does score low in both the multi-criteria analysis (last) and in the bottom third of the survey. This strategy will likely take additional design and outreach with the neighbors prior to implementation.
Enhanced School Bus Program	\$320k (per year)	Providing additional school buses at Stanley Middle School and new service at Lafayette Elementary will reduce school-related trips during peak times. This strategy scored reasonably high in the multi-criteria assessment and near the top in the preference survey. It is relatively expensive to implement, at approximately \$320,000 per year to the current contractor operating the school buses. This program will likely take additional time to identify and acquire funds.
Regional Trail Connection to BART/Downtown	\$50-100k	This project helps create a cohesive bicycle and pedestrian network across Downtown, to reach key destinations such as BART and nearby commercial establishments. It also helps tie together the Safe Routes and the other school-related projects. It scored high in the multi-criteria analysis and it is relatively low-cost. However, it did score in the bottom third of the survey.
Long-Term (10-20+ Years): Long-Term Projects to Consider if Needed		
Brook St-School St Pedestrian Footbridge over Moraga Rd	\$2-3M	This strategy will require significant engineering design and coordination with the Masonic Lodge and Lafayette School District, as part of the bridge will be located on respective properties. It will also likely require purchasing some land or otherwise obtaining a special access agreement from the Masonic Lodge and the School District to allow for some of the ramp structures to be built.
Brook St-School St Intersection Realignment	\$4-5M	This strategy enhances traffic capacity and helps provide a better east-west bicycle connection across Moraga Rd. It scored high in the multi-criteria assessment, but in the middle of the pack in the survey. There are still concerns that this strategy would encourage cut-through traffic on Brook St. However, the congestion relief associated with the Short and Medium-Term strategies should improve conditions along Moraga Road to the point that it would reduce the attractiveness of using Brook St as a cut-through route. But additional traffic calming measures on Brook St could be explored. This strategy will likely take at least five years to implement.
Moraga Rd Extension to SR 24 and 1st St Behind McCaulou's/Whole Foods	\$20-30M	This project is only required if the City experiences traffic growth at the "higher 20% growth" forecast shown in the earlier section. To achieve this growth, sites such as McCaulou's/Whole Foods would need to redevelop. If this redevelopment occurs, the connection from Moraga Rd to SR 24 and 1 st St should be constructed as part of the site plan. This roadway will provide a direct connection and was shown to be the most effective at improving queuing along Moraga Rd.
Pilot Project		
Mount Diablo Blvd/Moraga Rd 2nd Northbound Right-Turn	\$100-200k	While this strategy scored high in the multi-criteria assessment and the survey, it would require the removal of the north-south crosswalk on the east leg of the intersection. Arup and City staff have considered that this is too significant of an impact on pedestrian circulation. This strategy would also contradict established City policies promoting pedestrian mobility and Complete Streets principles, especially in the downtown core. However, the strategy does provide significant congestion reduction benefits for a modest cost.

Short-Term (1-10 Years) Summary

These strategies should be implemented as early as possible to address existing congestion, as funding opportunities arise. The rationale supporting the Short-Term strategies is that these can be implemented relatively quickly and in conjunction with proposed Downtown school campus redesigns funded by the school district bond measure passed in 2016. Each of the Short-Term strategies would involve varying degrees of modifications to physical infrastructure. To complement these strategies, it will also be important to continue regular monitoring of traffic conditions on Moraga Road and Mount Diablo Boulevard to track growth trends in traffic volumes, travel times, and even modal shifts.

Long-Term (10-20+ Years) Summary

Depending on the rate of traffic growth, some of the Long-Term strategies may be needed in approximately ten to fifteen years under the Higher Growth scenario. However, these strategies might not be required at all if growth under the Business as Usual scenario occurs or other long-term factors put downward pressure on demand for single-occupancy vehicle use. Drive alone mode share and auto ownership per household continue to trend down locally in Lafayette and the Bay Area overall, while bicycle usage and ridesharing (carpooling and Uber/Lyft) are increasing. In the future, autonomous vehicles could allow for an increase in road capacity and promote low cost shared trips, which could reduce overall congestion.

The strategy delivering the most significant capacity increase, the Moraga Road extension (#11), is only required if Downtown traffic volume growth exceeds 20%. This level of traffic growth would likely require that a significant portion of Downtown (e.g., including the Whole Foods site) be redeveloped at an intensity greater than what is permitted under the existing General Plan and DSP.

The trip reduction strategies (e.g., school loading zones and the enhanced school bus program), coupled with other land use and development policies, could help slow the rate of traffic growth in Downtown. This would result in future growth closer to the Business as Usual line (shown in blue) depicted in Figure 44. Slower traffic growth would provide the City with greater flexibility in terms of the number and timing of strategies⁷.

Pilot Project

The City Council has recommended that City staff conduct a pilot of the Mount Diablo Blvd/Moraga Rd 2nd Northbound Right-Turn strategy to test its effectiveness and impact on pedestrians.

⁷Additional detail on the growth assumptions is provided in the memorandum *A Framework for a Downtown Congestion Reduction Plan Implementation Strategy – Correlations between Estimated Future Development and Traffic Growth* (Arup, March 23, 2017).

6 Funding and Implementation

Lafayette relies primarily on grant funds to implement approved transportation programs and projects. Funding derives primarily from Federal, State, and regional programs authorized by corresponding legislation. Often, the authorized funding from such legislation is cyclical. As a result, project implementation timing is often reliant on sufficient funding availability from certain grant programs. In many cases, the agency administering grant funds differs from the agency actually sourcing the grant funding. For example, One Bay Area (OBAG) grant funds include Federal dollars that are appropriated to states and then distributed among regional planning agencies, often using an established population or road-miles metric. Regional agencies then administer these funds based on legislative authority. As an example, as the designated Metropolitan Planning Organization (MPO) for the Bay Area, the Metropolitan Transportation Commission (MTC) maintains authority to allocate Federally-authorized transportation funds appropriated to the Bay Area region via the State. Likewise, State-administered grant programs are typically competitive across the state. Regionally-administered grant programs are usually competitive – with some exceptions for formula programs - across the Bay Area, within Contra Costa County, or even within the Lamorinda and Tri-Valley sub-regions.

Virtually all grant funding programs require some form of matching or in-kind funding contribution from the project sponsor, i.e., the agency implementing the project or program. There is also variation in the frequency and dollar amounts among transportation grant funding programs. Some programs reliably request calls for projects on an annual basis whereas others become available only if sufficient funds can be derived from their designated sources in order to garner competitive applications. To exemplify this, the Contra Costa Transportation Authority (CCTA) administers the ½-cent countywide transportation sales tax, called Measure J. Since Measure J took effect in 2009, CCTA has periodically packaged accrued sales tax revenues into defined grant programs, which is then made available for transportation projects through a mix of competitive grant and formula-based programs.

Generally, transportation funding availability also assumes relatively consistent legislative support to either continue, expand, or in some cases contract or even eliminate programs. Several grant programs could be considered to fund and implement the recommended the congestion reduction strategies. However, for reasons described above, the frequency and dollar amount of available grant funding cannot be forecasted with certainty. Only a few select programs have a consistent history in advertising calls for projects on an annual basis. These include the statewide Active Transportation Program (ATP) and the regional Transportation Development Act (TDA) program. Others programs, such as the Statewide Transportation Improvement Program (STIP) and countywide Measure J sales tax programs, typically only become available on a periodic basis. Although, Lafayette may also consider pursuing anticipated new funding programs, like those derived from the recently passed Senate Bill 1 (SB 1), which raised the statewide fuel tax.

The following portion of this chapter summarizes Federal, State, and regional programs that could be considered in pursuit of future funding to implement Plan strategies.

6.1 Federal Funding Sources

The Federal government has historically authorized five-to-six-year transportation bills that dedicate funding for surface transportation infrastructure planning and investments nationwide. In December 2015, the Fixing America's Surface Transportation (FAST) Act was signed into law. This bill authorizes \$305 billion for fiscal years 2016 through 2020. Relative to prior authorizing legislation by Congress, the FAST Act makes more federal-aid highway funding available to locally-owned transportation infrastructure and also increases overall spending for the Surface Transportation Block Grant (STBG) program. This legislation also preserves the Safe Routes to School (SR2S) program, with funding for projects that improve pedestrian and bicycle access and safety around primary and middle schools.

Local municipalities can apply for FAST Act funds, although a local match is required for these funds. Like past Federal transportation bills, programs under the FAST Act typically feature additional environmental and project performance reporting requirements relative to State and regional programs. Sample Federal programs to consider for Plan implementation include the following:

Highway Safety Improvement Program (HSIP) - Federal

Walking and cycling projects are eligible activities, as are non-construction activities, such as education and enforcement. The Caltrans Division of Local Assistance (DLA) manages California's local agency share of HSIP funds. Local HSIP projects must be identified on the basis of collision history, collision potential or other related data.

Intelligent Transportation Systems (ITS)

The USDOT Joint Program Office for Intelligent Transportation Systems (ITS JPO) focuses on research, development, and education to advance information and communication technology for improved traffic safety and mobility. Of late, this focus has increasingly emphasized autonomous vehicle technologies and opportunities for related deployment of those technologies. The ITS JPO oversaw the "Smart City Challenge", which asked mid-sized cities to pitch ideas for state-of-the-art transportation systems, especially those that could leverage sophisticated data applications. If, and when, a similar program becomes available to smaller sized cities, Lafayette may consider this opportunity for longer-term strategies.

Surface Transportation Block Grant (STBG) Program

The STBG provides block grant funds that are used for roads, bridges, transit capital, and bicycle projects. According to the U.S. Department of Transportation (USDOT), this is among the most flexible of all Federal programs. However, eligible projects are restricted to roadways functionally classified as major collectors or greater. Cities, counties, metropolitan planning organizations (MPO), and transit operators can apply for STBG funds. An 11.5 percent local match is typically required for these funds.

Transportation Alternatives (TA) Program

The TA program derives its funding from set-asides from within the STBG program, the latter of which serves as an "umbrella" funding program. This set-aside funding focuses on a variety of relatively smaller-scale transportation projects such as pedestrian and bicycle facilities,

recreational trails, SR2S projects. The TA is considered the most significant Federal funding source for bicycling and walking infrastructure projects, in terms of dollar amount. However, up to half of TA grants can be diverted to other purposes by state and local governments.

National Highway Performance Program (NHPP)

NHPP funding provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS. A 20 percent local or state match is required for these funds. States may transfer up to 50 percent of NHPP funding to the STBG program, TA, CMAQ, or other programs each year. Though Lafayette generally does not have jurisdiction over highway facilities, this program may be most useful for joint projects with Caltrans, as it pertains to traffic congestion and safety proximate to sections of State Route 24 that traverse Downtown.

Transportation Infrastructure Finance and Innovation Act (TIFIA)

The TIFIA program provides credit assistance to large-scale surface transportation projects. Most projects need to meet a minimum cost of \$10 million for projects involving local governments. This change may allow active transportation projects to more easily take advantage of these credit and innovative financing mechanisms. The relatively large funding requirement is likely to make this one of the more selective programs, and therefore may be of consideration for longer-term traffic congestion reduction strategies.

Highway Research and Development (HRD) Program

The HRD program funds strategic investment in research activities that address current and emerging highway transportation needs. As such, HRD funding can be used to improve bicycle safety through education, police enforcement, and traffic engineering. Cities, counties, and state agencies can apply for these funds. A 20 percent state or local match is required for these funds.

6.2 Statewide Funding Sources

Active Transportation Program (ATP)

California's Active Transportation Program (ATP) was created in 2013 by Senate Bill 99 and Assembly Bill 101. Its purpose is to encourage increased use of active modes of transportation, including bicycling and walking. Program funding is divided into three components. Half of ATP funding is awarded through a statewide competitive program. Ten percent of funding is awarded through the small urban and rural area competitive program. 40 percent of funding is awarded to MPOs, such as MTC, through the large urbanized area competitive program (i.e., Bay Area region). SR2S projects may also qualify under this program.

Caltrans Sustainable Transportation Planning Grant Program

The Caltrans Division of Transportation Planning offers Sustainable Transportation Planning Grants to provide funding to support transportation planning (not construction or environmental review). Therefore, Grant objectives are to strengthen the economy, promote equity, and protect the environment. Eligible projects include safe routes to school plans, streetscape plans,

complete street plans, and safety enhancement plans. Although policy-oriented, this program could provide additional funding to conduct detailed design and outreach during the implementation process. The program requires a 20 percent local match. Grants are available in amounts from \$100,000 to \$500,000.

California State Parks Recreational Trails Program (RTP)

The Recreational Trails Program (RTP) provides funds for recreational trails and trails-related projects, including Class I Bicycle Paths. The program is administered at the state level by the California Department of Parks and Recreation (DPR) and the Caltrans Active Transportation Program (ATP). While DPR does not anticipate conducting another cycle before 2018, the agency does intend to create a new application guide in 2017 to incorporate updated information based on the FAST Act. Applicant, including cities and towns, are responsible for obtaining a match amount that is at least 12 percent of the total project cost.

California Cap-and-Trade Funding

The Global Warming Solutions Act of 2006 (AB 32) authorized the California Air Resources Board (ARB) to institute programs to reduce greenhouse gas (GHG) emissions. The Cap-and-Trade Program, a key element of the ARB's plan to reduce emissions, funds several programs that support the goals of AB 32. Several of these programs relate to transportation and mode shift.

Highway Safety Improvement Program - State

The Caltrans Highway Safety Improvement Program (HSIP) funds countermeasures at locations with documented collisions and safety issues. Cost-benefit ratio is a primary factor in successful awards. Projects with documented collision history, including frequency and severity typically rank higher. Project types may include separated bikeways, median refuges and curb extensions, and upgraded traffic signals with pedestrian countdown signals and pedestrian-scale lighting.

Senate Bill 1 (SB 1)

Also known as the Road Repair and Accountability Act of 2017, this legislation authorizes \$54 billion over 10 years to repair California roads, freeways, and bridges and enhance funding for transit and traffic safety. Funding derives from a 12-cent vehicle fuel tax increase approved by Governor Brown in April 2017. Approximately \$2 billion are set aside for local streets and roads repair, congested corridor relief solutions, matching funds for local agencies, local planning grants, and bicycle and pedestrian-specific projects. Starting in FY18-19, revenues from this program will accrue to Lafayette and could reach approximately \$400,000 - 500,000 on an annual basis.

Transportation Development Act (TDA), Article 3

TDA Article 3 is perhaps the most readily available source of local funding for bicycle projects. TDA funds are derived from a statewide quarter-cent retail sales tax. This tax is returned to the county of origin and distributed to the cities and county on a population basis. Under TDA Article 3, two percent of each entity's TDA allocation is set aside for pedestrian and bicycle projects; this generates approximately \$3 million in the Bay Area annually; in recent years, this has resulted in approximately \$800,000 set aside specifically for Contra Costa County. Eligible

projects include the design and construction of walkways, bicycle paths and bicycle lanes, and safety education programs. According to MTC Resolution 875, these projects must be included in an adopted general plan or bicycle plan and must have been reviewed by the relevant city or county bicycle advisory committee.

6.3 Regional Funding Sources

Innovative Deployments to Enhance Arterials (IDEA)

A relatively new grant funding program administered by MTC, this funding source is intended to assist cities, counties and transit agencies improve the operation of major arterial roadways and to make these roadways more ready for connected and automated vehicle technologies.

One Bay Area Grants (OBAG)

OBAG uses federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals, such as those required under SB 375. Cities and counties can use these OBAG funds to invest in bicycle and pedestrian improvements and Safe Routes to School projects, among other uses. Additionally, Local Streets & Roads Preservation (LSRP) is a sub-program for which funding is distributed based on a split threshold of population and road-miles per jurisdiction. Funds acquired via LSRP could be leveraged to attract other grant funds for roadway improvements above and beyond basic pavement rehabilitation and maintenance. MTC distributes OBAG funds to county Congestion Management Agencies in each Bay Area county. For Contra Costa County, CCTA serves as the CMA. The CMAs are then responsible for selecting eligible projects within each county.

Transportation Fund for Clean Air (TFCA)

TFCA is a grant program administered by the Bay Area Air Quality Management District (BAAQMD) and funded through a surcharge on motor vehicles registered in the Bay Area. The Air District offers funding to public agencies for trip reduction, bicycle parking and bikeway, and clean air vehicle projects. A subprogram of the TFCA is the Bikeways, Roads, Lanes and Paths program, which offers funding for bicycle parking and bikeway projects. Funding is offered on a first-come, first-served basis until the funds are spent. Funding for bicycle projects is also available through the TFCA's County Program Manager Fund. Under that sub-program, 40 percent of TFCA revenues collected in each Bay Area county is returned to that county's congestion management agency (CMA) for allocation. Applications are made directly to the CMAs, but must also be approved by the BAAQMD.

Measure J

In November 2004, Contra Costa voters approved Measure J, which extended Measure C (approved 1988), the county's half-percent sales tax for transportation, until 2034. Measure J contains numerous dedicated funding programs, as put forth in its Expenditure Plan, which provides transparency as to the areas of investment with sales tax revenues. Relevant programs for traffic congestion reduction strategies include the Local Streets Maintenance & Improvements program, which are "return-to-source" funds that are repatriated by percentage formula to local jurisdictions in order to maintain local streets and roads. Pertinent competitive programs include the Pedestrian, Bicycle and Trail Facilities (PBTF) program as well as the

Transportation for Livable Communities (TLC) program, which supports mixed-use, walkable and transit-accessible development and projects that encourage walking and bicycling. Furthermore, the Measure J Strategic Plan calls out funds set aside specifically for Downtown traffic improvements in Lafayette. This project funding is provided under “Downtown Corridors Traffic Improvement”. With its current, relatively nominal fund balance, it is intended to implement relatively low-cost improvements.

Table 11 matches the Plan strategies with the funding sources summarized above. Potential funding matches are indicated with green blocks. These matches are not intended to represent guaranteed funding, but instead show programs for which strategies may be eligible based on research of program criteria.

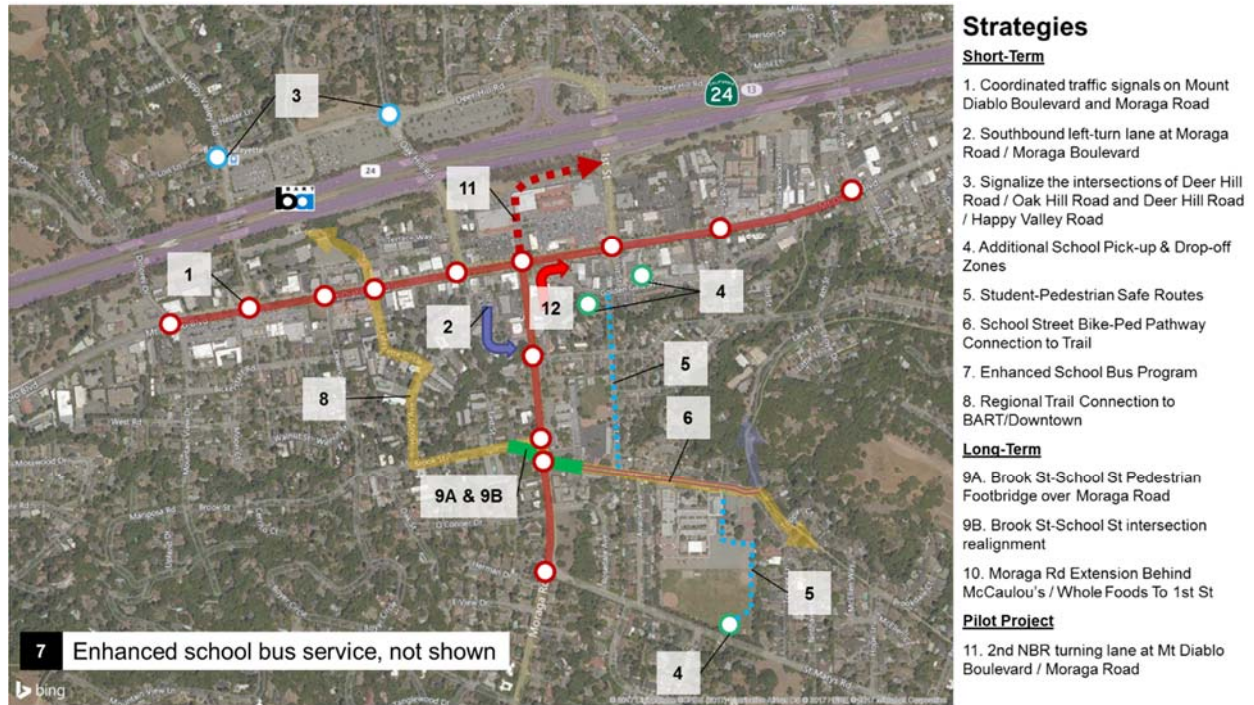
Table 11: Funding Sources and Strategies

Funding Source	Strategies											
	Coordinated Traffic Signals	Southbound Left-Turn at Moraga Rd/Moraga Blvd	Signalize Deer Hill Rd/Oak Hill Rd & Deer Hill Rd/Happy Valley Rd	Additional School Pick-Up and Drop-Off Zones	Student Pedestrian Safe Routes	School Street Bike-Ped Pathway Connection to Trail	Enhanced School Bus Service	Regional Trail Connection BART/ Downtown	Brook Street-School Street Pedestrian Footbridge over Moraga Rd	Brook Street-School Street Intersection Realignment	Moraga Rd Extension to First St/SR-24	Mount Diablo Blvd/Moraga Rd 2 nd Northbound Right-Turn
FEDERAL												
Highway Safety Improvement Program (HSIP)												
Intelligent Transportation Systems (ITS) program												
National Highway Performance Program (NHPP)												
Surface Transportation Block Grant (STBG)												
TIFIA												
STATE												
Active Transportation Program (ATP)												
California Office of Traffic Safety Pedestrian and Bicycle Safety Grants												
Caltrans Transportation Planning Grants												
Safe Routes to School (SR2S)												
Surface Transportation Improvement Project (STIP)												
Senate Bill 1												
Transportation Development Act (TDA), Article 3												
REGIONAL												
Metropolitan Transportation Commission (MTC) Innovative Deployments to Enhance Arterials (IDEA)												
MTC One Bay Area Grants (OBAG)												
BAAQMD Transportation Fund for Clean Air (TFCA)												
Measure J, Pedestrian, Bicycle and Trail Facilities (PBTF) program												
Measure J, Transportation for Livable Communities (TLC)												
Measure J, Downtown Corridors Traffic Improvements fund												

Appendix A: Strategy Concepts

This appendix provides additional detail on the proposed strategies. Figure 40 presents the recommended strategies. Each strategy is summarized on the following pages.

Figure 40: Recommended Strategies



1. Coordinated Traffic Signals on Mount Diablo Boulevard and Moraga Road

Provide a series of traffic signal system upgrades along Mount Diablo Boulevard and Moraga Road. These improvements include: 1) install new traffic signal controllers, 2) extend the traffic signal interconnect system on Mount Diablo Boulevard to include Mountain View Drive, Happy Valley Road, and Dewing Avenue, 2nd Street, and Brown Avenue, 3) incorporate the Moraga Road / St. Mary's Road intersection into the Moraga Road coordinated system, 4) install advanced traffic cameras for video data collection and detection, 5) investigate options for implementing advanced adaptive traffic control systems. Figure 41 shows an example of advanced adaptive signal hardware used for vehicle detection and coordination.

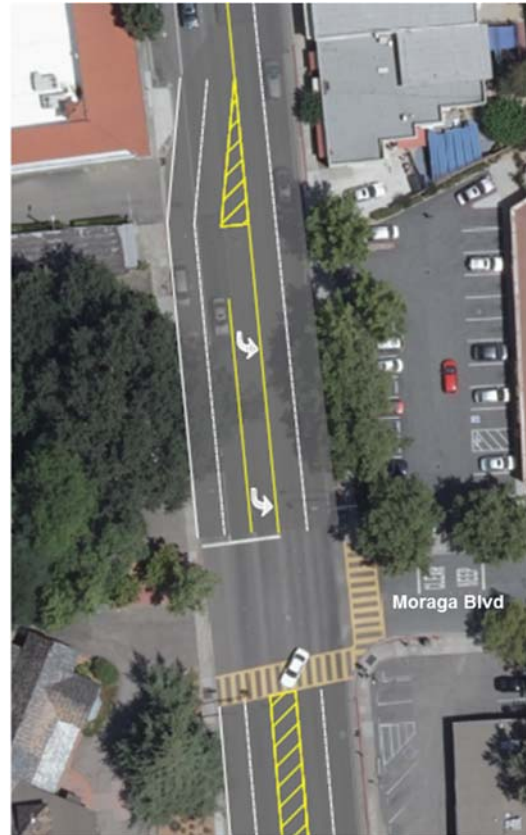
Figure 41: Adaptive Signal detection camera and radio on a traffic signal mast arm (Source:



2. Southbound Left-Turn lane at Moraga Road and Moraga Boulevard

Provide a left-turn lane at the southbound approach of the Moraga Road / Moraga Boulevard intersection, while maintaining two southbound and northbound travel lanes. The turn lane would remove 5-6 on-street parking spaces on the west side of Moraga Road. The turn lane will provide an area for vehicles to line up and not block southbound traffic as they wait to make a left-turn. This will increase capacity and improve traffic operations on Moraga Road. Figure 42 shows the proposed left-turn lane to Moraga Boulevard.

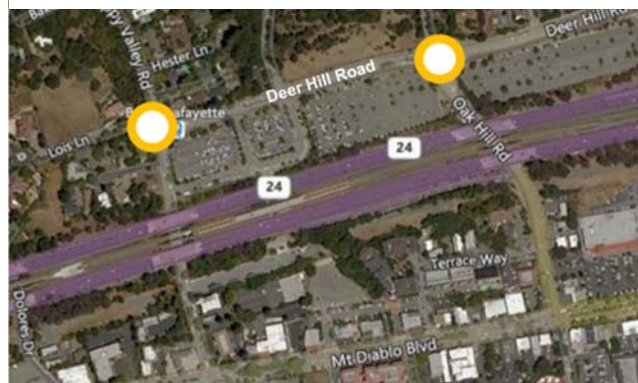
Figure 42: Southbound left-turn at Moraga Road and Moraga Boulevard



3. Signalize the Intersections of Deer Hill Road and Oak Hill Road and Deer Hill Road and Happy Valley Road

Install new traffic signals at the Deer Hill Road / Oak Hill Road and Deer Hill Road / Happy Valley Road intersection. Traffic signals at these intersections will improve traffic operations and provide an enhanced environment for pedestrians using the crosswalks. Roundabouts were also evaluated but eliminated from consideration because they would not likely provide sufficient traffic capacity. Figure 43 shows the location of the proposed traffic signals.

Figure 43: Recommended traffic signal locations on Deer Hill Road



4. Additional School Pick-up & Drop-off Zones

Introduce two new pick-up and drop-off zones at Golden Gate Way and St Mary’s Road. The new zones provide additional options for parents to drop-off children that could divert some vehicle trips from critical segments of Moraga Road. Figure 44 shows the location of the two additional loading zones.

Figure 44: Additional school pick-up & drop-off zones



5. Student-Pedestrian Safe Routes

Create a seamless pedestrian network with new paths and enhanced facilities on existing streets. This network would include the School Street Bike-Ped Connection to Trail concept, with enhanced safety measures at other key intersections. These Safe Routes provide a seamless network for children and other pedestrians to travel between the schools and the new pick-up and drop-off zones, the Regional Trail, and Moraga Road. These improvements are necessary to support the pick-up and drop-off zones and promote additional walking and cycling around the schools. Figure 45 shows the location of the Safe Routes providing access to the schools.

Figure 45: Student Pedestrian Safe Routes



6. School Street Bike-Pedestrian Pathway Connection to Trail

The School Street Bike-Ped Pathway Connection to Trail includes a redesign of the street to provide a wide path for pedestrians and cyclists on the north side of the street that connects the Downtown schools and the Lafayette-Moraga Regional Trail. The proposed design would remove some on-street parking. However, parking could be added with a redesign of School Street in front of the Middle School. This proposed design would integrate well with the Brook St-School St Intersection Realignment and the School Street One-Way Westbound strategy. Figure 46 shows the proposed design from Moraga Road to the Regional Trail.

Figure 46: School Street Bike-Ped Pathway



7. Enhanced School Bus Program

Expand the school bus program by increasing the contracted service by four buses and extending the service to Lafayette Elementary.

8. Regional Trail Connection to BART/Downtown

Improve bicycle and pedestrian facilities and signage between the Lafayette-Moraga Regional Trail and BART and Downtown. This would include the School Street Bike-Ped Connection to Trail, improvements on Brook Street, Hough Avenue, and Lafayette Circle.



9A. Brook Street-School Street Pedestrian Footbridge over Moraga Rd

Construct a pedestrian and bicycle bridge over Moraga Rd to connect Brook St and School St and remove the existing crosswalks on Moraga Rd at both Brook and School Streets. This strategy would eliminate the at-grade pedestrian crossing phases and pedestrian conflicts on Moraga Rd, which will provide traffic operations benefits along Moraga Rd and enhance safety. Figure 47 shows the proposed footbridge layout.

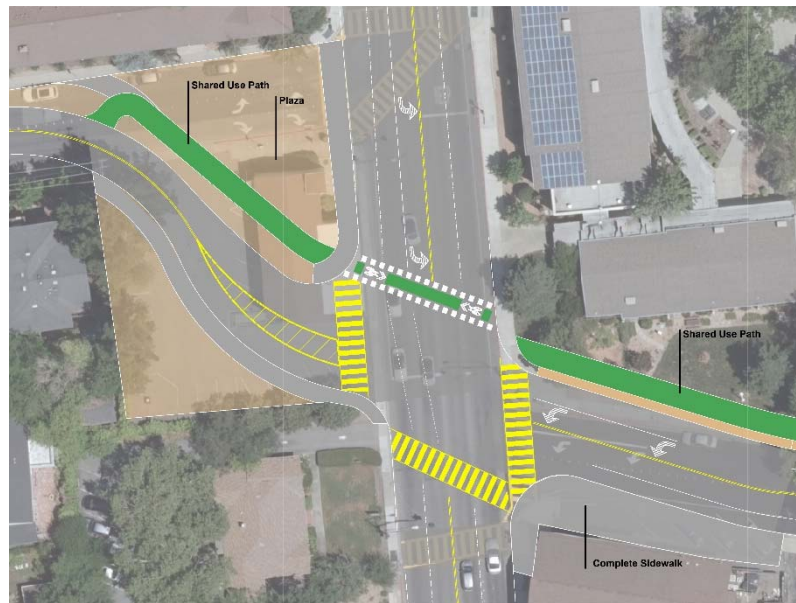
Figure 47: Brook Street-School Street Pedestrian Footbridge over Moraga Road



9B. Brook Street-School Street Intersection Realignment

Realign Brook and School Streets to create a single intersection at Moraga Road with a southbound left-turn pocket. Consolidating the two intersections at Brook and School Street to one and providing the left-turn pocket improves traffic operations on Moraga Road, Brook Street, and School Street. The Masonic Lodge property would need to be acquired and the building demolished. Also, a few on-street parking spaces on the south side of School Street would need to be removed. Figure 48 shows the proposed realignment.

Figure 48: Brook Street-School Street Realignment



10. Moraga Road Extension Behind McCaulou’s / Whole Foods To 1st Street

Extend Moraga Road north of Mount Diablo Boulevard through the shopping center, between Safeway and McCaulou’s, to connect with 1st Street opposite the State Route 24 eastbound on-ramp. This connector would operate one-way northbound only. This project would provide a direct connection for traffic heading to the freeway, which redistributes traffic from key segments of Mount Diablo Boulevard and 1st Street. This would improve traffic operations through the Downtown “Y”. This project is only required in the long-term if population and employment growth exceed certain targets and if the redevelopment of the shopping center presents an opportunity. Figure 49 shows one potential alignment for the Moraga Road extension with the redevelopment of the Whole Foods site.

Figure 49: Moraga Road Extension



11. 2nd NBR turning lane at Mt Diablo Boulevard and Moraga Road (No North-South Crosswalk at the east leg)

Provide a second northbound right-turn from the middle lane at the Moraga Road / Mount Diablo Boulevard intersection and remove the north-south crosswalk on the eastern leg of the intersection. These changes would increase capacity for the critical northbound right-turn, which would reduce queuing and improve traffic operations along Moraga Road. The crosswalk needs to be removed to avoid conflicts between turning drivers and pedestrians. Several alternatives that considered other lane configurations, signal phasing, and crossing options were evaluated but eliminated from consideration during Steering Committee review. This strategy requires approval by the City Council. Figure 50 shows the location of the proposed second northbound right-turn lane at the Mount Diablo Boulevard / Moraga Road intersection.

Figure 50: 2nd Northbound Right Turning Lane



Appendix B: Public Surveys

The scope of work for the Downtown Congestion Reduction Plan called for two public outreach periods. This Appendix describes the purpose, methodologies, and outcomes for each period. The first outreach period occurred during the first phase of study, from mid-November through December 2015. This outreach commenced after the first joint City Council and Circulation Commission meeting to review Plan progress. For this outreach period, Arup designed a “Priorities Survey”, which featured a dynamic “Collaborative Map” on which participants could mark specific locations and insert comments regarding their concerns and ideas to address Downtown traffic congestion. The second outreach period occurred from late April through May 2017. This outreach also commenced after the second joint City Council and Circulation Commission meeting. For this latter outreach, Arup designed a “Preference Survey”, in which participants could opine on the preliminary Short List of strategies recommended by the Steering Committee. Arup also hosted a public workshop at the Veterans’ Memorial Building, to gain in-person feedback on the preliminary strategy recommendations.

B.1 – Priorities Survey

To augment data based analysis and assessment, feedback was sought from local residents through a range of survey tools aimed at gathering community input on transportation issues and to identify priorities for the study. Two survey tools were developed and have been made available along with a project website (www.lafayettecongestion.com):

1. Transportation Survey of issues and priorities (857 responses)
2. Collaborative Map of specific transportation issues (420 responses)

The primary findings from these survey tools are summarized below:

- Congestion is felt to be a major problem in Lafayette with downtown, highway, and school congestion among the most pressing transportation issues.
- The availability and price of parking in Downtown and at the BART station are major concerns.
- Bicycle and pedestrian safety conditions are an impediment to access for non-driving travelers, especially school children.
- Frustrations about growth in the downtown and from Moraga infuse concerns about current and future traffic conditions.

Transportation Survey

The Transportation Survey was open for two months from November 2015 to January 2016. In total, 961 participants took the survey. Access to the survey was not restricted by email, IP address, or other mechanism, but when the survey was closed, the data was culled to ensure unique responses from duplicate IP addresses. After removing duplicate and unfinished surveys, the responses totaled 857.

The survey was generally representative of Lafayette residents and other groups interested in Lafayette transportation. The majority (82%) of respondents were Lafayette residents, followed by Moraga residents at 9 percent of respondents, Orinda residents at 1 percent, and 8 percent of respondents were from other Bay Area locations. Employment status and percentage of respondents with children in school was generally comparable to the American Community Survey (ACS) numbers for Lafayette. Commuting modal share was also comparable to ACS percentages. The share of school children who walked or biked to school was lower for this survey than the rates for Lafayette Elementary School listed in the *Safe Routes to School Report* (2013), which may suggest lower walking and biking rates for other schools in Lafayette since this survey was not restricted to Lafayette Elementary families.

While respondents indicated that they use a range of modes for commuting purposes, they rely almost exclusively on driving to get to downtown destinations for non-work trips. Most survey respondents (91%) visit Downtown Lafayette frequently (at least a few times per week) for non-work purposes. For such trips, 89 percent of respondents drive alone or with others. No respondents listed County Connection buses as a mode for downtown trips. The remaining travelers visited Downtown by walking (6%) or bicycling (3%).

While an overwhelming 98 percent of respondents rated the quality of life in Lafayette as “excellent” or “good” (Figure 51), over half of residents rated congestion as “severe” or worse (Figure 52).



Figure 51: Transportation Survey from lafayettecongestion.com, active November 2015 - January 2016.

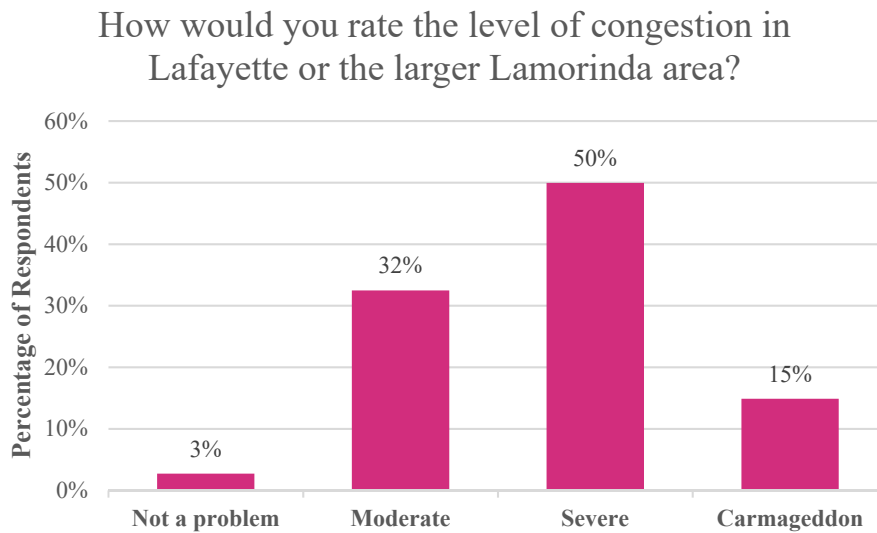


Figure 52: Transportation Survey from lafayettecongestion.com, active November 2015 - January 2016.

For the final multiple choice questions, respondents were asked to choose their highest and lowest three priorities from a list of fourteen options. Respondents did not have the ability to rank among their priorities. Reducing downtown congestion was the clear top priority. Downtown parking, highway ramp access, and school congestion were fairly even second priorities. See Figure 53 below for a full list.

What are your HIGHEST three priorities for improving transportation in the downtown?

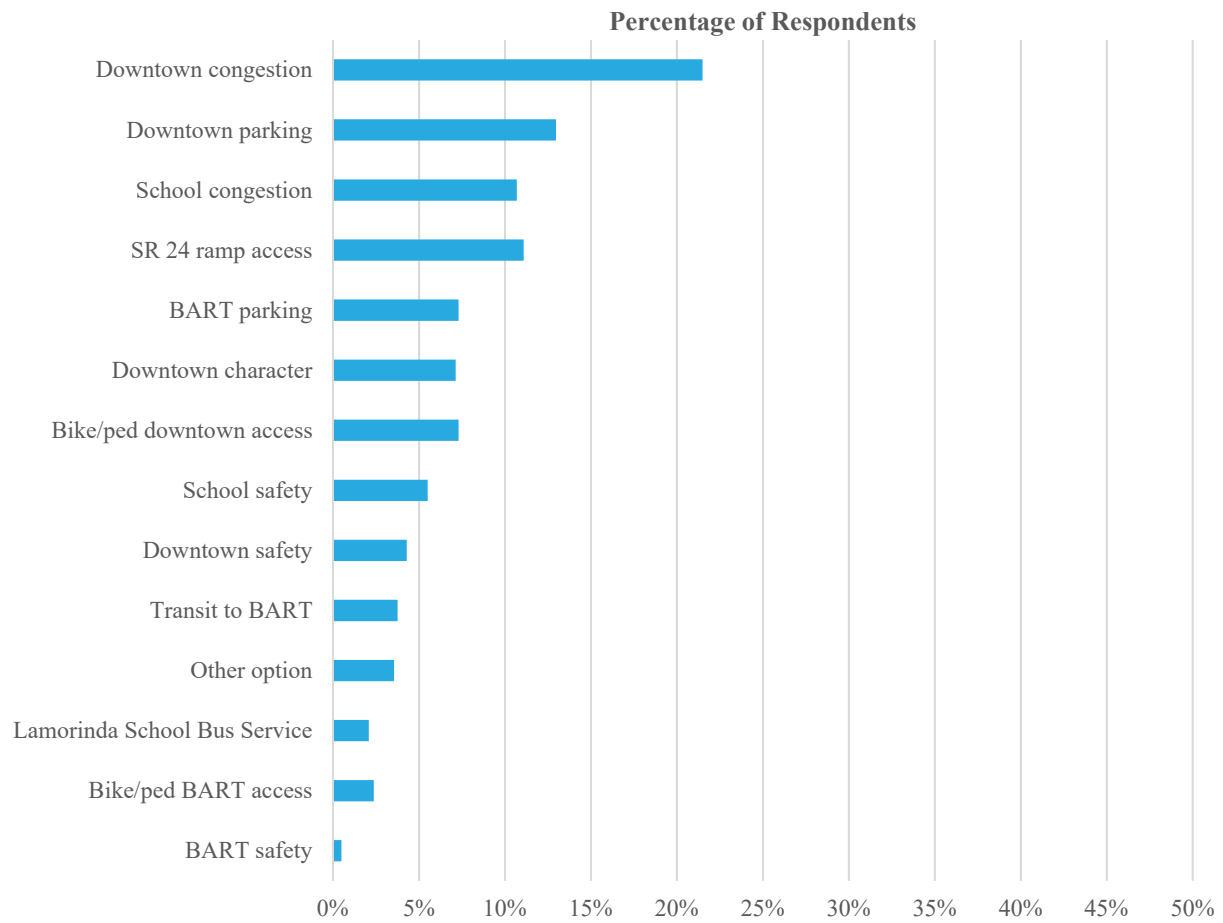


Figure 53: Transportation Survey from lafayettecongestion.com, active November 2015 - January 2016.

While most issues selected as low priorities were not selected as high priorities, school safety was twice as likely to be selected as a high priority than as a low priority (Figure 54).

What are your LOWEST three priorities for improving transportation in the downtown?

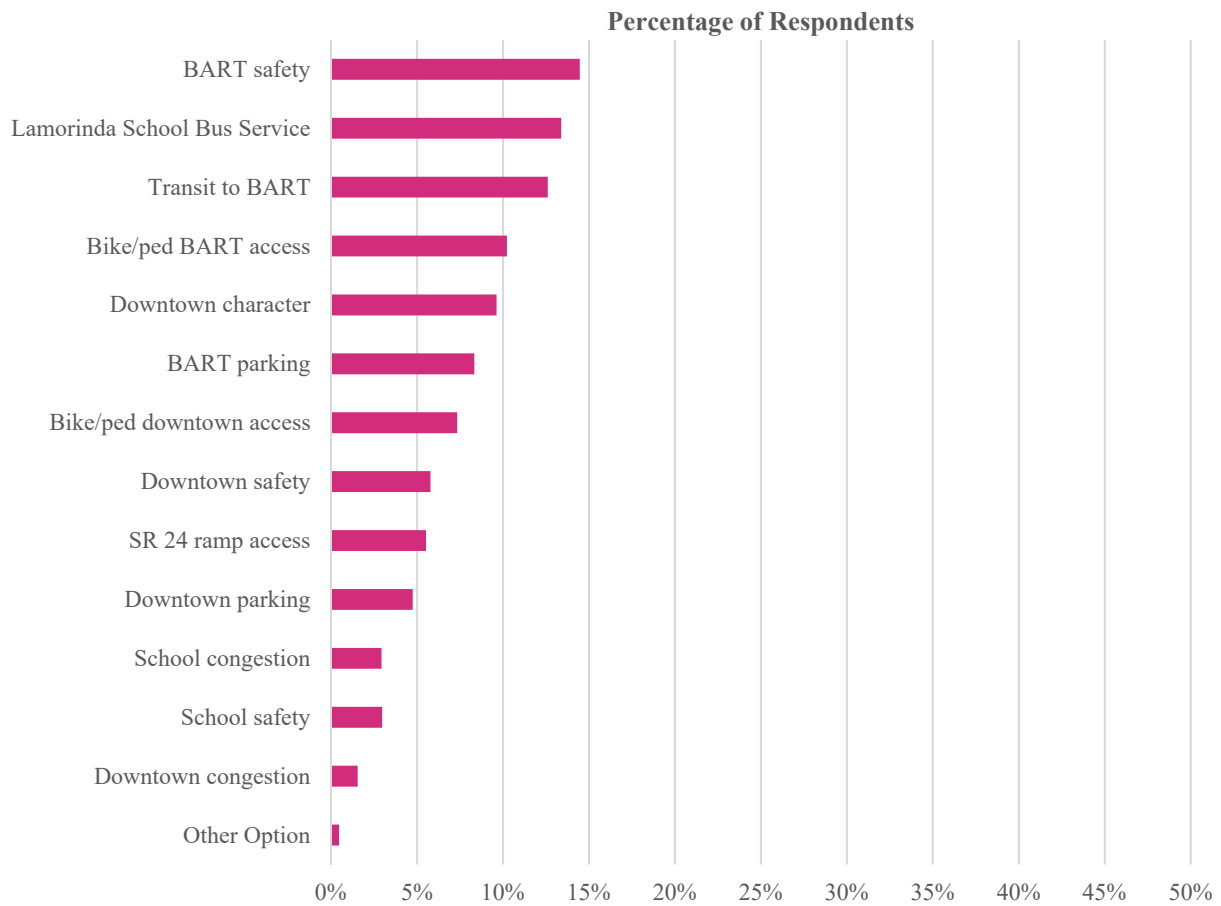


Figure 54: Transportation Survey from lafayettecongestion.com, active November 2015 - January 2016.

Of the 857 survey participants, 45 percent responded to the open-ended question. The responses were coded the responses into eight general categories: parking, growth, biking, safety, walking, transit, school options, and intersections (Figure 55).

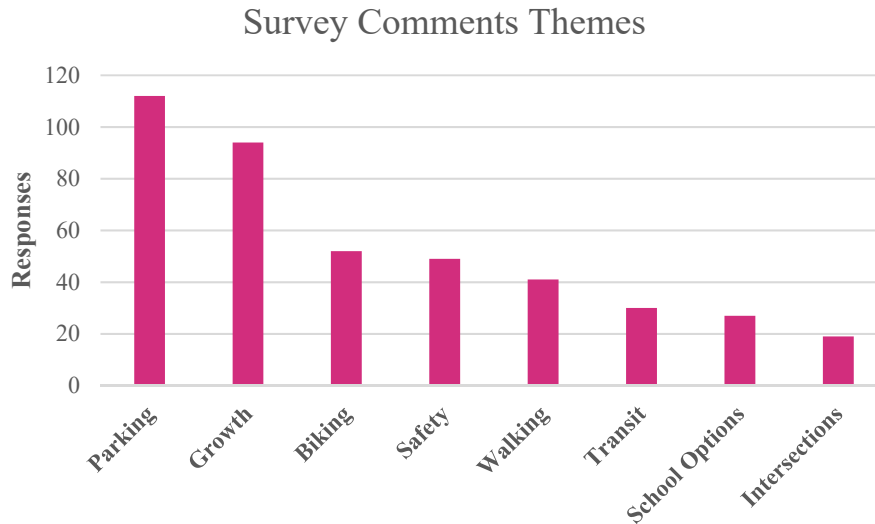


Figure 55: Transportation Survey from lafayettecongestion.com, active November 2015 - January 2016.

Under these themes, these discussions were most common:

1. Parking was the most commonly discussed item. Respondents had negative opinions regarding downtown parking meters and discussed availability problems in specific parking lots. Calls for parking garages were common.
2. Growth was discussed almost as much as parking. Commenters expressed fear that growth will transform Lafayette in part by exacerbating existing traffic issues.
3. Respondents expressed a desire to bicycle, but safety was a prominent concern. There were calls for more bike parking and more direct connections between BART and the Lafayette/Moraga Regional Trail.
4. Safety was a concern in general, especially regarding speeding drivers. Respondents highlighted the area around the schools for needing more safety measures.
5. Respondents expressed an interest in walking, but in safer conditions.
6. The idea of a downtown circulator was frequently mentioned, as was improving County Connection headways.
7. Parents mentioned safer walking and biking routes for their children, and respondents generally mentioned improving bus service.
8. Some respondents commented on intersections, either general operations (such as signal timing) or the design of specific intersections (such as lane striping).

Collaborative Map Survey

As of January 11, 2016, 131 people provided 420 comments to the Collaborative Maps survey.⁸ Most people contributed a few comments, but sixteen people contributed more than five comments each, with one person providing 41 comments and three people providing 25 to 29 comments each. There was no maximum contribution per unique email address set. See Figure 56 below.

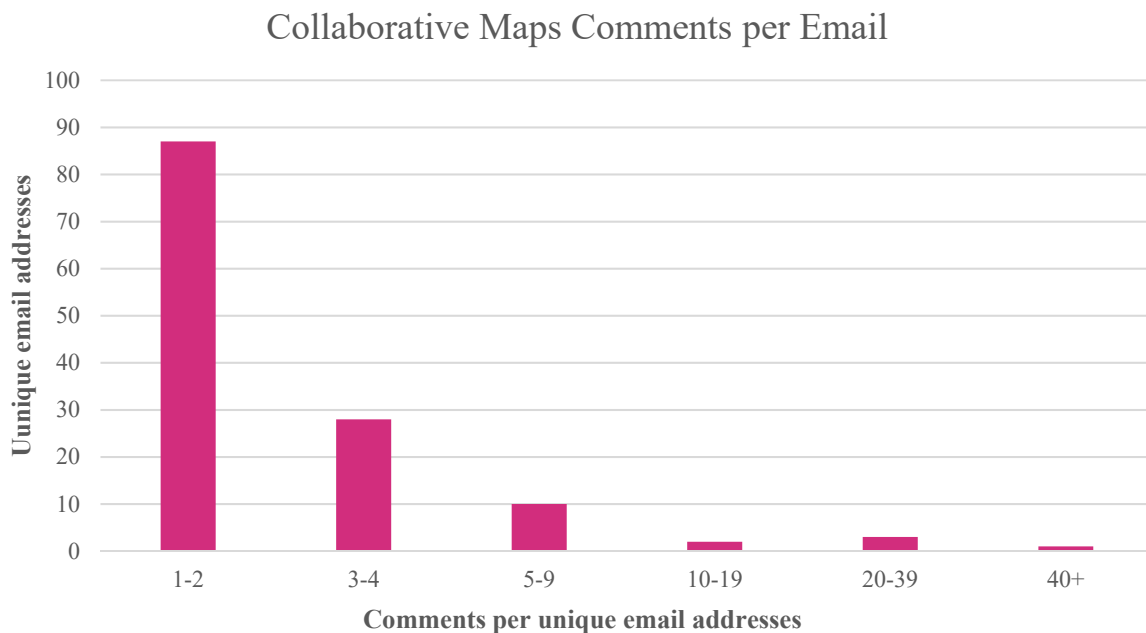


Figure 56: Collaborative Maps Survey from lafayettecongestion.com, active November 2015 - January 2016.

About half of the comments focused on general traffic conditions with pedestrian and bicycling comments falling into second and third, respectively (Figure 57). Comments spanned the spectrum of ideas and observations from the specific (“Need a pedestrian overcrossing here.”) to the general (“Put up signage to remind drivers that texting while operating a vehicle is illegal and causes traffic.”). Traffic comments focused on Mount Diablo Boulevard and especially Moraga Road. Given that Mount Diablo Boulevard has a higher average daily traffic volume than Moraga Road, the greater density of comments along Moraga Road shows the intensity of the conflicts along that roadway. Emphasizing the importance of Moraga Road, bicycling comments also converged on the stretch of Moraga Road from School Street to Mount Diablo Boulevard. Pedestrian comments, however, spanned the Downtown, showing the need for better walking conditions throughout the study area.

The Collaborative Map comments will be utilized in Phase 2 of the study as the “long list” of projects is screened down to a “short list”. The comments will help in this screening process.

⁸ A unique person is actually a unique email address. While one person could use different email addresses to submit repeating comments, the incentive for doing this was low, since we did not limit the number of comments per email address.

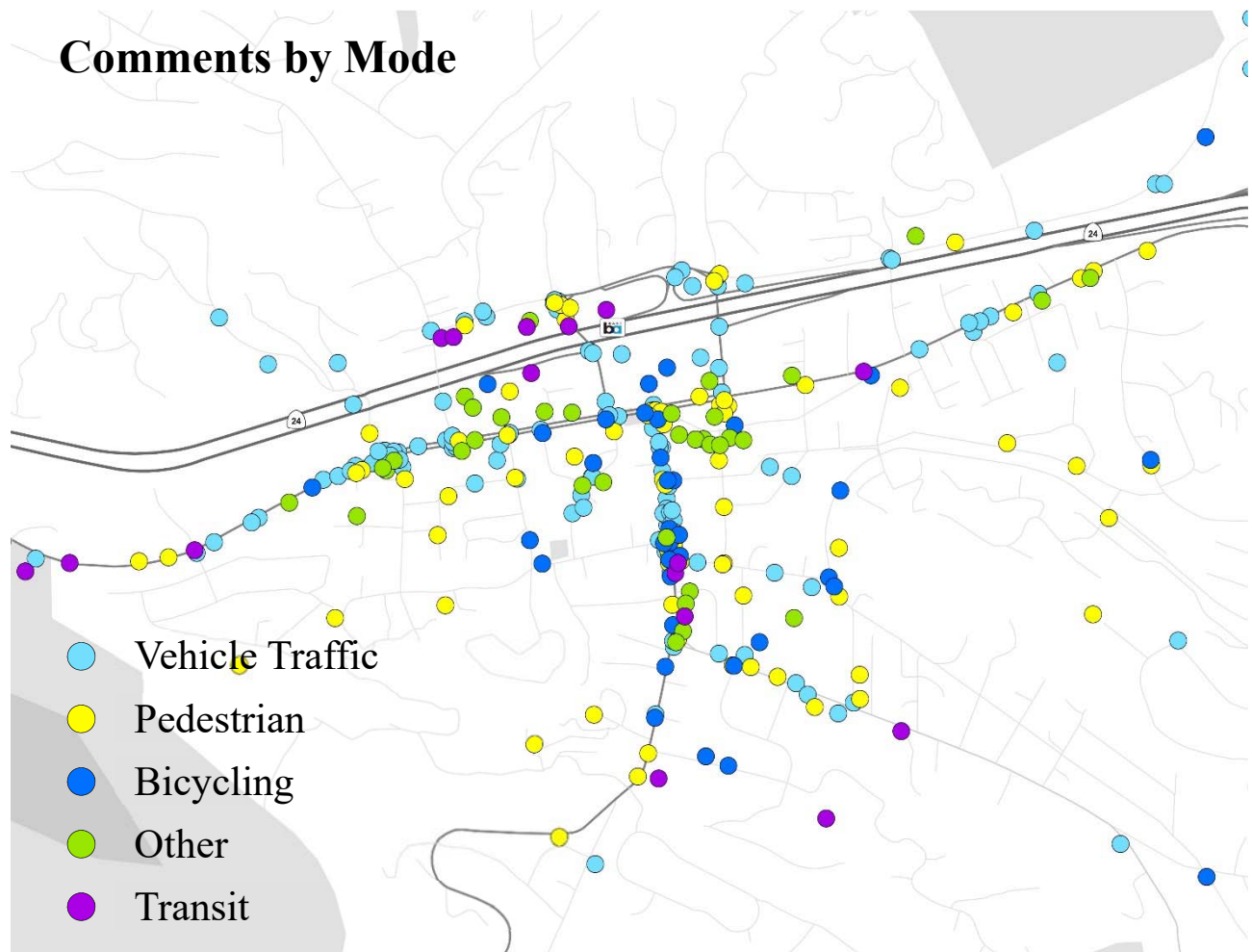


Figure 57: Collaborative Maps Survey from lafayettecongestion.com, active November 2015 - January 2016.

In addition to creating their own comments, participants could engage with other commenters through “agree” and “disagree” buttons. Of the 420 comments submitted to the Collaborative Map, 306 or 73% received “agree” or “disagree” votes. With many of these comments receiving multiple or even dozens of votes, the total vote tally came to 1,421. While most comments had only a small handful of votes, some comments received a large number. The density of votes per comment is shown in Figure 58.

More information on the surveys can be found in the Appendix of this report.

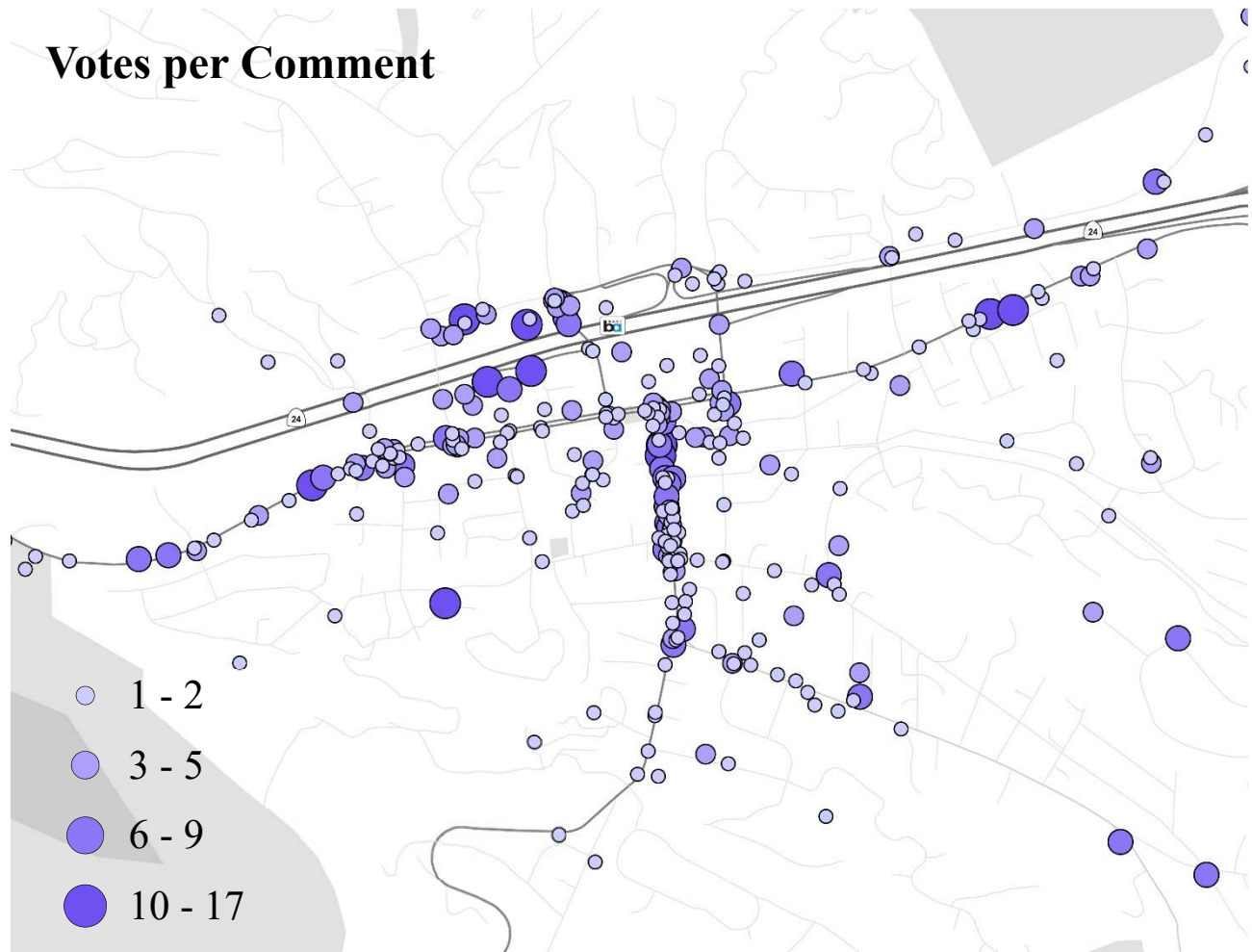


Figure 58: Collaborative Maps Survey from lafayettecongestion.com, active November 2015 - January 2016.

B.2 – Preferences Survey

The second round of outreach included an online preference survey that was launched at the City Council meeting on April 24, 2017 and a public workshop held at the Lafayette Veterans Memorial Center on May 23, 2017.

This second outreach effort was intended to gauge public opinion on the refined Short List of strategies generated by the Steering Committee and analyzed by Arup. The outreach was launched at the joint City Council / Circulation Commission meeting on April 24th with the online Preference Survey (<https://lafayettecongestion.com/2017/02/08/transportation-survey-2/>). The public workshop, which was held on May 23rd, included a presentation by Arup and City staff and a workshop that allowed residents to provide strategy input in person.

Arup closed the preference survey on June 1, 2017. The survey was completed by 619 participants. The survey consisted of two questions plus a third question that asked for additional qualitative comments regarding the strategies. Survey results are shown below⁹.

Table 12 below summarizes the two survey questions:

- Q1: Select up to five (5) strategies that you feel will reduce congestion. The 619 participants submitted 2,718 responses.
- Q2: Given the pros and cons described for each strategy, select up to five (5) projects that you would support the City investing in. The 619 participants submitted 2,597 responses.

The percentages in Table 12 represent the number of respondents that included the strategy as one of their “top five” responses to the question.

⁹ The results reported from the survey tool calculate the response percentages in a different way than reported in this memo. The percentages in the survey output are calculated by dividing the number of votes for each strategy by the total votes submitted by all participants, not by the number of participants that included the strategy in their “top 5”. Over 3,000 total “votes” were submitted for all strategies by the 619 respondents. The survey tool generates lower percentages because it divides the number of votes for each strategy by the 3,000 total votes, as opposed to the number participants.

Table 12: Survey Results**Question 1**

Select up to five (5) strategies that you feel will reduce congestion.	Count	%
1. Coordinated Traffic Signals	464	75%
3. Mount Diablo Blvd/Moraga Rd 2nd Northbound Right-Turn	304	49%
4. Moraga Rd/Moraga Blvd Southbound Left-Turn Lane	226	37%
14. Enhanced School Bus Program	220	36%
8. Additional School Pick-up & Drop-off Zones	216	35%
12. BART Pedestrian Bridge over Oak Hill Rd	170	27%
5. Brook St-School St Intersection Realignment	162	26%
7. Moraga Rd Extension to SR 24 and 1st St Behind McCaulou's/Whole Foods	159	26%
15. Staggered School Times	148	24%
6. Signalize Deer Hill Rd/Oak Hill Rd and Deer Hill Rd/Happy Valley Rd	144	23%
13. Student Pedestrian Safe Routes	136	22%
11. Regional Trail Connection to BART/Downtown	119	19%
9. School Street Bike-Ped Pathway Connection to Trail	109	18%
2. School St One-Way Westbound (1st St to Moraga Rd)	79	13%
10. Mount Diablo Blvd Bike-Ped Pathway Expansion	62	10%

Question 2

Given the pros and cons described for each strategy, select up to 5 projects that you would support the City investing in.	Count	%
1. Coordinated Traffic Signals	451	73%
3. Mount Diablo Blvd/Moraga Rd 2nd Northbound Right-Turn	274	44%
14. Enhanced School Bus Program	223	36%
4. Moraga Rd/Moraga Blvd Southbound Left-Turn Lane	209	34%
8. Additional School Pick-up & Drop-off Zones	207	33%
12. BART Pedestrian Bridge over Oak Hill Rd	156	25%
5. Brook St-School St Intersection Realignment	148	24%
13. Student Pedestrian Safe Routes	143	23%
6. Signalize Deer Hill Rd/Oak Hill Rd and Deer Hill Rd/Happy Valley Rd	141	23%
15. Staggered School Times	138	22%
7. Moraga Rd Extension to SR 24 and 1st St Behind McCaulou's/Whole Foods	128	21%
11. Regional Trail Connection to BART/Downtown	121	20%
9. School Street Bike-Ped Pathway Connection to Trail	119	19%
10. Mount Diablo Blvd Bike-Ped Pathway Expansion	72	12%
2. School St One-Way Westbound (1st St to Moraga Rd)	67	11%

Some key observations include:

- Coordinated traffic signals scored the highest on both questions, with over 70% expressing support. However, the strong response could reflect a lack of understanding of the project definition and the relatively limited congestion benefits identified by our analysis.
- The 2nd Northbound Right-Turn lane at Mount Diablo Blvd / Moraga Rd scored second in both questions, with 44-49% support.
- The School St One-Way Westbound (First St to Moraga Rd) and the Mount Diablo Blvd Bike-Ped Pathway Expansion scored the lowest on both questions, with support in the 10-13% range.
- The school-related strategies, including the Enhanced School Bus Program and the Additional Pick-Up & Drop-Off Zones, received support from over a third (33-37%) of respondents.
- The remainder of the strategies showed support ranging from 20 to 25%.

- The high number of strategies (15) presented in this survey resulted in votes being spread across many selections. This results in only one strategy, Coordinated Traffic Signals, earning greater than a 50% share of the votes. This could indicate that there is a lack of consensus on which strategies to implement.

City staff analyzed the text comments (Q3) from 314 responses to identify if the comments generally supported or were concerned/opposed to each strategy. Figure 59 presents this analysis. and the full text responses are attached to this memo. The strategies are ranked by the number of total comments received. Three additional strategies have showed up in the comments, including reducing/stopping Downtown development, constructing a pedestrian bridge over Moraga Road, and providing Downtown/BART shuttles. The qualitative responses show a wide range of opinions, similar to what we heard at the public workshop.

Figure 59: Inventory of Qualitative Comments from Online Preference Survey

Rank	Strategy #	Proposed Strategy	Key Phrases	Frequency			Ratio	
				Total	Supportive	Concerned/ Opposed		
1	10	MDB Pathway Expansion	Pathway/Expansion/Remove/Eliminate/10	40	0	40	0%	100%
2		(Reduce/stop Downtown land development)	Development/Additional/Building/Housing	36	0	36	0%	100%
3	2	School St One-Way WB	School/One way/Westbound/2	29	2	27	7%	93%
4	5	Brook St-School St Realignment	Brook/School/Alignment/5	20	11	9	55%	45%
5	*6	Deer Hill Signals	Signal/Deer Hill/Oak Hill/Light/6	19	5	14	26%	74%
6		(Pedestrian bridge over Moraga Rd)	Pedestrian/Bridge/Raised/Moraga Rd	15	15	0	100%	0%
7	14	Enhanced School Bus Program	Bus/School/Program/14	15	14	1	93%	7%
8	7	Moraga Rd Extension to SR 24 Behind Safeway/McCaulou's	Extension/Northbound/Moraga Rd/7	15	5	10	33%	67%
9	15	Staggered School Times	Staggered/School/Time/Bell/Schedule/15	14	4	10	29%	71%
10	*8	Additional School Pick-up & Drop-off Zones	School/Additional/Pick/Drop/Loading/Zone/8	10	8	2	80%	20%
11	1	Coordinated Traffic Signals	Signal/Coordinated/Timed/Light/1	9	6	3	67%	33%
12	12	BART Pedestrian Bridge over Oak Hill Rd	BART/Bridge/Oak Hill/Ped/12	9	2	7	22%	78%
13		(Downtown/BART bus and/or shuttles)	Bus/Shuttle/Commute/BART	8	8	0	100%	0%
14	4	Moraga Rd/Moraga Blvd Southbound Left-Turn Lane	Moraga Blvd/Southbound/Left/Turn lane/4	8	3	5	38%	63%
15	3	2nd Northbound Rt Turn Lane @ Moraga Rd/MDB	Northbound/Double/Right/Turn lane/3	7	7	0	100%	0%
16	9	School St Bike-Ped Pathway Connection to Trail	School/School St/Trail/Path/9	6	3	3	50%	50%
17	11	Regional Trail Connection to BART/Downtown	Regional/Trail/Connection/BART/Downtown/11	5	3	2	60%	40%
18	13	Student Pedestrian Safe Routes	Student/Ped/Safe/Route/Path/13	4	3	1	75%	25%
Notes								
This is a mention/idea that is <u>not</u> a proposed "Short List" strategy in Downtown Congestion Reduction Plan								
*Commentors submitted "split votes"; they express support for one of two options available within the given strategy, and concern/opposition for the comparable option. When both options were mentioned by a single commentor, 1 vote for each mention is recorded.								

The qualitative comments generally follow the results of the first two survey questions. There is strong and nearly unanimous opposition for two strategies: the MDB Pathway Expansion and School St One-Way Westbound. However, there are only a few strategies that received a high number of supportive votes. The pedestrian bridge over Moraga Road (not in our strategy package) and the Enhanced School Bus Program received the most supportive votes (15 and 14 votes, respectively), but these totals were half of the opposition votes for the MDB Pathway Expansion (40 votes) and School Street One-Way (36 votes) strategies. The Brook Street-School Street Realignment strategy had almost equal votes in support and opposition (11 support votes to 9 opposed).

The key findings from the qualitative responses include:

- There is a broad range of opinions regarding the strategies.

- Two strategies, the MDB Pathway Expansion and the School Street One-Way Westbound, received significant opposition.
- A detailed analysis was performed to determine whether certain strategy combinations were considered popular. The analysis did not reveal any clear patterns. The most popular combination, which included the Coordinated Traffic Signals, the 2nd Northbound Right-Turn, and the Southbound Left-Turn at Moraga Boulevard, was selected by 18% of the respondents. However, the other combinations of strategies were selected by only a very small number of respondents.

Appendix C: Multi-Criteria Analysis Methodology

Multi-criteria analysis (MCA) provide a method for comparing and contrasting a diverse set of strategies. MCA can take into account a broad range of measures, both quantitative and qualitative, that reflect many different aspects of a strategy as well as the values and priorities of the local community. During the earlier study phase of this Plan, each of the projects was assessed using the following measures:

Congestion Reduction (LOS/Travel Time)

The congestion reduction potential of each strategy was assessed for both the AM and the PM peak periods. Intersection traffic level-of-service (LOS), travel time, and queuing were measured using microsimulation models developed for the AM and the PM using Synchro/SimTraffic and VISSIM respectively. Each strategy was evaluated independently and with other complementary projects. The detailed traffic results are provided in the August 31, 2016 technical memorandum provided on the project website. *Per direction from the Steering Committee: this is the most critical metric for gauging strategy effectiveness and is therefore weighted more heavily than other criteria.*

Auto/Truck Safety

The safety for road users, which includes automobiles and trucks, was assessed qualitatively using engineering judgment and best practices research.

Bike/Pedestrian Safety and Connectivity

The safety of bicyclists and pedestrians is critical as these users are the most vulnerable. Providing convenient and safe routes for both cyclists and pedestrians is essential to encourage the shift away from auto travel. These measures were evaluated qualitatively based on existing engineering judgment and best practices research.

Parking Impact

Many of the strategies involve the removal of on-street parking spaces. The removal of parking is often the only way to reallocate road space to bike lanes and sidewalks without physically widening the road. This measure indicates the number of parking spaces removed.

Environmental/Utility Impacts

This measure considers each strategy's effect on the environment and utilities. Environmental concerns would include elements such as air quality, noise, stormwater, biological resources, etc. The utilities include water provided by the East Bay Municipal Utilities District (EBMUD), electricity provided by Pacific Gas & Electric (PG&E), as well as local stormwater and sewer systems.

Ease of Implementation

The ease of implementation considers the potential regulatory, political, design and engineering challenges associated with each strategy. This measure also captures if the strategy would have property impacts or require additional right-of-way. A qualitative assessment was performed using our understanding of engineering design in similar areas, California State law and environmental regulations under the California Environmental Quality Act (CEQA), and existing regulatory rules.

Cost

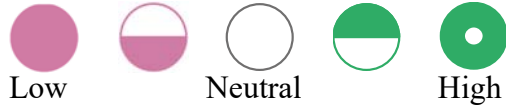
High-level conceptual cost estimates were developed for each strategy based on our understanding of each strategy, the local context, the initial conceptual designs, and engineering unit cost estimates.

Urban Design

Preserving Lafayette's existing character, ensuring that it remains walkable, bike-friendly, and appealing, and promoting attractive urban design are all important considerations. Therefore, any strategies that could make the area feel less welcoming, unfriendly to pedestrians or bicyclists, or detract from Lafayette's historic character were considered to have a negative impact, while any strategies that enhanced the livability of the area were seen to have a positive impact. ***Per direction from the Steering Committee, the Urban Design factor was to be for discussion purposes only and is therefore not to be considered in the composite scoring.***

Multi-Criteria Analysis






For each measure, the assessment utilizes a five-point “Consumer Reports” style rating with a numerical equivalent from “Low” (score of 1) to “High” (score of 5) performing, with neutral in the middle (score of 3). These are presented below:



The detailed analysis table with the scoring is attached as an appendix.

















The Steering Committee provided direction on how to aggregate and weight the ratings into a composite score. To reflect the importance of congestion reduction, this measure is assigned a weighting of three (3). Four other qualitative measures (Auto/Truck safety, Bike/Ped Safety and Connectivity, Parking Impact and Environmental/Utility Impacts) each receive a score that is unweighted; these particular criterion scores are absolute. To accurately reflect relative score weighting, the Congestion Reduction score is multiplied by three. The four other criteria scores are simply added to the tripled Congestion Reduction score, to reach a total Composite Score for each strategy. Separately, the Urban Design criterion is used for qualitative discussion purposes only. Ease of Implementation and Cost criterion are also not included in the composite scoring and are reported separately.

The final summary table includes the weighted score for congestion reduction, the composite score for the qualitative ratings and the overall composite score that adds the congestion and the qualitative scores. The table below summarizes the metrics used to develop the scoring and the detailed table attached to this memorandum.

Metric	Description	Score Range (LOW to HIGH)				
						
		1	2	3	4	5
Congestion Reduction	To what degree would the strategy reduce congestion within the study area?	Worsens congestion	No improvement in congestion	Improves congestion		
Auto/Truck Safety	To what degree does the strategy provide safe and comfortable facilities for autos and trucks?	Degrades safety	No improvement in safety	Improves safety		
Bike/Pedestrian Safety and Connectivity	To what degree does the strategy provide safe and comfortable facilities and enhanced connectivity for cyclists and pedestrians?	Lacks adequate safety provisions and does not improve the user experience	Does not improve on the current bike/pedestrian safety and connectivity	Provides substantial safety features and creates an excellent user experience		
Parking	To what degree does the strategy increase or decrease parking supply?	Decrease in parking	No change in parking	Increase in parking		
Environmental / Utility Impact	Will the strategy have environmental (air quality, noise, stormwater) or utility (water, sewer, electricity) impacts?	A high potential for utility impacts and/or negative environmental impacts	No environmental or utility impacts	Minimal potential for utility impacts and/or positive environmental impacts		
Urban Design	To what degree will the strategy impact the character, livability, and urban design of Downtown?	Degrades urban design	No improvement in urban design	Enhances urban design		
Ease of Implementation	What challenges (regulatory, political, engineering, etc.) will impact the implementation of each strategy?	Significant implementation challenges	Modest implementation challenges	Few implementation challenges		
Estimated Cost	Includes capital costs, construction costs, and soft costs for each strategy.	\$ 2016 Dollars				









The composite score was used to rank the projects using the methodology described above. The final scoring matrix and the detailed table is attached as an appendix.







Capacity Enhancing Strategies Summary

Strategy	Composite Score	Ease of Implementation	Cost
New Traffic Signals on Deer Hill Rd	29	 Signals require engineering design and intersection reconfiguration	 \$500-750k
Brook St-School St Intersection Realignment	27	 Requires property acquisition & significant engineering	 \$4-5M
MDB/Moraga Rd 2nd NBR	26	 Can implement with striping and minor signal changes	 \$100-200k
Moraga Rd Extension Behind McCaulou's/Whole Foods to First St	26	 Requires property acquisition & likely full site redevelopment, plus significant engineering	 \$20-30M
School Street One-Way Westbound	26	 Can implement with striping and minor signal changes; also needs neighborhood support	 \$100-200k
BART Pedestrian Bridge Over Oak Hill Road ¹	26	 Requires significant engineering & coordination with BART/Caltrans	 \$6-8M
Moraga Rd/Moraga Blvd SBL lane	24	 Can implement with striping and minor signal changes	 \$75-100k
Coordinated Traffic Signals	24	 Can implement with minor signal software upgrades & minor engineering	 \$1-1.5M

Strategy	Composite Score	Ease of Implementation	Cost
Brook Street-School Street Pedestrian Footbridge over Moraga Rd ²	n/a	Requires some level of property transaction costs & significant engineering	\$2-3M
<p>Notes:</p> <p>¹ This strategy was subject to MCA analysis during the study phase of this Plan, however it was eliminated from further consideration upon review at City Council.</p> <p>² MCA analysis task completed prior to introduction and approval of footbridge strategy at City Council.</p>			

Vehicle Trip Reduction Strategies

Strategy	Composite Score	Ease of Implementation	Cost
Regional Trail Connection to BART/Downtown	27	 Relatively straightforward design; easy to implement with signs, striping	 \$50-100k
Additional School Loading Zones	26	 St Mary's Rd loading zone encroaches onto fields; both zones would require new lighting, shelters, etc.	 \$200-400k
Student Pedestrian Safe Routes Priority Streets	26	 Can implement with minor engineering	 \$50-100k
Enhance School Bus Program	25	 Current funding constraints & mode (behavior) shift may be challenging	 \$320,000 (annually)

Strategy	Composite Score	Ease of Implementation	Cost
Staggered School Times	25	 <p>Requires coordination with school district & likely significant change to current district operations</p>	 <p>(unknown)</p>
Mt Diablo Boulevard Bike-Ped Pathway Expansion	22	 <p>Can implement with striping</p>	 <p>\$1-2M</p>
School Street Bike-Ped Connection to Trail	21	 <p>Modest engineering required to implement</p>	 <p>\$500k-1.5M</p>