State Route 29

Comprehensive Multimodal Corridor Plan

Appendices

May 2020

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Appendix A: Solano-Napa Activity Based Model Sub-Area Validation Report

Memorandum

October 4, 2019

To:	NVTA, Rebecca Schenck	Project:	SR 29 CMCP
From:	Kenneth Isenhower III, EIT Jim Damkowitch	Ref/Job No.:	11187559
CC:		File No.:	C2641MEM002.DOCX

Subject: VISSIM Validation Memorandum

1. Introduction

The purpose of the State Route (SR) 29 Comprehensive Management Corridor Plan (CMCP) Technical Memorandum is to present the results of the VISSIM simulation baseline calibration analysis. Once the baseline calibration has been approved by reviewing agencies, the VISSIM model will be applied to refine and evaluate the performance of various operational improvements within the study corridor. This will serve to provide requisite technical traffic support information for an SB-1 Solutions for Congested Corridors Cycle 2 grant application and a Project Initiation Document (PID).

2. Project Description

The project limits of the SR 29 CMCP study are from post mile 5.5 in Solano County to 9.100 in Napa County. The extents are approximately 0.35 miles south of Mini Drive and 9.5 miles north of Imola Avenue. The proposed project is to identify improvements to the SR 29 corridor over the next 20 years.

3. Baseline Data Collection for Simulation

Speed data used for VISSIM validation purposes was a combination of INRIX data (for passenger vehicles and trucks combined) and National Performance Monitoring Research Data Set (NPMRDS) data (for just trucks). Data was available within the SR 29 study corridor for SR 29 from Mini Drive to Imola Avenue, which includes a portion of both SR 12 and SR 121. Data collection also includes the SR 221 from the SR 29 junction to Imola Avenue. The Imola Avenue (SR 121) portion of the study extends from Foster Road to 4th Avenue. The following north-south collector roads were also analyzed including: Newell Drive/Flosden Road, Kelly Road, and Napa Valley Corporate Drive. A summary of the roadways analyzed is shown in Table 1 below. Together, they comprise approximately 40 miles.

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Table 1 – Roadways for Analysis

Roadway	Note
SR 29	Mini Dr to Imola Ave
SR 221	
SR 121/Imola Ave	Foster Rd to 4th Ave
Newell Dr/Flosden Rd	
Kelly Rd	
Napa Valley Corporate Dr	

Data was collected in 5-minute increments. The amount of data collected from INRIX was 1 year, while 2.5 years was collected for trucks from NPMRDS. The date range for trucks was increased in order to have a sufficient amount of data points to perform calculations related to the analysis.

Table 2 – Data Sources

Vehicle Type	Source	Date Range	Week Days	Weekend Days
Cars & Trucks	INRIX Analytics	7/1/2018 to 6/30/2019	T,W,R	Sat, Sun
Trucks	NPMRDS Analytics	1/1/2017 to 7/31/2019	T,W,R	Sat, Sun

For both vehicle types, the analysis focused on a specific range of hours. Peak hours were chosen for the weekdays to align with commuter traffic (7-8 AM, 4:30-5:30 PM) and for the weekend, the peak hour chosen was 2-3 PM. In order to calculate Free-Flow Speed, a 3-hour time range (12-3 AM) was chosen for both weekdays and the weekend days.

Table 3 – Hours for Analysis

Category	Time Range
Weekday, AM peak	7-8AM
Weekday, PM peak	4:30-5:30PM
Weekday, FFS time range	12-3AM
Weekend, peak	2-3PM
Weekend, FFS time range	12-3AM

Only data specific to SR 29 was used for validation purposes. SR 29 speed data was compiled and processed to validate the existing conditions. Existing AM and PM peak hour data was evaluated using the micro-simulation software VISSIM. For calibration purposes, roadway operations were evaluated for the peak hour between 6 am and 8 am as well as 4 pm to 6 pm. These time periods typically include the busiest weekday commute hours.

Other data used for VISSIM validation included turning movement counts, posted speed limits, and current signal timings. Data was collected from previous studies within the area. These studies include the Napa Pipe EIR (2009), Watson Ranch EIR (2018), SR 29/SR 221/Soscol Ferry Road Roundabout Intersection Improvement Study (2018), and Imola Corridor Complete Streets Plan (2019).

4. Micro-simulation

VISSIM micro-simulation software (developed by PTV, Inc.) will be used to simulate the corridor operations under both baseline and future year conditions. Before the SR 29 Corridor VISSIM micro-simulation model can be used to determine operational performance of proposed corridor improvements it must be calibrated to emulate current conditions. Calibration was performed by modifying inputs after existing conditions were placed within the model. These modifications involve driver behaviors and lane utilizations based on field observations and engineering judgement. Both AM and PM peak hours were validated based on several criteria per the micro-simulation guidelines (Federal Highway Administration, 2003).

4.1 Validation Criteria

The following validation criteria were used to verify validation of the networks to existing conditions:

- SR 29 Travel Times within ±15%
- Level of Service at the following Key Intersections:
  - SR 29/American Canyon Road
  - SR 29/SR 221/Soscol Ferry Road
  - SR 29/SR 12/Airport Boulevard
  - SR 29/SR 12 West (Carneros Highway)
- Vehicle Throughput – Intersection Approaches

4.2 Validation Procedure

The existing network was validated by adjusting driver behavior, emergency stopping distance, lane change behavior, continuous vehicle routing, and signal timings. Signal timings were adjusted to approximate field observed queue lengths. These parameters were adjusted until the travel times and level of service reflected field observations and conditions.

5. VISSIM Baseline Network Results

The VISSIM baseline network micro-simulation results were compared with field observation and data collected from various sources. Summary performance measures were examined to verify the baseline simulation was adequately calibrated to field conditions.

5.1 Corridor Travel Times

Travel times were derived from the NPMRDS speed data. This data was summarized in four segments and then consolidated to one complete corridor travel time that a motorist would experience on an average day traveling either northbound or southbound.

Table 4 presents the AM and PM peak hour travel times from the NPMRDS data compared to the baseline network travel times.

Table 4 – Corridor Travel Time Comparison

Direction	Corridor Travel Time			
	-15%	Actual	VISSIM	15%
NB AM	0:16:32	0:19:27	0:18:05	0:22:22
NB PM	0:13:17	0:15:38	0:17:40	0:17:59
SB AM	0:12:19	0:14:29	0:16:47	0:16:39
SB PM	0:20:25	0:24:01	0:21:52	0:27:37

As presented in Table 1, the AM and PM peak hour networks have been calibrated within 15% of the average travel time experienced during a weekday throughout a year.

5.2 Level of Service

LOS is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment representing progressively worsening traffic conditions. LOS was calculated for all intersection control types using the methods documented in the Transportation Research Board Publication *Highway Capacity Manual, 6th Edition* (HCM).

Table 5 compares the LOS for the AM and PM peak hours as estimated by micro-simulation (VISSIM) and static (SYNCHRO) results from previously performed traffic analyses in the corridor. Given the methodological differences between micro-simulation and static analysis, a direct correspondence should not be expected.

Table 5 – Key Intersections Level of Service Comparison

Intersection	Control Type[1,2]	VISSIM AM PH		Synchro AM PH		VISSIM PM PH		Synchro PM PH	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR 29 & American Canyon Rd	Signal	54.3	D	44.7	D	65.6	E	55.2	E
SR 29 & SR 221/Soscol Ferry Rd	Signal	143.7	F	239.3	F	240.8	F	187.3	F
SR 29 & SR 12/Airport Blvd	Signal	52.1	D	80+	F	112.8	F	80+	F
SR 29 & SR 12 West	Signal	32.9	C	63.8	E	72.3	E	28.8	C

1. LOS = Delay based on average of all approaches for Signal

As presented in Table 5, the intersection LOS comparison generally reflects a reasonable correspondence of congested conditions at key intersections. The most notable incongruence being at SR 29/SR 12 West which show an AM/PM opposite LOS result.

5.3 Vehicle Throughput

Another validation criteria is vehicle throughput. This can be through a specific intersection or segment of corridor. The same studies used to compare LOS were used to compare the throughput at key intersections along SR 29 relative to the micro-simulation VISSIM model. To measure the effectiveness of throughput, a threshold of 10% of the total intersection counts is compared to the micro-simulation total. The model is considered to be calibrated if the total volume for the intersections lies within 10% above or below the field count.

Table 6 presents the vehicle throughput for the key intersections.

Table 6 – Key Intersections Throughput Comparison

#	Intersection	Intersection Total							
		AM Peak Hour				PM Peak Hour			
		-10%	Count	VISSIM	10%	-10%	Count	VISSIM	10%
1	SR 29 & American Canyon Rd	3,406	3,784	3,985	4,162	4,252	4,724	4,523	5,196
2	SR 29 & SR 221/Soscol Ferry Rd	4,551	5,057	4,840	5,563	4,659	5,177	5,039	5,695
3	SR 29 & SR 12/Airport Blvd	4,685	5,205	5,489	5,726	5,209	5,788	5,288	6,367
4	**SR 29 & SR 12 West**	4,586	5,096	4,767	5,606	4,586	**5,096**	**5,712**	5,606

As presented in Table 6, all key intersections, except the intersection of SR 29 & SR 12 West during the PM peak hour, have throughput within 10% of the field counts used to develop the model.

6. Conclusion

Three measures of effectiveness for model calibration are corridor travel times, LOS, and throughput. The key measure of effectiveness is corridor travel times. This measure of effectiveness is the primary focus of the model calibration effort. This measure shows that travel times are comparable to the data collected. The secondary and tertiary criteria of LOS and vehicle throughput validation results although not exact, shows a reasonable correspondence with the validation count data set. Given that the validation count data set is based on past studies and data collection from different years, seasons, days etc., the validation results are considered adequate for application of the SR 29 VISSIM micro-simulation model.

Appendix B: SR 29 CMCP VISSIM Microsimulation Model Development Report

Memorandum

September 29, 2019

To:	NVTA, Rebecca Shank	Project:	SR 29 CMCP
From:	Kenneth Isenhower III, EIT Jim Damkowitch	Ref/Job No.:	11187559
CC:		File No.:	C2641MEM001.DOCX

Subject: Existing Conditions Memorandum

1. Introduction

The purpose of the State Route (SR) 29 Comprehensive Management Corridor Plan (CMCP) Technical Memorandum is to present the results of the VISSIM simulation baseline calibration analysis. Once the baseline calibration has been approved by reviewing agencies, the VISSIM model will be applied to refine and evaluate the performance of various operational improvements within the study corridor. This will serve to provide requisite technical traffic support information for an SB-1 Solutions for Congested Corridors Cycle 2 grant application and a Project Initiation Document (PID).

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Vehicle Type	Source	Date Range	Week Days	Weekend Days
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For both vehicle types, the analysis focused on a specific range of hours. Peak hours were chosen for the weekdays to align with commuter traffic (7-8 AM, 4:30-5:30 PM) and for the weekend, the peak hour chosen was 2-3 PM. In order to calculate Free-Flow Speed, a 3-hour time range (12-3 AM) was chosen for both weekdays and the weekend days.

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Only data specific to SR 29 was used for validation purposes. SR 29 speed data was compiled and processed to validate the existing conditions. Existing AM and PM peak hour data was evaluated using the micro-simulation software VISSIM. For calibration purposes, roadway operations were evaluated for the peak hour between 6 am and 8 am as well as 4 pm to 6 pm. These time periods typically include the busiest weekday commute hours.

Other data used for VISSIM validation included turning movement counts, posted speed limits, and current signal timings. Data was collected from previous studies within the area. These studies include the Napa Pipe EIR (2009), Watson Ranch EIR (2018), SR 29/SR 221/Soscol Ferry Road Roundabout Intersection Improvement Study (2018), and Imola Corridor Complete Streets Plan (2019).

4. Freeway Operation Modeling Selection

VISSIM microsimulation software (developed by PTV, Inc.) was used to simulate the corridor operations along the study area for northbound and southbound traffic. The AM and PM peak hours were calibrated to a yearly average for field conditions. VISSIM must be calibrated to reflect current conditions to accurately predict future operations with proposed improvements. Calibration was performed by modifying inputs after existing conditions were placed within the model. These modifications involve driver behaviors and lane utilizations based on field observations and engineering judgement.

4.1 Validation Criteria

The following validation criteria were used to verify validation of the networks to existing conditions:

- Travel Times within ±15%
- Level of Service at the following Key Intersections:
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  - SR 29/SR 221/Soscol Ferry Road
  - SR 29/SR 12/Airport Boulevard
  - SR 29/SR 121
- Vehicle Throughput

4.2 Validation Procedure

The existing networks were validated by adjusting driver and vehicle behavior, emergency stopping distance, continuous vehicle routing, and signal timings. These parameters were adjusted until the travel times and level of service reflected field observations and conditions.

Calibration of the VISSIM model was accomplished by adjusting signal timings to ensure the approximate field observed queuing is captured, ensuring lane changes represent driver and vehicle behaviors within the field, and the total delay at each key intersection is modeled.

5. VISSIM Baseline Network Results

The VISSIM baseline network micro-simulation results were compared with field observation and data collected from various sources. Based on field observations, delays, driver and vehicle behaviors, and travel times were simulated. Summary performance measures were examined to verify the baseline simulation was adequately calibrated to field conditions.

5.1 Corridor Travel Times

Travel times were derived from the NPMRDS data collected. This data came in four segments and were consolidated to one complete corridor travel time that a driver would experience on average throughout a year.

Table 4 presents the AM and PM peak hour travel times from the NPMRDS data compared to the baseline network travel times.

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SR 29 & SR 12 West	Signal	32.9	C	68.3	E	28.8	C	68.1	E

1. LOS = Delay based on average of all approaches for Signal

As presented in Table 5, the intersection LOS comparison is not fully calibrated. However, this corridor analysis is to provide a regional perspective of current conditions.

5.3 Vehicle Throughput

Another effective way of calibration for a corridor is the throughput of vehicles through a specific intersection or segment of corridor. The aforementioned studies were used to compare to the throughput at key intersections along State Route 29 to the micro-simulation VISSIM model. To measure the effectiveness of throughput, a threshold of 10% of the total intersection counts is compared to the micro-simulation total. The model is considered to be calibrated if the total volume for the intersections lies within 10% above or below the field count.

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As presented in Table 6, all key intersections, except the intersection of SR 29 & SR 12 West during the PM peak hour, have throughput within 10% of the field counts used to develop the model.

6. Conclusion

Three measures of effectiveness for model calibration are corridor travel times, LOS, and throughput. Although the LOS comparison does not show exact calibration, the comparison shows that similar delays are seen for more than half. The throughput comparison shows that the intersections within the micro-simulation model are experiencing similar volumes when compared to the field counts. The key measure of effectiveness is corridor travel times. This measure of effectiveness is the primary focus of the model calibration effort. This measure shows that travel times are comparable to the data collected.

Appendix C: Public Outreach Materials

SR 29

COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

WHETHER YOU USE a CAR, TRUCK, BUS, BIKE,
or GET AROUND by WALKING, HOW
CAN WE MAKE HIGHWAY 29 EASIER to USE?

HELP US DESIGN a PLAN to HELP YOU GET WHERE YOU NEED to GO!

PUBLIC WORKSHOP
NOVEMBER 12, 2019

6:30 PM TO 8:30 PM
BOYS & GIRLS CLUB
60 BENTON WAY, AMERICAN CANYON

sr29corridorplan.com

NVTA
NAPA VALLEY TRANSPORTATION AUTHORITY

NAPA COUNTY CALIFORNIA
A Tradition of Stewardship
A Commitment to Service

CITY OF AMERICAN CANYON

CITY OF NAPA

SR 29

PLAN DEL CORREDOR MULTIMODAL COMPRENSIVO

YA SEA QUE MANEJES UN AUTO, CAMIÓN, AUTOBÙS, BICICLETA O CAMINES ¿CÓMO PODEMOS HACER LA AUTOPISTA 29 MÁS FÁCIL DE USAR?

¡AYÚDANOS A DISEÑAR UN PLAN para ayudarte a llegar a DONDE NECESITAS ir!

TALLER PÙBLICO
12 de Noviembre, 2019
6:30 PM TO 8:30 PM
BOYS & GIRLS CLUB
60 BENTON WAY, AMERICAN CANYON

sr29corridorplan.com

NVTA
NAPA VALLEY TRANSPORTATION AUTHORITY

NAPA COUNTY CALIFORNIA
A Tradition of Stewardship
A Commitment to Service

CITY OF AMERICAN CANYON

CITY OF NAPA

Frequently Asked Questions

ABOUT THE PLAN

What is the purpose of the SR 29 Comprehensive Multimodal Corridor Plan (CMCP)?

Answer: The purpose of the SR 29 CMCP is to identify a preferred SR 29 corridor concept and associated infrastructure improvements that will best meet both the local and regional goals, while providing the highest return on investment of limited regional transportation funding for the next 20 years. The plan will serve as an update to SR 29 Gateway Plan and be developed consistent with the *2018 Comprehensive Multimodal Corridor Plan Guidelines* (California Transportation Commission, December 2018) and the draft *SB-1 Solutions for Congested Corridors Program Guidelines* (California Transportation Commission).

To be competitive for procuring limited discretionary transportation funding - the CMCP must document how the recommended CMCP capital improvements address recent federal and state transportation planning objectives/initiatives – including multimodal considerations, social equity, climate change, goods movement, economic development and return on investment. Ultimately, the CMCP will serve as the formal update to the SR 29 Transportation Corridor Concept Report (Caltrans System Planning) as well inform a Project Study Report (PSR) for future programming of the selected corridor improvements. The latter document will be addressed in a subsequent phase of this effort.

Acquiring grant funding is the primary impetus for this effort. Improvements associated with Soscol Junction will be included in a Cycle 2 Solutions for Congested Corridor grant application to the State (March 2020) and the remaining improvements will be submitted as part of Cycle 3 grant application (2023).

Who is responsible for the SR 29 Comprehensive Multimodal Corridor Plan (CMCP)?

Answer: The SR 29 CMCP is being administered by the Napa Valley Transportation Authority (NVTA) in partnership with the County of Napa, the Cities of Napa, American Canyon, and Vallejo and Caltrans.

How much does the study cost and how is it being paid for?

Answer: The cost of the SR 29 CMCP is $280,022. A subsequent phase to develop the PSR of selected improvements is $339,798. The funding source for these studies is a combination of Transportation Development Act, Congestion Management Agency Planning Funds and the City of American Canyon

What are the plan's project limits?

Answer: The study corridor generally consists of the following area and road segments:

SR 29: from its juncture with SR 37 juncture to the south to Imola Avenue to the north.

SR 29 parallel roadways including:

- SR 221
- SR 12
- South and North Kelly Road
- Devlin Road
- Soscol Ferry Road
- Soscol Creek Road
- Newel Drive

How does this study differ from a planning-level conceptual study?

Answer: The SR 29 CMCP will recommend multi-modal improvements that will be evaluated for operational, modal and air quality benefits including functional design, right-of-way and intersection control (at intersections) using performance metrics from federal/state competitive grant programs. Combined with planning level cost estimates, this information will allow the proposed improvements to be "grant ready" and competitive for future transportation grant funding cycles.

How long will the study take to complete?

Answer: The study will take approximately nine (9) months to complete. It began in June 2019 and is scheduled to be completed in February 2020.

PUBLIC OUTREACH

How can I participate in the SR 29 CMCP?

Answer: There will be multiple opportunities for the public to provide input, including attending public workshops, other public meetings, and utilizing the project website – www.SR29CorridorPlan.com to review project information and provide comments. The website will link directly to the NVTA website as well as the Cities of Napa and American Canyon; and County's website. It will also include an interactive web-based tool to allow anyone to click on a proposed improvement location shown on a google-type map and insert a comment. The public is also invited to attend regularly scheduled NVTA Board meetings to learn more about the plan and to provide comments https://www.nvta.ca.gov/board-meeting-calendar In addition to web-based resources, social media platforms will also be used including Facebook, Twitter, NextDoor and Instagram. This will enable community members to participate, collaborate, and inform decision making as convenient, without the need to physically attend meetings. All agencies are encouraged to utilize existing eNews/email channels to reach out to their constituents to promote meetings, workshops, availability of the project website and interactive tool and virtual workshop(s).

How many public workshops are being held for the study?

Answer: Two public workshops will be held, one on November 13th 2019 and another in February 2020. The first public workshop will seek the public's input and the level of support for proposed/planned multimodal corridor improvements. The second workshop will provide the public an opportunity to comment on the recommended corridor concept and preferred package of multimodal improvements.

What Committees will be involved and who is the Stakeholder Advisory Committee?

Answer: Updates and/or materials will be shared with NVTA's Citizen Advisory Committee (CAC) and Technical Advisory Committee (TAC) approximately four (4) times during the course of the project. These committees will review project progress and submit comments to the Staff Working Group (SWG) and the NVTA Board.

A Stakeholder Advisory Committee (SAC) will also be formed to help guide the study. The SAC is made up of a diverse range of groups and organizations based primarily within the SR 29 study area. The role of the SAC will be to communicate their group's specific interest in the project. A list of SAC members is available on the project webpage: www.SR29CorridorPlan.com

For further information please contact:

Rebecca Schenck, Transportation Planner
Napa Valley Transportation Authority
625 Burnell Street
Napa, CA 94559
707-259-8636
rschenck@nvta.ca.gov

Public Participation Program

The State Route 29 Comprehensive Multimodal Corridor Plan (CMCP) is a complex multimodal performance-based corridor planning effort, requiring consideration of every available travel mode currently in use along the State Route (SR) 29 corridor. Led by the Napa Valley Transportation Authority, it is a joint effort between the City of American Canyon, the City of Napa and the County.

The purpose of this effort is to prioritize currently planned/programmed improvements in the corridor and "infuse" more multimodal improvements, parallel capacity improvements, and Integrated Corridor Management (ICM) strategies to develop a phased multimodal "package" of improvements that can be competitive when submitted for funding consideration by the State. "Multimodal" improvements include enhancement to bike and pedestrian access, bus service, connectivity and alternative transportation modes. To this end, it is imperative that members of the public have ample opportunities to provide input throughout the process, through a variety of media and venues.

An effective public participation program creates confidence in the planning process, promotes broad-based understanding, and reflects the interests and needs of the community. Successful implementation will require interactive and constructive relationships among Napa Valley Transportation Authority (NVTA) staff, the NVTA Working Group, the Cities of American Canyon and Napa, The County of Napa, decision-makers, and the community as a whole.

The Public Participation Program uses a multi-faceted approach, with a goal of engaging a broad representation of the community's population and interests. The Program will communicate using imagery and graphic tools to facilitate understanding of planning concepts and policies.

Goals

Given that the Plan have wide-ranging impacts including the ability to fund improvements through the State's grant process, the Public Participation Program should, accordingly, include a wide range of methods, venues, and constituents. As we envision it, the program should fulfill three broad purposes:

1. Educate the public about the purposes of the Plan, the process, and how they can be involved.
2. Expand the public's awareness of planning strategies and policies that have been used in other communities proven to effectively address critical issues.
3. Achieve public ownership of the proposed improvements.

Plan Elements

STAFF WORKING GROUP (Monthly Meetings)

The Staff Working Group will be a principal advisory body that will provide guidance and support the Consultant Team throughout the process. The Working Group will provide leadership; guidance on key issues based on their unique knowledge of community needs and goals; review of major work elements and products; and provide input and feedback on key issues, visions, and proposed improvements.

STAKEHOLDER AND JURISTICTIONAL INTERVIEWS (August/September)

Interviews will be conducted with representatives of public agencies, community members, property and business owners, and others to identify issues of concern. The Consultant team will conduct four meetings, working with the NVTA Working Group to determine attendees, key discussion items and agendas.

RGS will also conduct a series of "pop-up" events in the project area during this time as well as presentations to local community groups including the American Canyon Chamber of Commerce.

COMMUNITY WORKSHOPS (October/January)

Two community workshops will be held during this process. The first will allow participants to review key areas of concern and discuss potential solutions. The second will showcase the proposed improvements. Each workshop format will be defined in collaboration with NVTA staff in response to the specific objectives of the planning process. Each workshop will be structured as an event for the entire family and use techniques that engage the interest of participants; maximize opportunities for input and discussion; and incorporate citizen input into the planning process. Workshop methods may include:

- Large-scale base maps or aerials for recording issues, visions, and preferred options.
- Opportunities before and after workshops to view large maps to which they can add comments with sticky notes.
- Essays, note cards, and other comment forms that enable written communication on visions, zoning issues, and reactions to zoning options.
- Small group discussions.
- Click polling activities as part of our PowerPoint presentations.
- Development of a "virtual workshop" following the "live" meeting.

Workshop Promotion Strategies

Public workshops will be programmed to make them attractive and effective events, primarily by being meaningful and memorable for the participants. Thus, all workshops will have the following features:

- *Pre-meeting advertisement that is clear on the intent, topics, and format of the event.* This is intended to lessen the chance of people attending to bring up non-topical

issues or having unmet expectations. Notices will be posted at frequently-attended locations: libraries, parks, schools, coffee shops, and grocery stores and will also be promoted via social media, news releases and the project website.

- *Opportunities for both spoken and written comments.* Not all attendees are comfortable with public speaking at a public event. We will have activities that include writing, such as sticky notes on prepared maps, and the option of submitting written comment cards.

- *Outreach to non-English-speaking community members.* Options include posting bilingual notices in parks and at schools and contacting Spanish-language churches to help share this information. The Consultant Team will ensure that Spanish language materials are available at workshops.

Promotion Timelines:

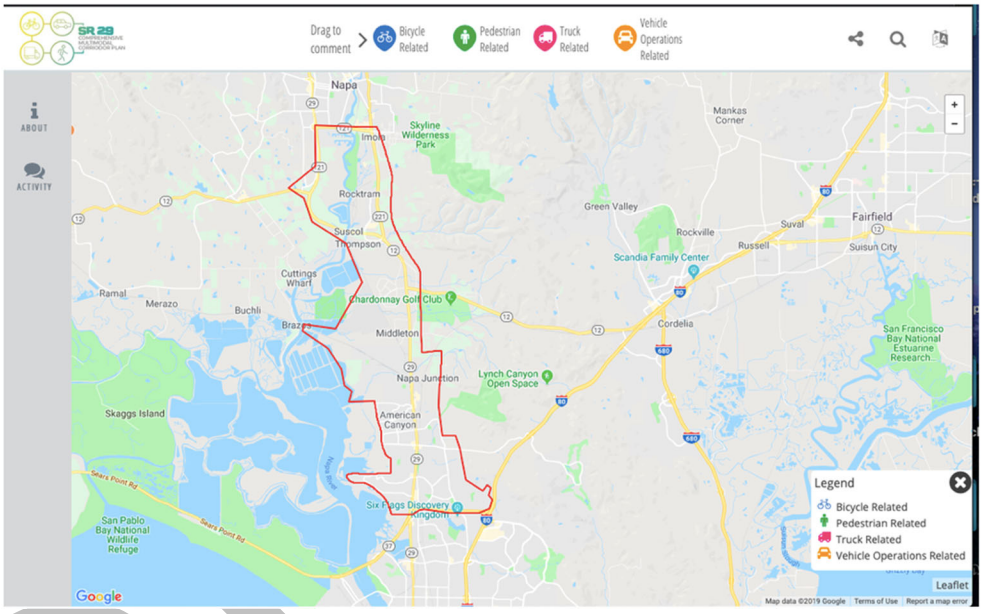
- ✓ Three-Four weeks prior:
  - Posters
  - Social Media Event Posts
  - Website Updates
  - News Release
  - City Council/Board Announcements
  - American Canyon Local TV Promotion
- ✓ Two weeks prior:
  - Social Media Posts re: Workshop Format and Goals
  - Stakeholder Outreach (Chamber/Community Groups)
  - Website Updates
  - eBlasts
  - American Canyon Local TV Promotion
- ✓ One week prior:
  - Social Media
  - eBlast Reminders
  - American Canyon Local TV Promotion
- ✓ Day after:
  - Launch of “Virtual Workshop” on Project Website
  - eBlasts
  - Social Media Promoting “Virtual Workshop”
- ✓ Two weeks after:
  - eBlasts and Social Media re: “Virtual Workshop”
- ✓ Three weeks after:
  - Close “Virtual Workshop”

WEBSITE (Completed)

RGS has created and will host a project-specific website, www.SR29CorridorPlan.com, which will link directly to the NVTA website as well as the Cities of Napa and American Canyon; and County's website. The site includes several pages which will be updated throughout the process. This includes:

- Project Information/Overview
- Meeting Calendar
- Interactive Web-Based Tool

  This is a bilingual, interactive mapping tool created by GHD that allow participants to identify key issues spatially using a Google-based interface that spans the entire corridor.



- Document Library
- Comment/Contact Information

SOCIAL MEDIA

Social media platforms including Facebook, Twitter, NextDoor and Instagram will be used to enable community members to participate, collaborate, and inform decision making as convenient, without the need to physically attend meetings.

- Facebook/Twitter/Instagram
  All participants (NVTA, City of American Canyon, City of Napa and Napa County) will push information via their Facebook pages to remind followers of public events and to announce when new materials have been posted to the project website's homepage. RGS will provide art and links to ensure consistency in this process.

- NextDoor
  NVTA will be the sole agency to post to NextDoor as their "area' incorporates the entire project corridor.

- eBlasts
  All agencies are encouraged to utilize existing eNews/email channels to reach out to their constituents to promote meetings, workshops, availability of the project website and interactive tool and virtual workshop(s).

COLLATERAL DEVELOPMENT (August)

Bilingual collateral materials will be developed to provide brief information about the planning process and promote upcoming workshops, meetings and engagement opportunities. These materials would be used at various community presentations, workshops and local engagement opportunities and will include:

- Development of a Project Brand (GHD-Completed)
- Project Fact Sheet (GHD/RGS)
- Posters Promoting Workshops (RGS)
- Business Card Hand Outs (GHD)
- Pull-Up Banner for Pop Up Meetings (RGS)

SR 29

COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

FOR IMMEDIATE RELEASE

Contact:
Kim Anderson, Regional Government Services
650-587-7300 x30
kanderson@rgs.ca.gov
www.sr29corridorplan.com/

Residents Invited to Help Shape Plan to Improve SR29

Interactive Workshop November 12, at 6:30PM Provides Unique Opportunity to Share Ideas for Making Driving, Biking, Walking, and Using Transit Easier

NAPA COUNTY, CA*:* Area residents, business owners, and community groups are invited to the Boys & Girls Club, 60 Benton Way, American Canyon on November 12, 2019, from 6:30pm-8:30pm to help develop a plan for making Highway 29 easier to travel. Attendees can talk to the planning team, view displays, and use interactive maps and other tools to provide direct feedback on issues in the Highway 29 corridor. Participants will be asked to share their experiences and ideas for additional transportation choices and neighborhood improvement. Refreshments will be served.

The plan will cover 11.5 miles of Highway 29, the main connection between Napa and American Canyon. This is one of most highly travelled and crowded roadways in Napa County. It is important for both quality of life and economic development that residents, commuters, and visitors be able travel easily whether they are choosing to walk, bike, drive or use transit to get around. The highway is important for businesses to move products efficiently to and from the area as well. The input of diverse communities and groups are vital to ensure that SR29 and its surrounding neighborhoods continue to provide value to local residents, visitors, and business owners alike.

The plan is being led by Napa Valley Transportation Authority (NVTA), in partnership with the County of Napa, the cities of Napa and American Canyon, and Caltrans. These entities are working together on this plan to identify projects that will be competitive to receive state and federal funding and can ultimately be constructed.

The public outreach team for the project is available for presentations to community, civic, business and non-profit groups to provide more details plan additional opportunities for input. For additional information: www.sr29corridorplan.com.

**#** **#**

Agenda

January 15, 2020

Time:	5:30 – 7:00 PM.	Project:	**SR 29 Comprehensive Multimodal Corridor Plan**
Location:	Senior Multi-Use Center 2185 Elliott Drive, American Canyon 94503		
Call Info:	1-888-398-2342 (ID: 9209029)		
Subject:	Stakeholder Group Meeting #1	From:	Jim Damkowitch, GHD

I. Introductions

II. Project Overview

- Plan Goals
- Smart Mobility Framework
- Funding Competitiveness

III. Stakeholder Role

- NVTA Expectations
- Stakeholder Responsibilities
- How you can help

IV. Public Outreach

- Project Website
- Interactive Web-based Tool
- Polling Questions
- Draft Workshop Summary Report
- Project Information Cards

V. Improvement Package

- Improvement Package Status (Improvement Concepts to be Included)
- SR 29/Airport Intersection Improvement Concept
- On the Bubble - Improvement Concepts

VI. Next Steps

VII. Next Meeting

SR 29

COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

STAKEHOLDER MEETING #1

January 15, 2020

Welcome!

Project Team

- Napa Valley Transportation Authority
- Consultant Team
- City of American Canyon
- City of Napa
- County of Napa
- Caltrans
- Stakeholder Advisory Committee

Project Goals and Scope

Project Goals

- Identify a prioritized list of multimodal improvements
- Develop implementable multimodal infrastructure plan
- Get Projects Funded!

Project Scope

- Identify improvements that address known corridor deficiencies
- Seek community and stakeholder input on the improvement concepts
- Develop technical information to support competitive grant applications.

Pivot Off of Corridor Planning to Date

- SR 29 Corridor Gateway Study
- Napa Countywide Bicycle Plan Update
- Napa Countywide Pedestrian Plan
- Napa Short Range Transit Plan

Project Goals and Scope

Smart Mobility Framework

Location Efficiency	• Support for Sustainable Growth • Transit Mode Share • Accessibility and Connectivity
Environmental Stewardship	• Climate and Energy Conservation • Emissions Reduction
Reliable Mobility	• Multimodal Travel Mobility • Multimodal Travel Reliability • Multimodal Service Quality
Social Equity	• Equitable Distribution of Impacts • Equitable Distribution of Access and Mobility
Health and Safety	• Multimodal Safety • Design and Speed Suitability • Pedestrian and Bicycle Mode Share
Robust Economy	• Congestion Effects on Productivity • Efficient Use of System Resources • Network Performance Optimization • Return on Investment

Project Goals and Scope

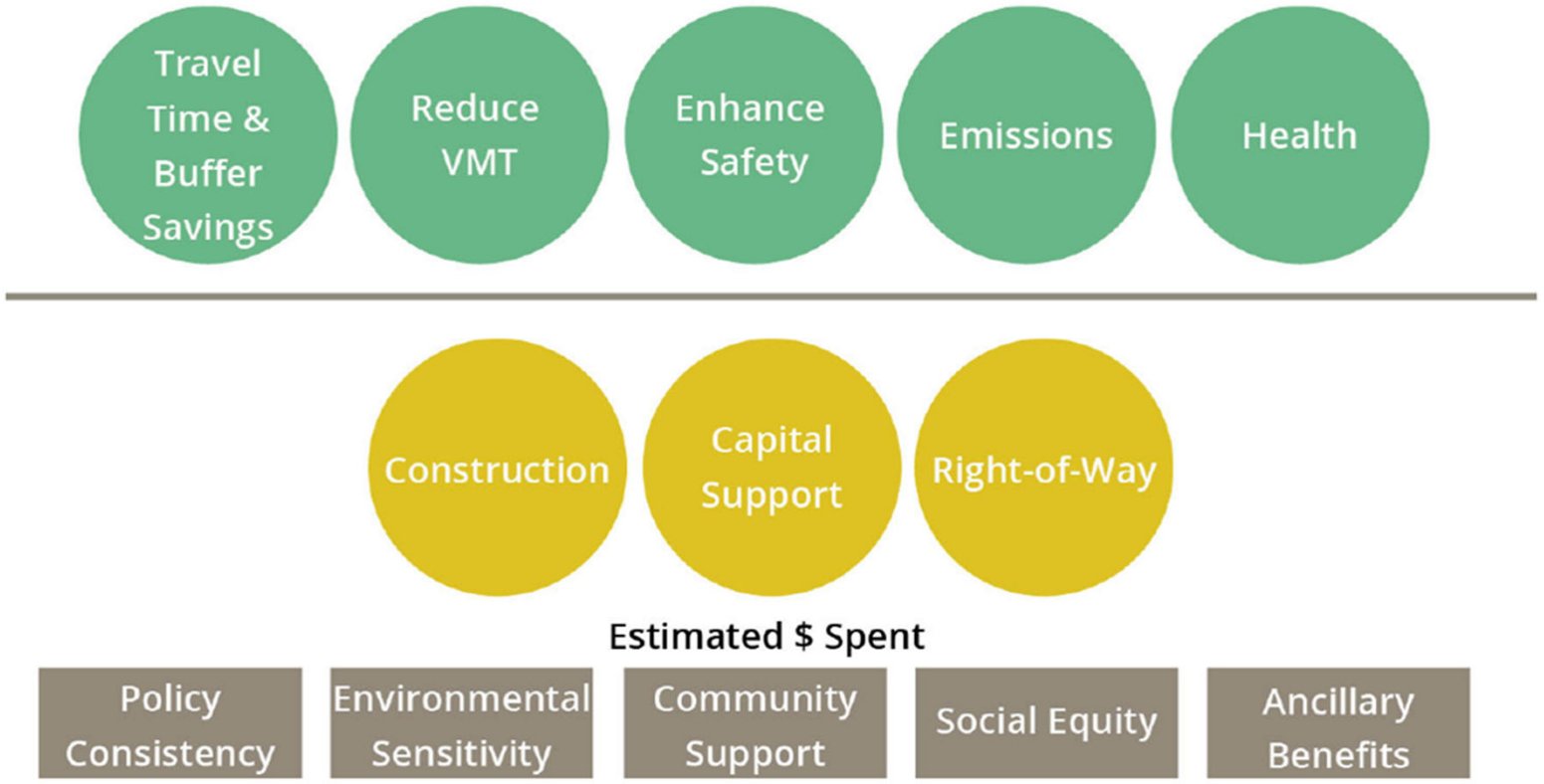
Performance Based

Analysis Purpose	Measure of Effectiveness	Model/Analysis Tool										Monetize for Benefit/Cost
		Solano-Napa ABM	Microsimulation	Level of Traffic Stress	NCHRP 552 Method	HSM Part C CMFs	SB-1 Emissions Calculator	GIS Analysis	Online Mapping Tools	Literature Review	NPMRDS/PeMS	
Baseline Travel Demand	Trips, Ridership, VMT	■										Yes
Future Travel Demand	Trips, Ridership, VMT	■										Yes
Roadway Operations	Delay and Buffer Time		■								■	Yes
Transit Ridership	Ridership, VMT	■							■	■		Yes
Pedestrian/Bike Connectivity	Access Indices			■				■				No
Pedestrian/Bike Mode Shift	Trips, VMT				■			■				Yes
Safety	Collision Reduction & Rates	■				■		■				Yes
Air Quality	Emissions (Criteria & GHG)	■	■		■		■					Yes
EJ/Social Equity	Access, Benefit/Burden	■		■				■	■			No
Economic Development	GRP, Jobs, Income							■		■	■	No
Health	Vehicle Miles Traveled	■			■				■			Yes
Adaptation	Network Vulnerability							■	■	■		No

Legend ■ *Direct or Indirect Application*

Project Goals and Scope

Benefit Cost

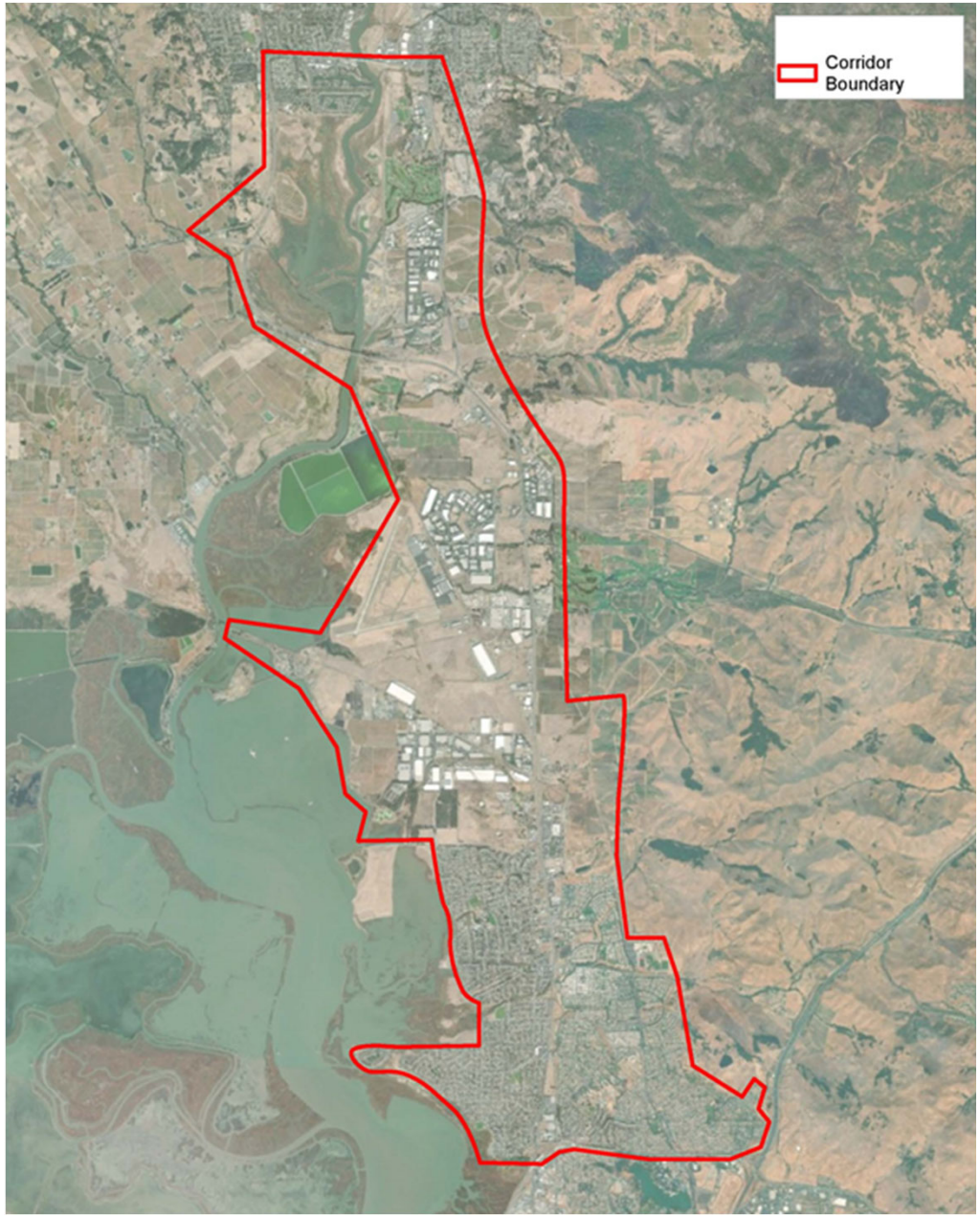


Plan Area

SR 29: from its juncture with SR 37 juncture to the south to Imola Avenue to the north

SR 29 parallel roadways including:

- SR 221
- SR 12
- South and North Kelly Road
- Devlin Road
- Soscol Ferry Road
- Soscol Creek Road
- Newell Drive



Community Outreach

- Project Webpage

http://www.sr29corridorplan.com

- Interactive Web-based Tool
  - Seek input on improvements the community will support
  - Remain “Live” through the end of February
  - Will be summarized along with the Preferred Improvement Package (March: Workshop 2)

- Polling Questions

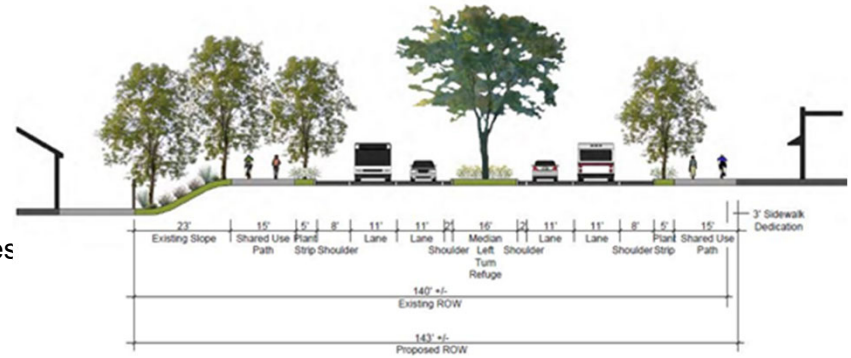
- Draft Workshop Summary Report

- Project Information Cards

SR 29
COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

Improvement Package

- Improve Concepts – Currently Included
  - Node Capacity Improvements
    - Soscol Junction
    - Airport / SR 29
    - Carneros / SR 29
  - Parallel Capacity Improvements
    - Devlin Extension
    - Newall/S Kelly Extension
  - Active Transportation Improvements
    - SR 29 Multimodal Improvements (Class I or Class II bike facilities
    - Vine Trail
    - Bay Trail
  - Transit Transportation Improvements
    - Route 11X & Route 29: Service frequencies (30 min Peak Period) + 7 Bus Stop Changes.
    - Transit Signal Priority (14 Intersections)
    - Queue Jumps at following Four Key Intersections:



SR 29/SR12/Airport Blvd

NB: Implement queue jump lane in right hand through lane

SB: Construct a dedicated queue jump lane accessed from the right turn lane; requires modifying signal pole location

SR 29/Napa Junction Road

NB: Implement advanced right-turn phase and utilize the right-turn lane as a queue jump

SB: Use existing right-turn lane for queue jump lane and construct new right-turn lane

SR 29/Donaldson Way

NB: Convert shoulder to shared right-turn queue jump lane. Implement a bus-only phase

SB: Convert shared through/right-turn lane into a right-only lane and use as queue jump

SR 29/American Canyon Road

NB: Convert right-turn only lane into a dedicated queue jump lane and construct new right-turn only lane

SB: Convert right-turn only lane into dedicated queue jump lane and construct new right-turn only lane

Improvement Package

- Improve Concepts – On the Bubble
  - Node Capacity Improvements
    - Roundabout Corridor along Kelly/Newell Drive Extension
  - Active Transportation Improvements
    - Pedestrian Bridge Crossings
      - » South Napa Junction
      - » Donaldson Way
      - » American Canyon
    - Local Class I/II Connections (various locations)
  - Transit Transportation Improvements
    - Bus on Shoulder where feasible along the corridor
    - Passenger Rail – SMART Extensions
      - » Napa Junction to Vallejo Ferry Terminal
      - » Novato to Suisun City
  - Integrated Corridor Management (ITS)
    - TMC at “new” NVTA Maintenance Facility
    - Traffic Monitoring Detectors (11 Locations)
    - Variable Message Signs (7 Locations)
    - Trailblazer Signs (17 Locations)

THANKS FOR YOUR PARTICIPATION

Contact Information:

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Regional Government Services
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Project Web Page: http://www.sr29corridorplan.com

SR 29
COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

www.ghd.com

Appendix D: Public Workshop Summary Reports

MEMO

TO: Jim Damkowitch GHD, Project Manager
Rebecca Schenck, NVTA Project Manager

FROM: Kim Anderson, RGS Senior Advisor
Task Manager for Public Outreach

DATE: January 14, 2020

RE: Phase 1 Outreach Interim Report

Introduction:

This memorandum summarizes public input received to date during Phase 1 of the public outreach effort for the SR 29 Comprehensive Multimodal Corridor Plan. This phase of outreach included developing a dedicated project website and on-line interactive mapping tool, publicizing and conducting the first public workshop, and launching a follow-on virtual workshop for those unable to attend the live workshop. A final report will be provided at the end of the Phase 1 process.

Workshop #1:

Date: November 12, 2019

Project Team Staff in Attendance: Kendall Flint (RGS), Kim Anderson (RGS), Sylvia Valle (RGS - Spanish Translation), Jim Damkowitch (GHD, Project Manager), Kenneth Isenhower (GHD), Paige Thornton (GHD), Todd Tregenza (GHD), Rebecca Schenck (NVTA, Project Manager), Sanjay Mishra (NVTA), Danielle Schmitz (NVTA).

The workshop set-up included a project overview presentation, interactive mapping station, map exhibit stations (both background maps and potential corridor concepts), and a final click polling activity to gain input from attendees (see Attachment A: Workshop Overview for additional detail).

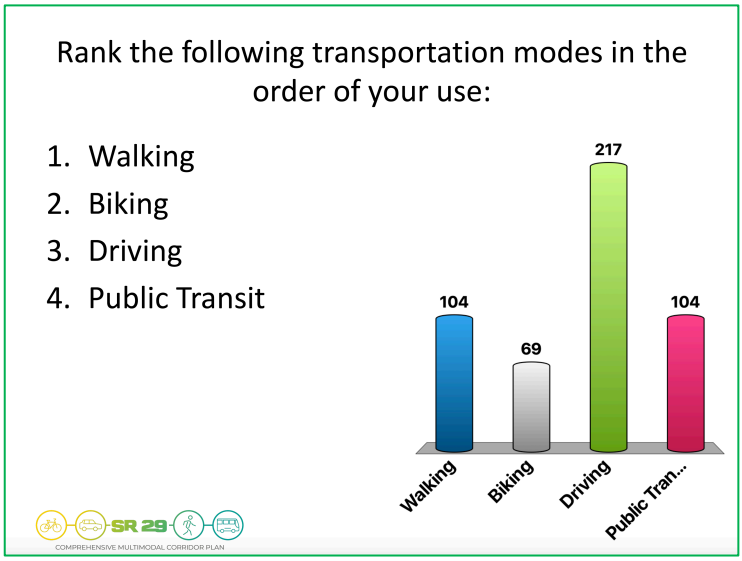
The workshop was promoted via press release to local media, through flyers and project cards, on various social media outlets, and by email blasts.

Of the 31 individuals on the workshop sign-in sheet, 7 identified as staff or city council members for the City of American Canyon. Between 19 and 24 of those present answered the polling section of the presentation, depending on the question.

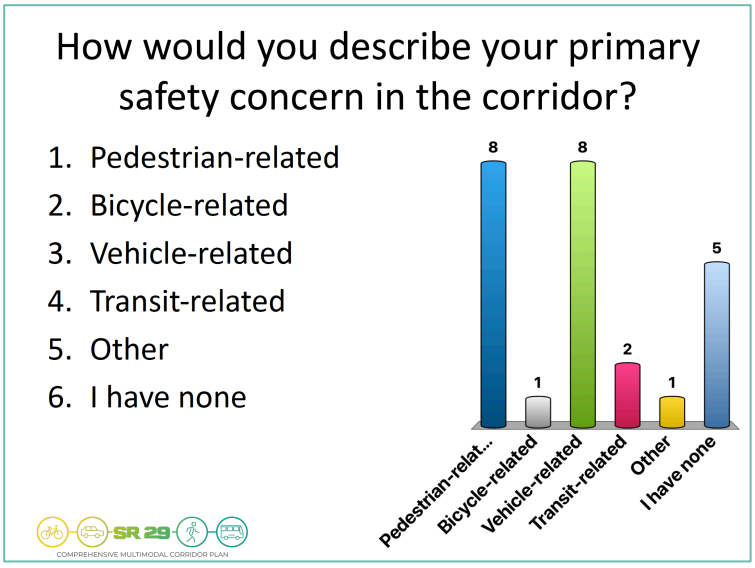
Key Findings From Polling:

- Of all respondents answering questions, ***the largest group (37.5%) were first time workshop attendees.***
- ***All age ranges except those 74 and older were represented,*** the highest representation (nearly 42%) were between 55 & 73 (Baby Boom Generation).

- When asked to rank transportation modes by order of use, ***the highest rank was driving, with walking and public transit tied as the second most utilized mode.***



- ***75% of attendees never travel as a pedestrian in the corridor***; only one respondent walks in the corridor daily. Most that choose not to walk cited safety concerns or lack of designated paths.
- Only one respondent bicycles in the corridor; ***the reason most often cited for not biking was fear for safety at 52.38%***, followed by lack of paths/connections at 28.57%.
- ***Dedicated paths*** were most often cited as a way to make respondents feel comfortable biking or walking.
- Nearly three-quarters of respondents never use transit, with the most cited reason for non-use was that ***it is inefficient/takes too long to arrive at destinations.***



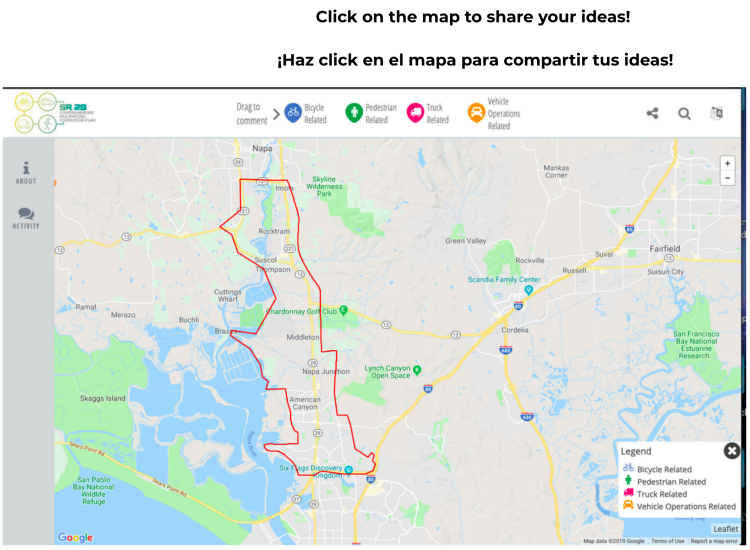
- ***Top three priorities in the corridor:***
  - Reducing Vehicle Congestion
  - Better signal timing
  - Improving bicycle connectivity

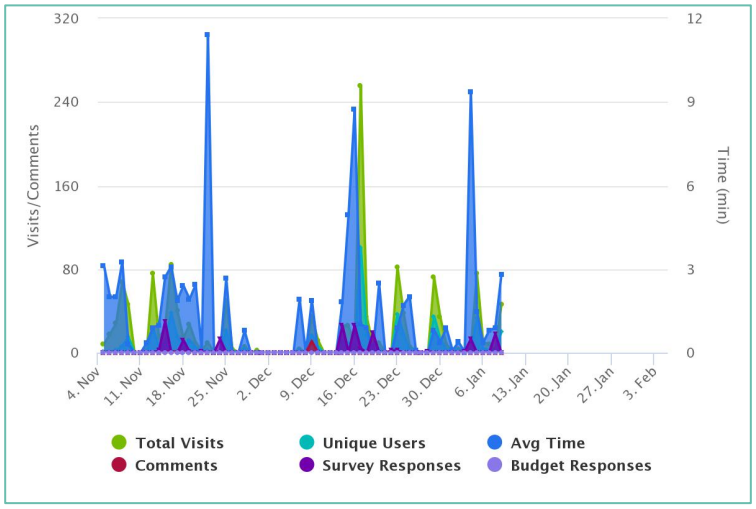
- ***Top four priority solutions:***
    - Increasing parallel roadway capacity – Delvin – Newell – South Kelly Extensions
    - Multi-modal Improvements on SR 29 (SR37 to Soscol Junction)
    - Intersection Improvements at Soscol Junction – Airport – Caneros
    - Transit Frequency Improvements on SR 29 (Queue Jumps & Part-time Use of Shoulder for Transit Vehicles)

A full print-out of the polling questions and results is included as Attachment B to this memorandum.

Interactive Mapping Tool (Social Pinpoint)

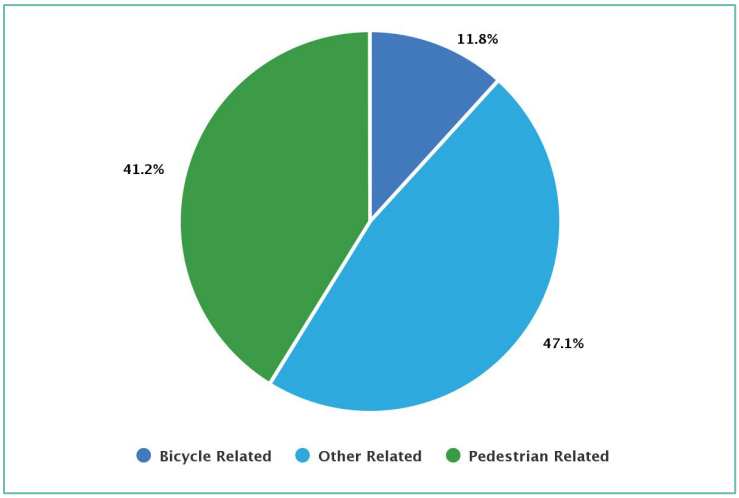
Summary: The interactive map tool has been live on the project website since the week prior to the November 12 workshop. Static versions of the concepts are also displayed on the website. Description and graphics in the mapping tool mirror the maps displayed on the website with some additional information to clarify map feature locations.





Through January 9, the mapping tool has produced 796 total visits with 322 unique users. 17 general comments and 111 corridor concept specific comments have been generated to date. A histogram charting the responses received be week is shown at left.

Visitors to the mapping tool were asked for their support for each corridor concept and given the opportunity to leave a comment specific to the concept. A report listing each concept and the comments received is included as Attachment C. A summary of support for each concept can be found on the next page.

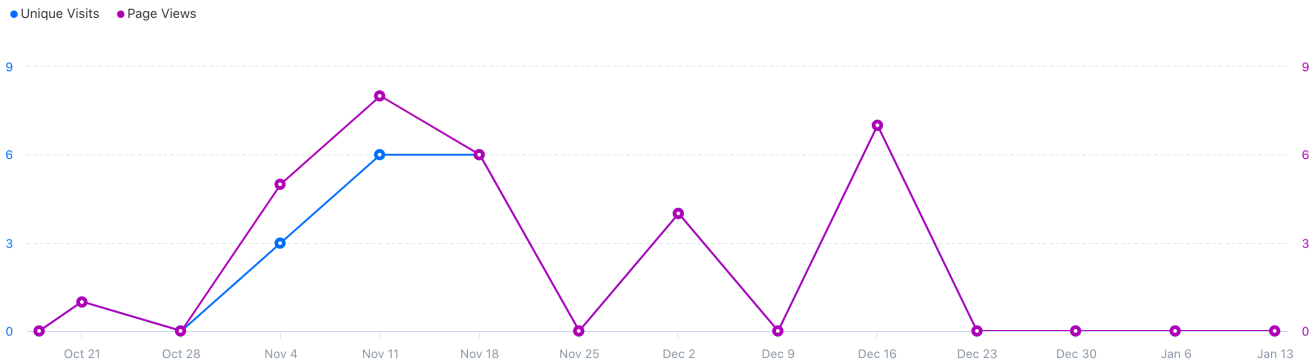


Corridor Concepts Support Summary:

Concept	*Yes Support*	*Don't Support*	*Not Sure*
Parallel Capacity: Devlin	7	0	0
Parallel Capacity: South Kelly/Newall Drive	7	0	1
Multi-Modal Improvements: SR 37 to Napa Junction	2	0	1
Multi-Modal Improvements: Napa Junction to Vine Trail	3	0	0
Multi-Modal Improvements: So. Kelly Rd to Soscol Junction	3	0	1
Intersection Improvements: Carneros - SR 29/SR12/SR121	2	1	0
Intersection Improvements: SR 29/SR 12/Airport Blvd	2	1	1
Intersection Improvements: Soscol Junction	4	1	0
Grade Separated Pedestrian Crossings	17	1	1
Vine Trail Alignment Improvement	6	0	0
Bay Trail Alignment	6	1	0
SMART Extension: American Canyon to Vallejo Ferry Terminal	5	0	1
SMART Extension: Novato to Suisun City	4	0	2
Bus Stop Changes	6	0	0
Bus on Shoulder	1	1	1
Route 11 Express Bus Service	4	0	0
New Route 29 Bus Service	6	1	0
Bus Queue Jump	4	3	2
Bus Transit Signal Priority	4	2	5
Future NVTA Maintenance Facility / Transportation Management Center	3	0	1
Integrated Corridor Management: Variable Message Sign	9	3	2
Integrated Corridor Management: Traffic Monitoring Detectors	7	1	2
Integrated Corridor Management: Trailblazer Signage	6	1	1
Integrated Corridor Management: CCTV Cameras	7	1	1

Virtual Workshop:

Website Analytics (since workshop): 118 Unique Visitors with 157 webpage views. Website views spiked around the workshop date and a few days after and were somewhat higher again between Dec 6 & 16th. Ten general website comments have been received to date that were not specific to any of the corridor concepts.



The interactive mapping tool has been live longer and is generating more activity than the virtual survey. The analytics of the website indicate that the majority of people visiting the site are either going to the mapping tool or leaving a direct comment on the website. It may also suggest that many users are going directly to the interactive mapping tool and bypassing the website. The project team will be analyzing this further and making adjustments to drive more visitors to the survey as well as the interactive mapping tool.

Next Steps:

The project team will continue outreach efforts to encourage more survey responses from the virtual workshop platform and will continue to promote the successful on-line interactive mapping tool during the remainder of the Phase 1 outreach effort. A particular effort will be potential pop-up events and presentations to civic, community, and faith-based groups, as well as another press release, email blast, and social media postings announcing the closure of the survey. A second community workshop is planned in the early spring.

REGIONAL GOVERNMENT SERVICES
SERVING PUBLIC AGENCIES SINCE 2002

MEMO

TO: Jim Damkowitch GHD, Project Manager
Rebecca Schenck, NVTA Project Manager

FROM: Kendall Flint RGS, Task Manager, Public Outreach

DATE: November 5, 2019

RE: Proposed Workshop Structure and Materials UPDATE

The following is the proposed structure and materials required for the upcoming SR29 Workshop for your approval/review.

Workshop Set-Up Materials

5:00 - 6:00 Project Team Set-Up

RGS to Provide:

- Welcome Signs
- PowerPoint Projector and Screen
- Two Laptop Computers
- Turning Point System
- Meeting Sign-in Sheets
- Name Badges for Project Team
- Name Tags for Public
- Hard Copies of PPT Presentation
- Hard Copies of FAQ
- 5 Easels
- Meeting Evaluation Forms
- Pens/Pencils
- Sticky Notes
- Comment Cards

GHD to Provide:
10 easels and up to 12 (36 x 48) white boards for clipping plots (lots of clips)

Workshop Structure

6:30-6:40 Welcome and Introductions (Jim Damkowitch/Rebecca Schenck)

6:40-7:00 Overview of Plan (PPT – GHD/RGS)

7:00 – 7:35 Stations
Interactive Web-based Tool Station (1)
Minimum 4 Laptops with Power Cords and Mice
One Projector Screen (RGS)

Background Information Station (2)
Will include plots of our existing condition analyses:

- Collision Maps
- Level of Traffic Stress Maps
- Congestion, Travel Time Reliability, Traffic Volume Maps
- Existing Infrastructure Condition Maps
- Points of Interest and ROW Maps

Roadway Improvements Corridor Map for Public Input (3)

Active Transportation Improvements Corridor Map for Public Input (4)

Transit Improvement Corridor Map for Public Input (5)

ITS Improvement Corridor Map for Public Input (6)

7:35 – 8:00 Turning Point Exercise (RGS-Flint
Corridor Concept Preferences

8:00 Project Team Summarizes Input Received
Brief Overview of Next Steps (PPT)

- Promote Project Website
- Project Schedule

Wrap-Up

Attachment B: Turning Point Polling Results

Session Name
SR29

Date Created
11/12/2019 5:44:55 PM

Active Participants
26

Total Participants
26

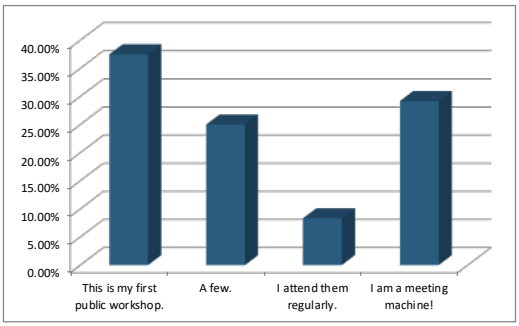
Average Score
0.00%

Questions
15

Results by Question

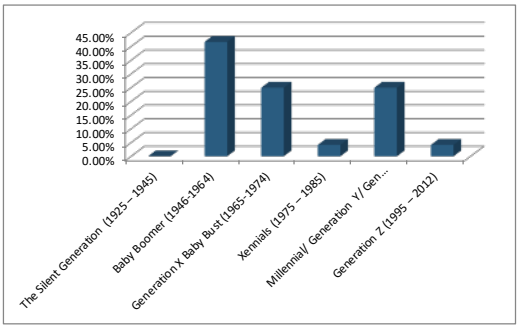
1. How many public workshops have you attended in the past? (Multiple Choice)

	Responses	
	Percent	Count
This is my first public workshop.	37.50%	9
A few.	25.00%	6
I attend them regularly.	8.33%	2
I am a meeting machine!	29.17%	7
Totals	**100%**	**24**



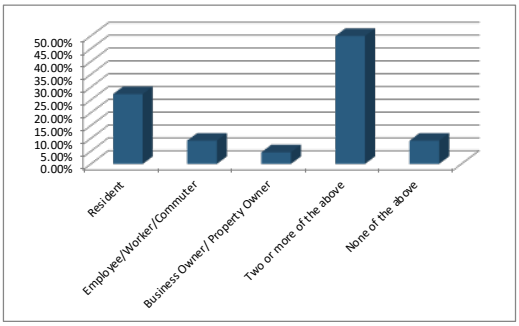
2. What age group do you belong to? (Multiple Choice)

	Responses	
	Percent	Count
The Silent Generation (1925 – 1945)	0.00%	0
Baby Boomer (1946-1964)	41.67%	10
Generation X Baby Bust (1965-1974)	25.00%	6
Xennials (1975 – 1985)	4.17%	1
Millennial/ Generation Y/ Gen Next (1980 – 1994)	25.00%	6
Generation Z (1995 – 2012)	4.17%	1
Totals	**100%**	**24**



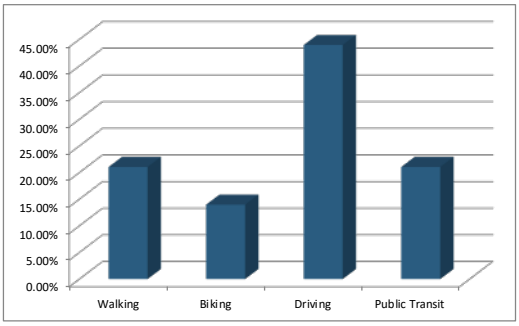
3. I am a ____ in the SR 29 Corridor community. (Multiple Choice)

	Responses	
	Percent	Count
Resident	27.27%	6
Employee/Worker/Commuter	9.09%	2
Business Owner/ Property Owner	4.55%	1
Two or more of the above	50.00%	11
None of the above	9.09%	2
Totals	**100%**	**22**



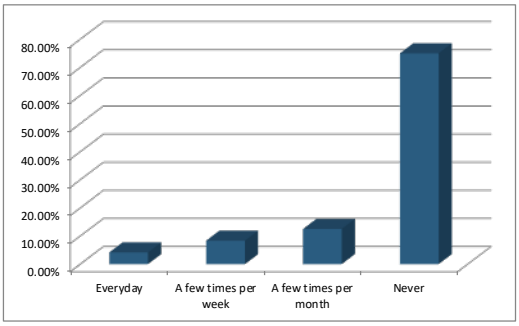
4. Rank the following transportation modes in the order of your use: (Priority Ranking)

	Responses	
	Percent	Weighted Count
Walking	21.05%	104
Biking	13.97%	69
Driving	43.93%	217
Public Transit	21.05%	104
Totals	**100%**	**494**



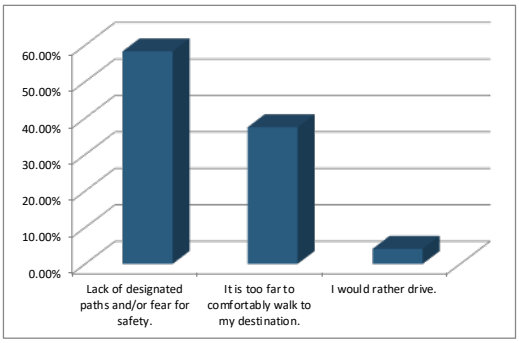
5. How often do you travel as a pedestrian along SR29? (Multiple Choice)

	Responses	
	Percent	Count
Everyday	4.17%	1
A few times per week	8.33%	2
A few times per month	12.50%	3
Never	75.00%	18
Totals	**100%**	**24**



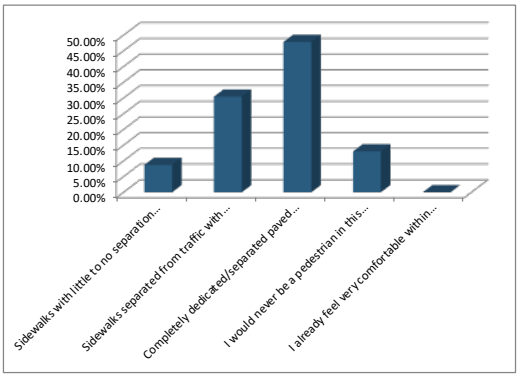
6. If you choose not to – why? (Multiple Choice)

	Responses	
	Percent	Count
Lack of designated paths and/or fear for safety.	58.33%	14
It is too far to comfortably walk to my destination.	37.50%	9
I would rather drive.	4.17%	1
Totals	**100%**	**24**



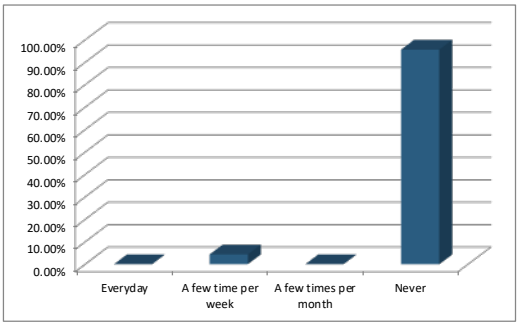
improvements would you prefer implemented in order to feel comfortable? (Multiple Choice)

	Responses	
	Percent	Count
Sidewalks with little to no separation from traffic	8.70%	2
Sidewalks separated from traffic with landscaped planting strips	30.43%	7
Completely dedicated/separated paved path	47.83%	11
I would never be a pedestrian in this corridor	13.04%	3
I already feel very comfortable within this corridor	0.00%	0
Totals	**100%**	**23**



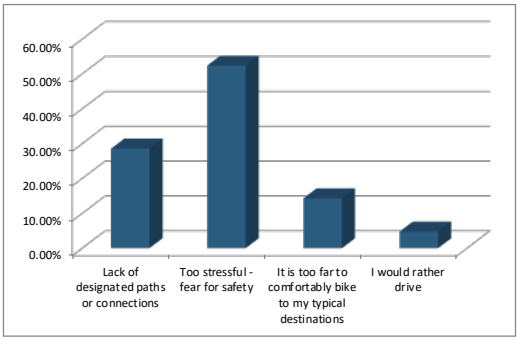
8. How often do you bike on SR29? (Multiple Choice)

	Responses	
	Percent	Count
Everyday	0.00%	0
A few time per week	4.35%	1
A few times per month	0.00%	0
Never	95.65%	22
Totals	**100%**	**23**



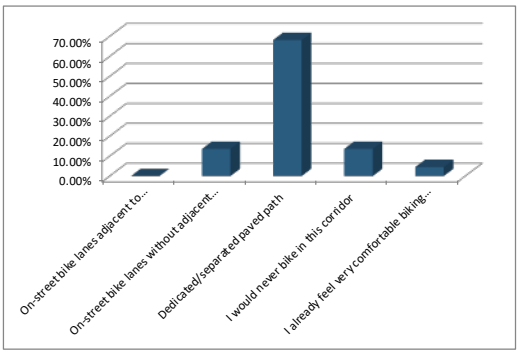
9. If you choose not to bike – why? (Multiple Choice)

	Responses	
	Percent	Count
Lack of designated paths or connections	28.57%	6
Too stressful - fear for safety	52.38%	11
It is too far to comfortably bike to my tvpical destinations	14.29%	3
I would rather drive	4.76%	1
Totals	**100%**	**21**



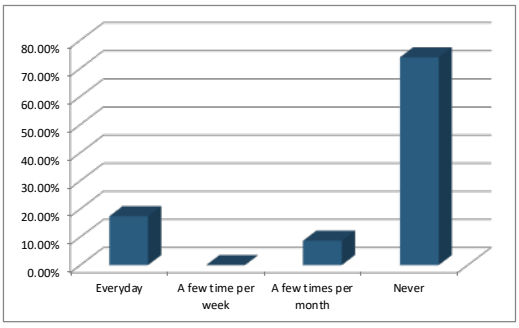
10. What improvements would you like to see in order to feel safer biking? (Multiple Choice)

	Responses	
	Percent	Count
On-street bike lanes adjacent to parking	0.00%	0
On-street bike lanes without adjacent parking	13.64%	3
Dedicated/separated paved path	68.18%	15
I would never bike in this corridor	13.64%	3
I already feel very comfortable biking within the corridor	4.55%	1
Totals	**100%**	**22**



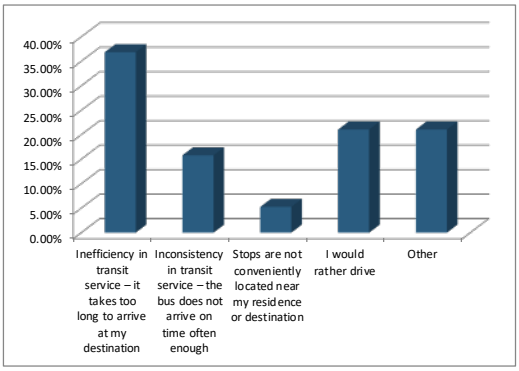
transit in the corridor? (Multiple Choice)

	Responses	
	Percent	Count
Everyday	17.39%	4
A few time per week	0.00%	0
A few times per month	8.70%	2
Never	73.91%	17
Totals	**100%**	**23**



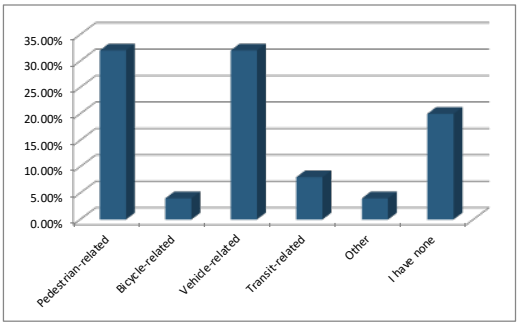
12. If you choose not to use public transit– why? (Multiple Choice)

	Responses	
	Percent	Count
Inefficiency in transit service – it takes too long to arrive at my destination	36.84%	7
Inconsistency in transit service – the bus does not arrive on time often enough	15.79%	3
Stops are not conveniently located near my residence or destination	5.26%	1
I would rather drive	21.05%	4
Other	21.05%	4
Totals	**100%**	**19**



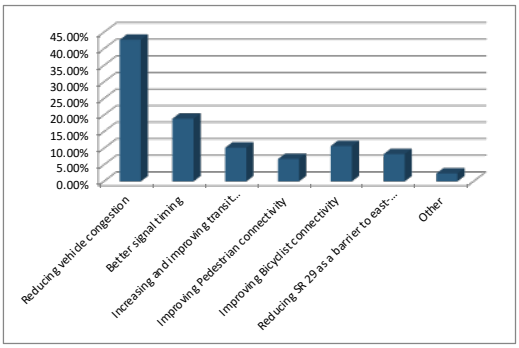
13. How would you describe your primary safety concern in the corridor? (Multiple Choice)

	Responses	
	Percent	Count
Pedestrian-related	32.00%	8
Bicycle-related	4.00%	1
Vehicle-related	32.00%	8
Transit-related	8.00%	2
Other	4.00%	1
I have none	20.00%	5
Totals	**100%**	**25**



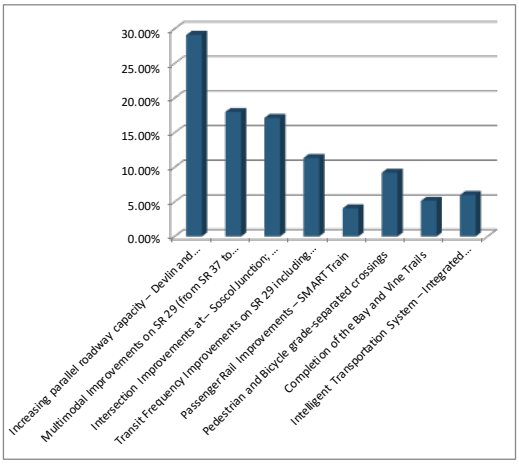
14. What are your top three priorities? (Priority Ranking)

	Responses	
	Percent	Weighted Count
Reducing vehicle congestion	42.72%	176
Better signal timing	18.93%	78
Increasing and improving transit service	10.19%	42
Improving Pedestrian connectivity	6.80%	28
Improving Bicyclist connectivity	10.68%	44
Reducing SR 29 as a barrier to east-west pedestrian and bike movements	8.25%	34
Other	2.43%	10
Totals	**100%**	**412**



15. What are your top FOUR priorities? (Priority Ranking)

	Responses	
	Percent	Weighted Count
Increasing parallel roadway capacity – Devlin and Newell-S Kelly Extensions	29.12%	136
Multimodal Improvements on SR 29 (from SR 37 to Soscol Junction)	17.99%	84
Intersection Improvements at – Soscol Junction; Airport; Carneros	17.13%	80
Transit Frequency Improvements on SR 29 including Queue Jumps and Part-Time Use of Shoulder for Transit	11.35%	53
Passenger Rail Improvements – SMART Train	4.07%	19
Pedestrian and Bicycle grade-separated crossings	9.21%	43
Completion of the Bay and Vine Trails	5.14%	24
Intelligent Transportation System – Integrated Corridor Management – ties real time information for transit vehicles and operations of SR 29, Devlin and Newell-S Kelly Extensions.	6.00%	28
Totals	**100%**	**467**



Memorandum

January 10, 2019

To:	Kim Anderson, RGS PT	Project:	SR 29 CMCP
From:	Paige Thornton, GHD	Ref/Job No.:	11189607
CC:	Jim Damkowitch, GHD	File No.:	11189607MEM001.docx

Subject: Social Pinpoint Improvement Survey Response Summary

1. Introduction

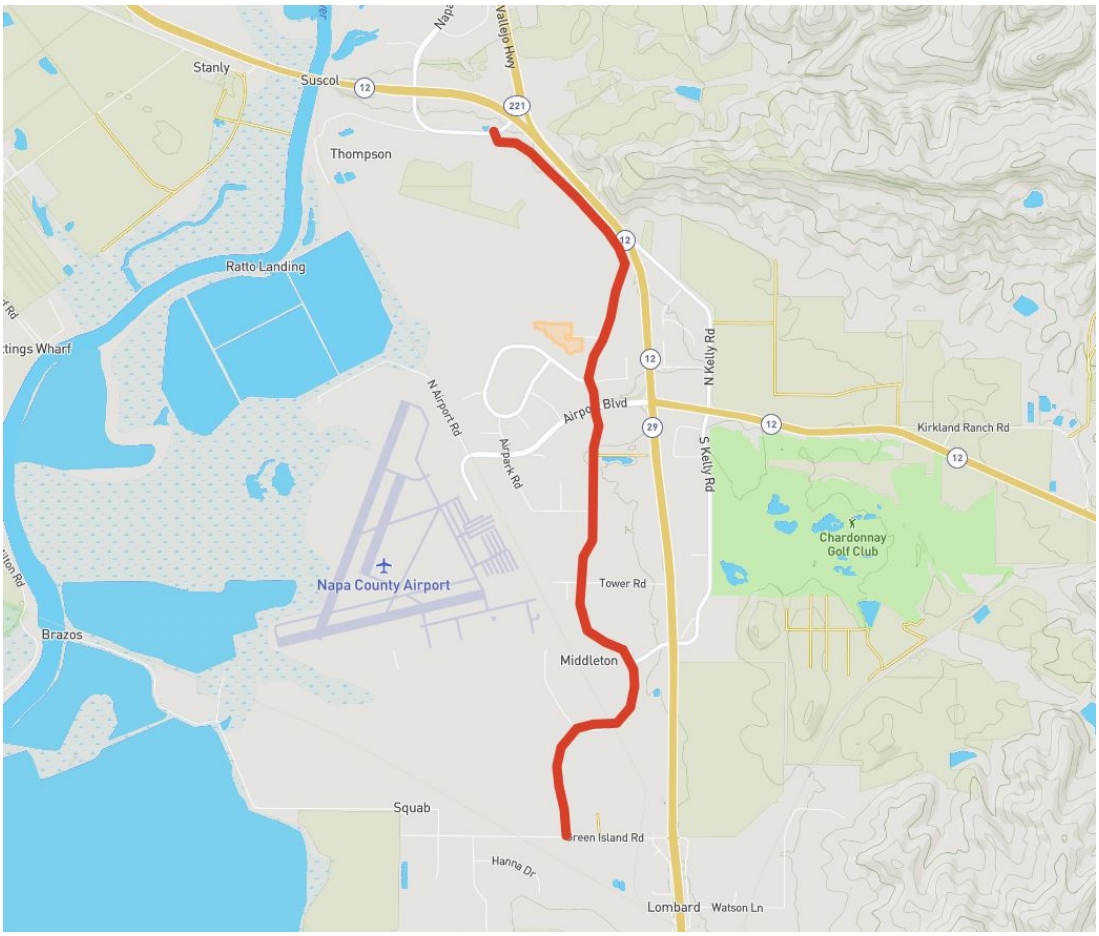
This memorandum includes a summary of survey responses associated with each improvement concept presented on the project's interactive web-based tool through Social Pinpoint. Description and graphics mirror the information displayed on the website, with some additional information to clarify map feature locations. Responses summarized herein include those recorded between November 12, 2019, the date of the project's first public workshop, and January 9, 2019.

GHD
943 Reserve Drive Roseville California 95678 USA
T 916 782 8688 **F** 916 782 8689 **W** www.ghd.com

2. Improvements

Devlin Parallel Capacity

The Devlin alignment will provide parallel road capacity to SR 29. Segments A, B, C, D, and F have been constructed. Segment E will be constructed in 2019. Segment H has received California Statewide Transportation Improvement Program (STIP) funding, slating the remainder of the alignment for completion.

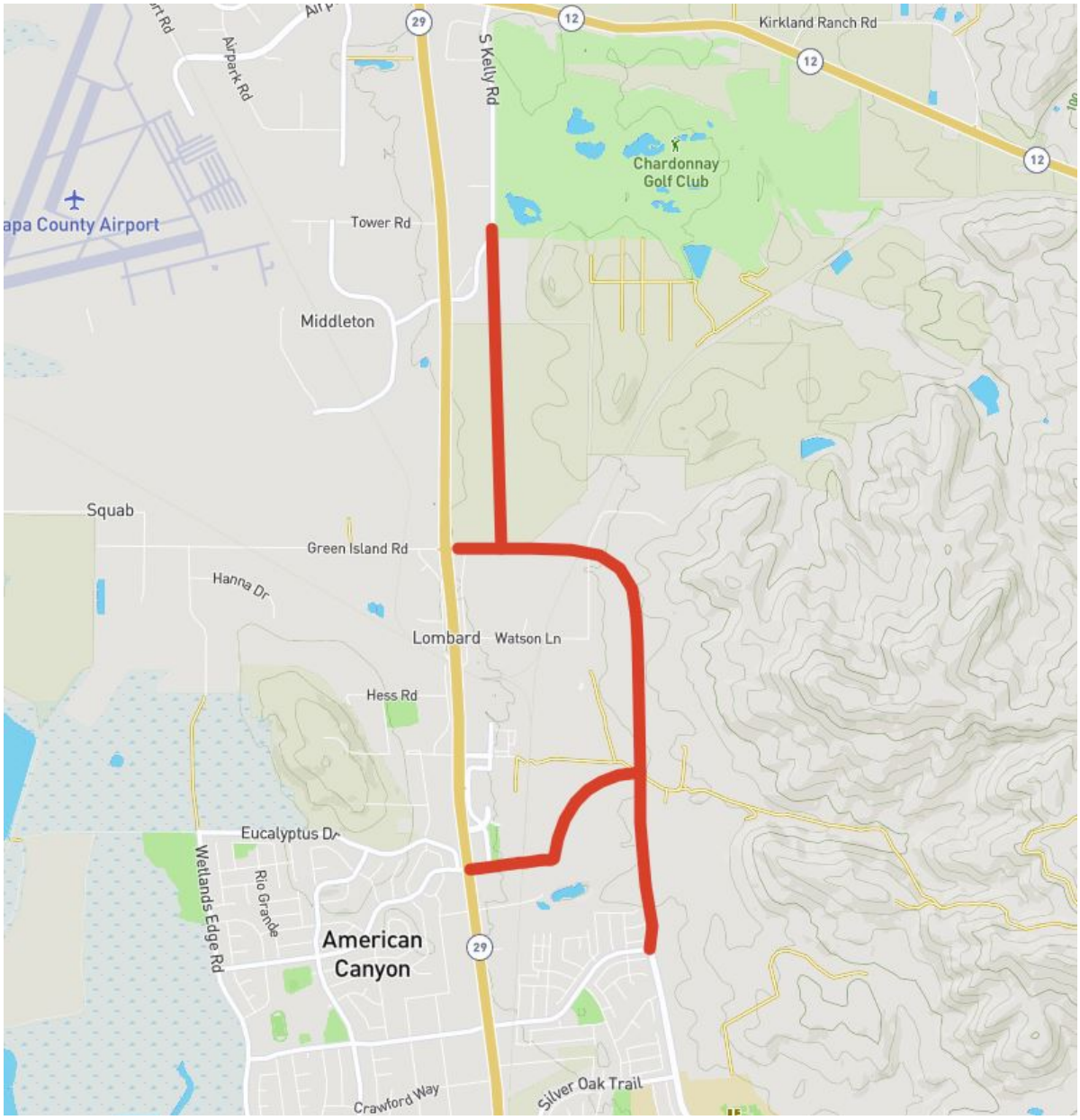


Devlin Parallel Capacity Alignment Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	N/A
11/19/19	Yes	N/A
11/25/19	Yes	N/A
12/15/19	Yes	There needs to be more than 1 way out of Green Valley Road Business park, in case of an emergency.
12/17/19	Yes	N/A
12/20/19	Yes	Should include complete streets design and traffic calming
01/05/19	Yes	I think having an alternate way around Hwy. 29 would help with traffic. A roundabout would not help make things better.

South Kelly/ Newell Drive Alignment

The South Kelly Road/Newell Drive alignment would provide parallel roadway capacity to SR 29. This improvement would include roadway extensions of Newell Drive, Rio Del Mar and South Kelly Road. Newell Drive would be extended as a 4 lane roadway from Donaldson Way to Rio Del Mar, and a 2 lane roadway from Rio Del Mar to Green Island Road. Additionally, Rio Del Mar would be extended to connect with the Newell Drive extension, and South Kelly Road would be extended to connect with the North segment of the Newell Drive extension, both as a two lane roadways.



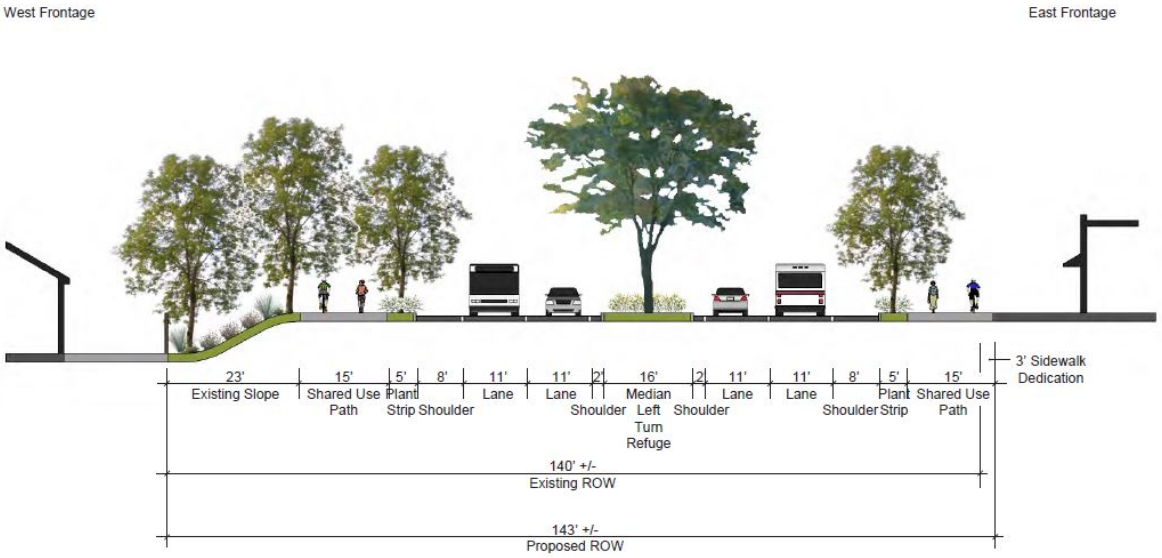
Newell Drive/South Kelly Road Parallel Capacity Alignment Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	N/A
11/16/19	Yes	Make the extension on Newell Dr. 2 lanes the whole way. Keep the speed limit at 35 m.p.h. People already speed at that limit and have a major disregard for pedestrians (mostly children walking to school). I have seen way too near misses on this road. And people stopping at the stop light to let their kids out on the side of the road. To make a big improvement on traffic for Newell Dr., change the high school traffic signal so ALL ways have a protected turn arrow. Many people get impatient and cross the crosswalk while there is still children in it. Also stopping putting so much housing in 1 condensed area, this is part of why traffic is so bad.
11/19/17	I'm not sure	I support this if the design on these alternate routes traffic calming/complete streets design
11/25/19	Yes	N/A
12/15/2019*	Yes	N/A
12/17/19	Yes	N/A
12/18/19	Yes	N/A
12/20/19	Yes	N/A

** Two responses excluded due to duplicate IP address used. Both comments indicated support for the improvement.*

SR 29 Multimodal Improvements - SR 37 to Napa Junction Rd

This segment includes multimodal roadway improvements from SR 37 to Napa Junction Road. Improvements would include use of the existing four lane roadway, Class I shared use paths on each side of the roadway, Class II striped bike lanes, pedestrian refuge at intersections, and landscaped planting strips to separate bicyclists and pedestrians from vehicular traffic.

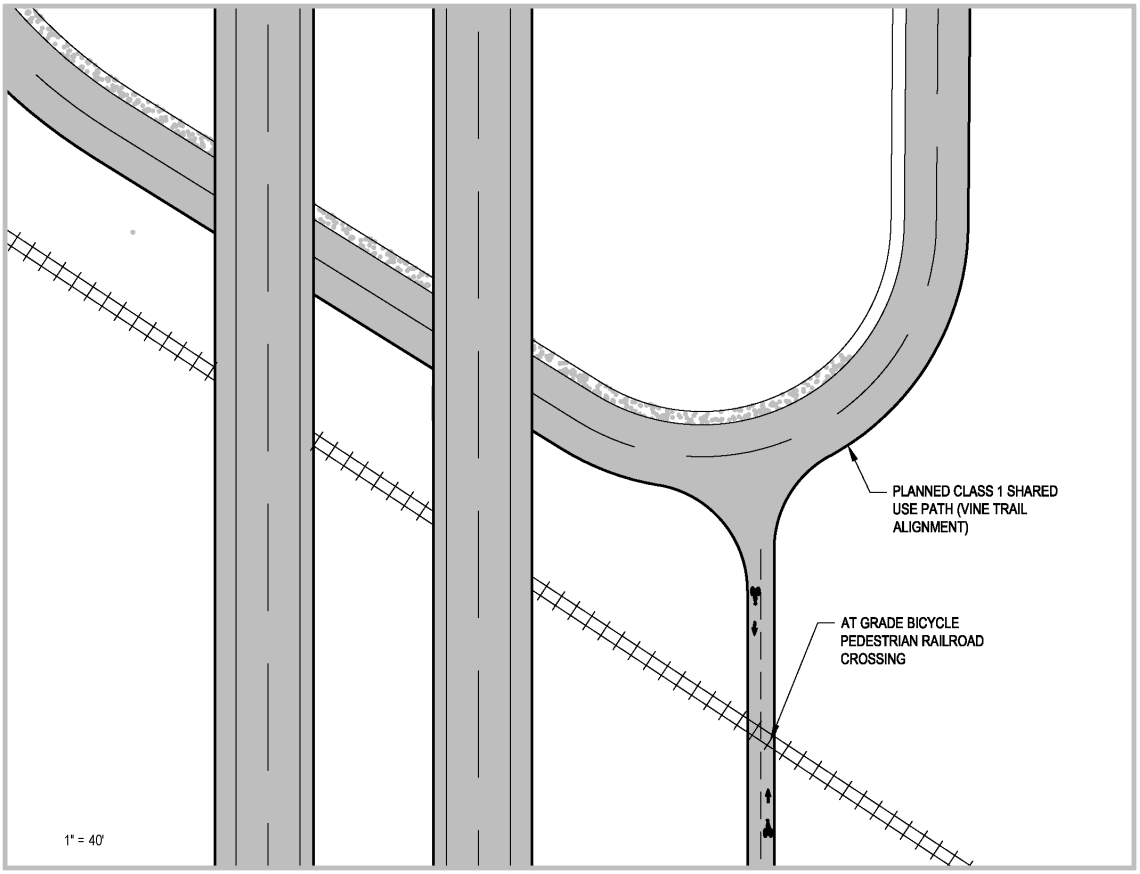


SR 29 Multimodal Improvements - SR 37 to Napa Junction Rd Improvement Survey Responses

Comment Date	Support for Improvement?	Support for part-time use of shoulder, queue jump lanes or shared use path in center median	Additional Comment
11/16/19	Yes	N/A	I do support these improvements, I'm sure they will get a lot of use. I don't support any of the options for the center median.
12/15/19	I'm not sure	N/A	Narrower shared use paths, and add a 3rd. lane in each direction
12/20/19	Yes	Part-time use of shoulder, Shared-use path in the center median	N/A

SR 29 Multimodal Improvements - Napa Junction Road to Vine Trail

This roadway segment includes multimodal roadway improvements from Napa Junction Road to the proposed Vine Trail and Paoli Loop. Improvements would include use of the existing four lane roadway and use of both existing and proposed Class I shared-use bicycle/ pedestrian facilities. There is an existing Class I shared-use path east of SR 29 from Napa Junction Road to Paoli Loop Road. This path would connect to the proposed Vine Trail alignment at Paoli Loop with an at-grade bicycle and pedestrian railroad crossing south of Paoli Loop. This would provide access to the proposed Class I Multi-use Vine Trail alignment along Paoli Loop and Green Island Road, which extends north to the west of SR 29. This proposed connection and alignment would provide a safe avenue for bicyclists and pedestrians completely separated from and parallel to SR 29.



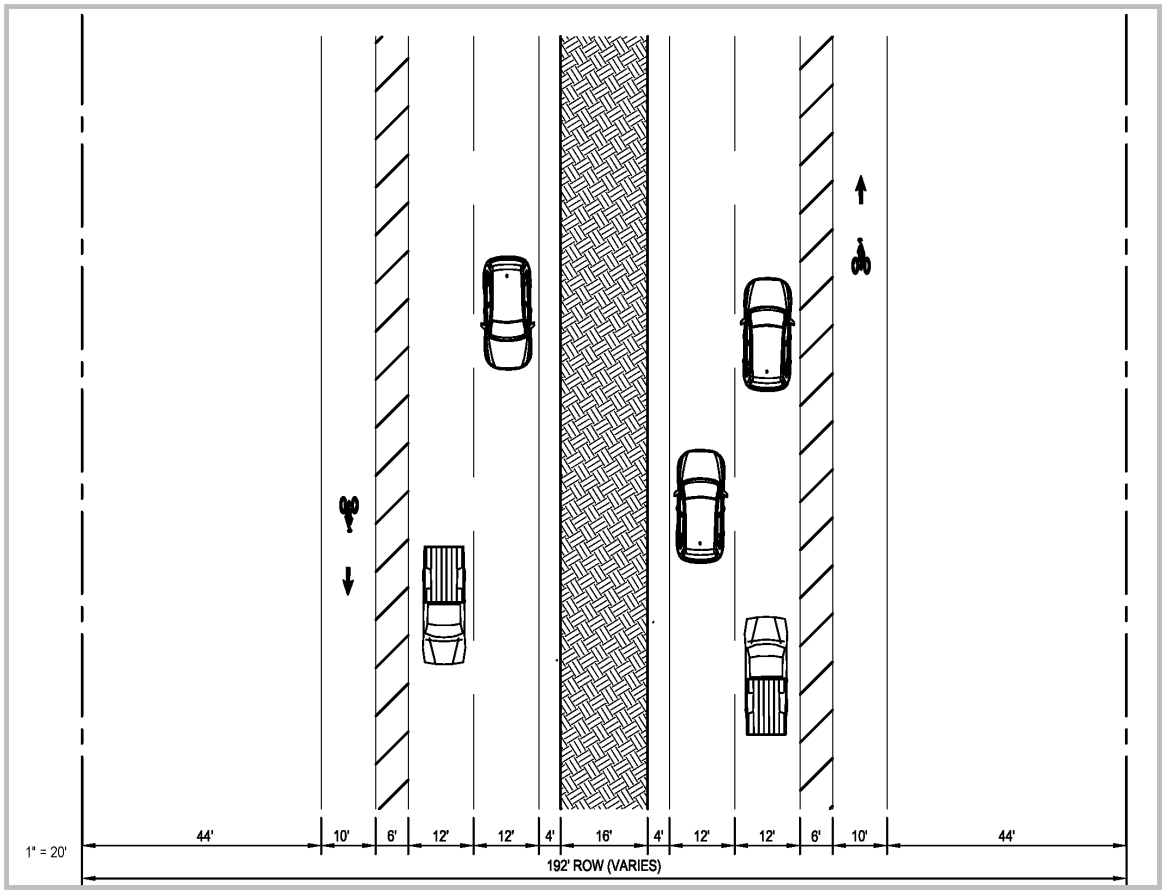
SR 29 Multimodal Improvements - Napa Junction Road to Vine Trail Improvement Survey Responses

Comment Date	Support for Improvement?	Support for part-time use of shoulder, queue jump lanes or shared use path in center median	Additional Comment
11/16/19	Yes	N/A	I feel with the proposed home building project this would get enough use. Though I feel there is too many homes planned. There have been several additions already that have increased travel time. It use to take me 20-30 minutes to drive my kids to 3 different schools in town. After just the new apartments by Walmart, that time increased to 40- 70 minutes (bad traffic, accidents).I don't think it is a good idea to use the center median for any of the above options.
12/15/19	Yes	N/A	N/A
12/20/2019*	Yes	Part-time use of shoulder, Shared -use path in the center median	N/A

** One response excluded due to duplicate comments recorded with same IP address used.*

SR 29 Multimodal Improvements - South Kelly Road to Soscol Junction

This segment includes improvements from South Kelly Road to Soscol Junction (SR 29/SR 221/Soscol Ferry Road). Improvements include use of the existing shoulder width to install Class II bike lanes from South Kelly Road to Soscol Junction Road, and an at-grade intersection improvement at South Kelly Road/SR 29 to provide safer bicycle and pedestrian access. These facilities would allow for connection to existing facilities Vine and Bay Trail facilities to the east of Soscol Junction via SR 29.



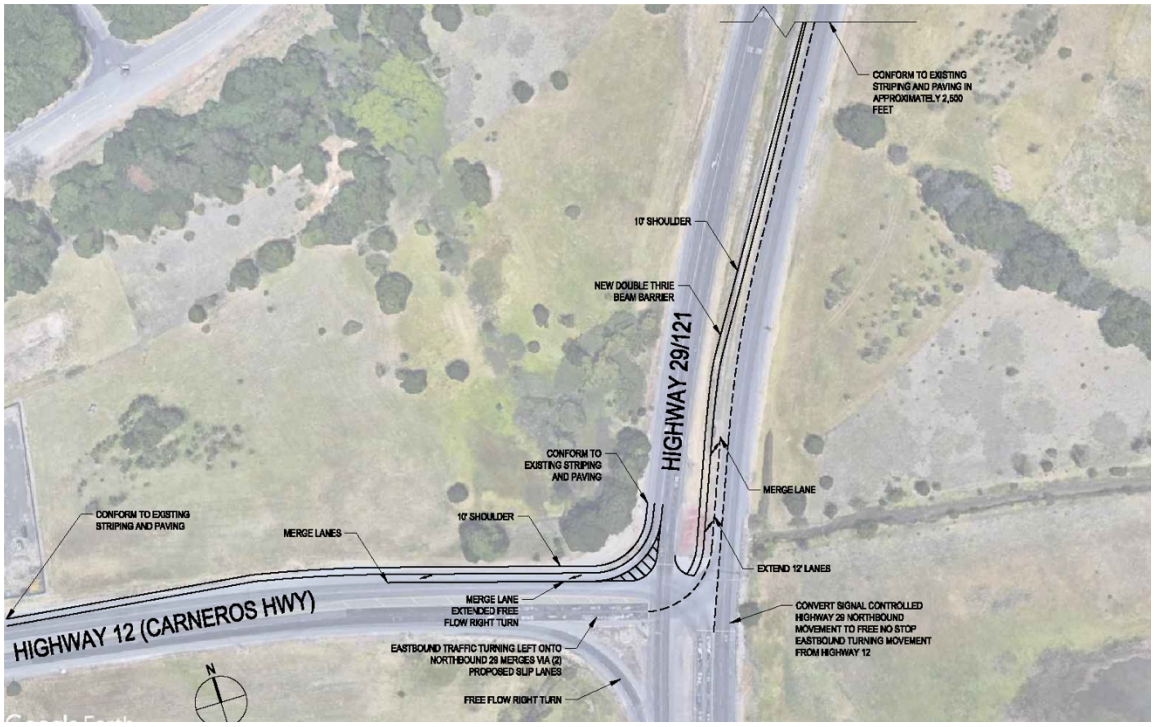
SR 29 Multimodal Improvements - South Kelly Road to Soscol Junction Improvement Survey Responses

Comment Date	Support for Improvement?	Support for part-time use of shoulder, queue jump lanes or shared use path in center median	Additional Comment
11/16/19	Yes	Part-time use of shoulder, Queue jump lanes, Shared -use path in the center median	N/A
11/16/19	I'm not sure	N/A	While it sounds like a good idea, it would be scary to ride alongside cars that are speeding by so fast. I'm not sure how much use it would get. I do not think any of the options for the center median are a good idea.
12/15/19	Yes	Queue jump lanes	N/A
12/20/19	Yes	Part-time use of shoulder, Shared -use path in the center median	N/A

Carneros - SR 29/SR12/SR121 Intersection Improvement

Intersection improvements at SR 29/SR 12/SR 121 include:

- Converting signal controlled northbound SR-29 movement to free no-stop thru movement
- Constructing dedicated unsignalized southbound SR-29 right turn lane and receiving westbound SR 12 merge lane with an approximate length of 1,000 feet west of intersection
- For the eastbound SR-121 dual left turn lanes, construct two receiving slip lanes on northbound SR-29 in existing median with approximate length of 3,100 feet north of the intersection



Carneros - SR 29/SR12/SR121 Intersection Improvement Survey Responses

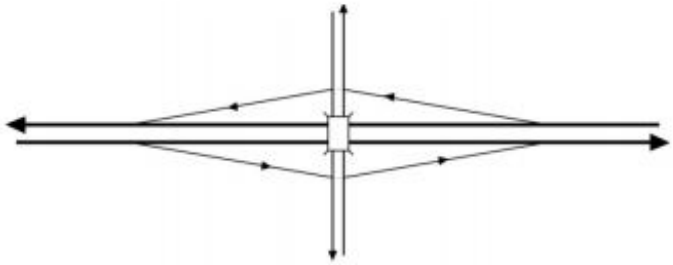
Comment Date	Support for Improvement?	Additional Comment
11/16/19	No	People are in such a rush, and terrible drivers. It would back up traffic more if there is no stop light to control traffic flow. Please, please, please DO NOT do this. People don't like to let other cars merge in, it would bigger traffic mess.
12/17/19	Yes	N/A
12/20/19	Yes	N/A

SR 29/SR 12/Airport Blvd Intersection Improvement

There are two proposed improvement alternatives at the intersection of SR 29/SR 12/Airport Blvd.

Alternative 1 includes an interchange, with SR 12/Airport Blvd crossing over a depressed SR 29, and restriction of left-turns from SR 29. The only permitted left-turn would be SR 29 southbound onto SR 12.

Alternative 2 is a tight diamond interchange. With this alternative, SR 29 would exist as a grade-separated over-crossing structure, and Airport Blvd/ SR 12 as the under-crossing.



SR 29/SR 12/Airport Blvd Intersection Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	No	I'm not sure the proposed changes would make anything better. Yes traffic gets back up during peak travel and special events,but that happens everywhere. The increase in homes built, has lead to more residents and traffic.
12/17/19	Yes	N/A
12/20/19	Yes	N/A
01/01/20	N/A	there are people using the turning lanes to bypass waiting in the traffic at the light. There are also people using the Walmart parking lot to bypass traffic at the light. It is quite dangerous trying to walk into the store in the morning during traffic times when they do this. so I suggest using a plan that keeps these things from happening. ty.

Soscol Junction Intersection Improvement

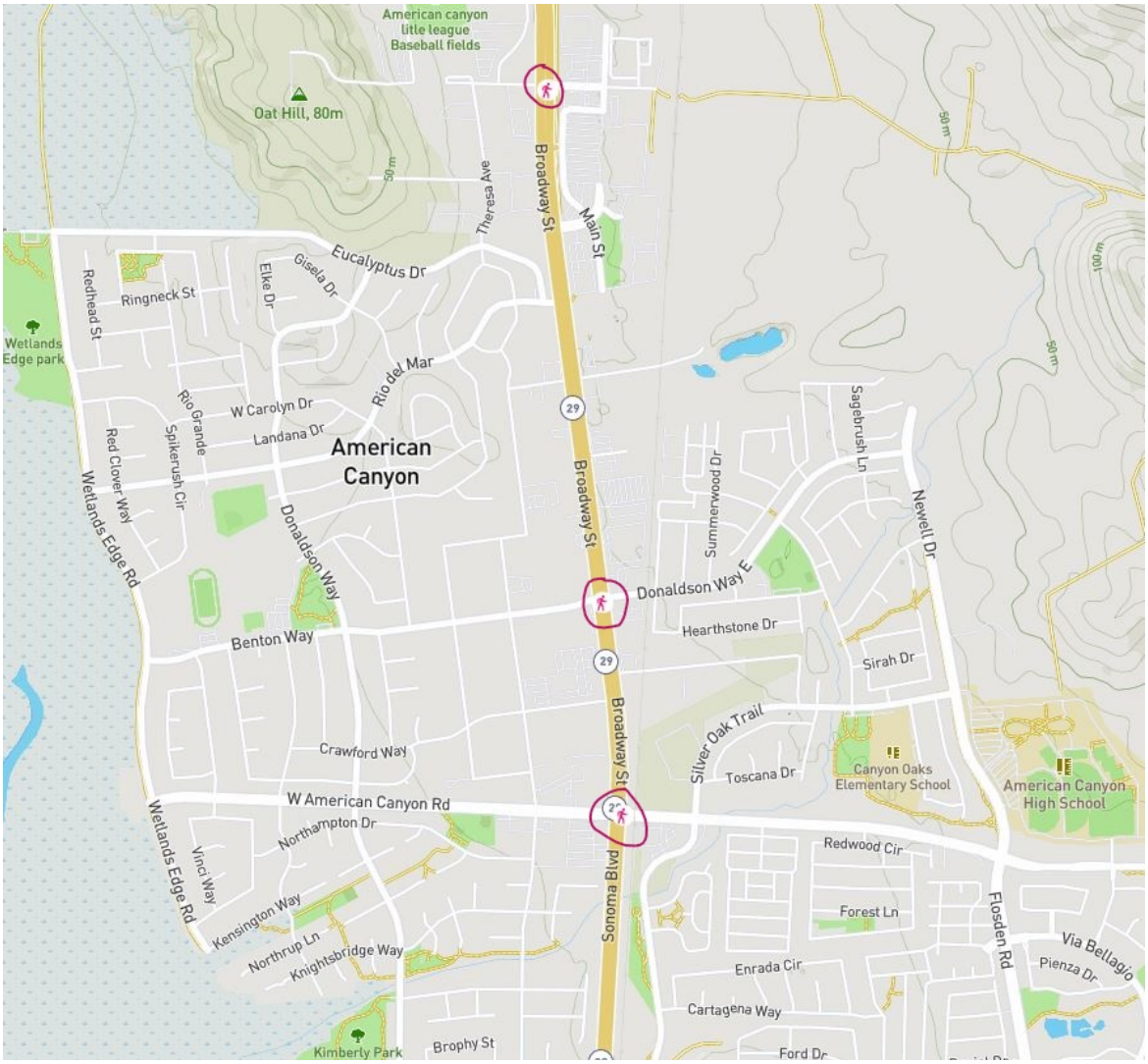
The proposed improvement at Soscol Junction (SR 29/SR 221/Soscol Ferry Rd) includes construction of two roundabouts. SR 29 will be a grade-separated structure with Soscol Ferry Road being the undercrossing, and Class I shared-use paths to connect to future alignments. This intersection improvement would improve safety and circulation.

Soscol Junction Intersection Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	
11/16/19	No	People can't handle the roundabouts at the high school, this would be much worse. Please don't waste money on this option. The highway is fine the way it is in this area. All city's deal with traffic.
11/19/19	Yes	
12/15/19	Yes	
12/20/19	Yes	

Grade-Separated Pedestrian Crossings

A grade-separated pedestrian crossing would provide safe access separated from vehicular traffic on SR 29. Proposed locations include: SR 29/Donaldson, American Canyon Rd/ SR 29 and Napa Junction Road/SR 29.



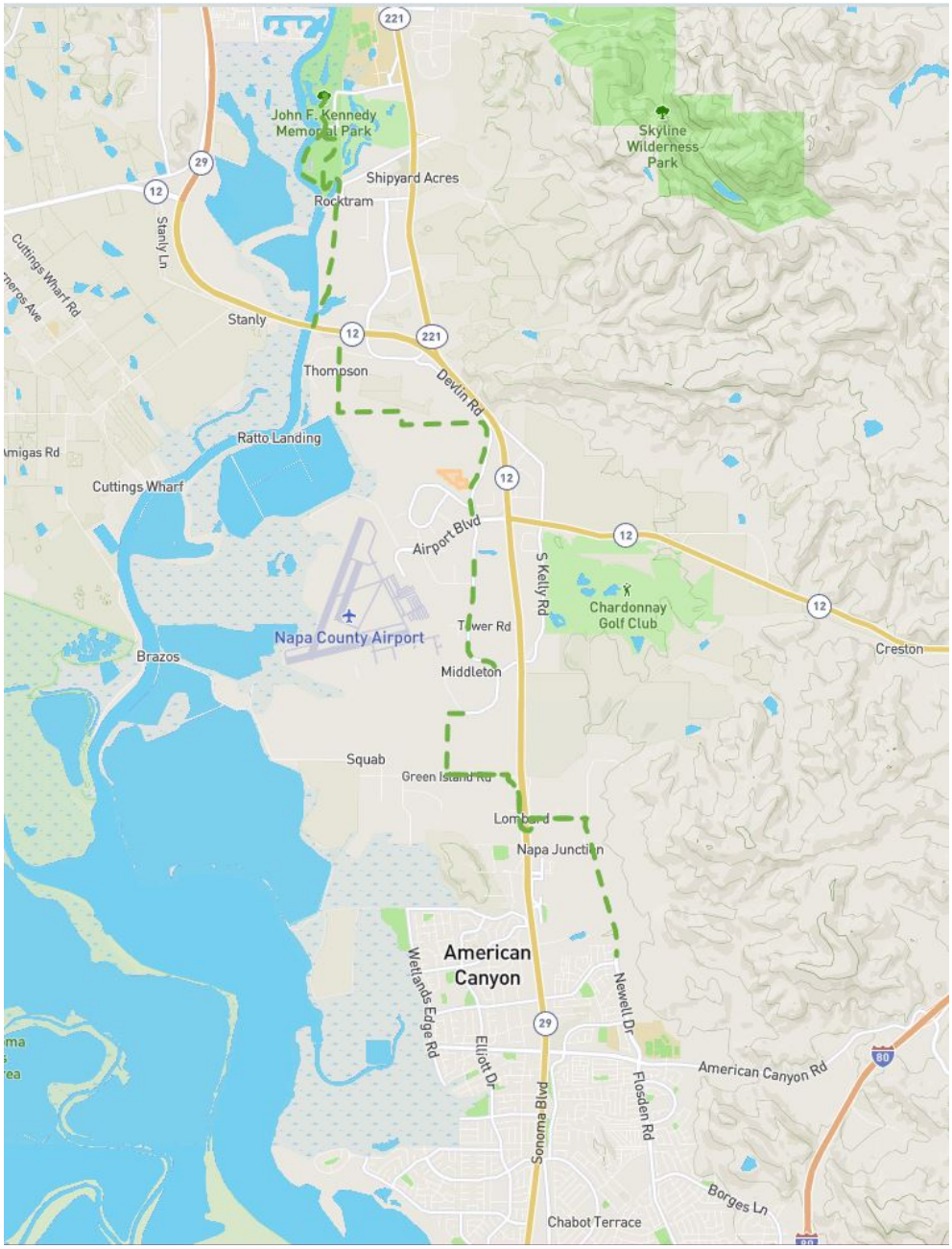
Grade-Separated Pedestrian Crossings Improvement Survey Responses

Comment Date	Support for Improvement?	Improvement Location	Additional Comment
11/16/19	Yes	W American Canyon/ SR 29	
11/16/19	Yes	Did Not Indicate	
11/19/19	I'm not sure	W American Canyon/ SR 29	What is "grade-separated"?? Does it mean an overpass? If yes, I support, but it sounds expensive
11/20/19	No	W American Canyon/ SR 29	Prioritize the pedestrian over cars. Slow speeds. Don't shame them by separating them from cars
11/25/19	Yes	Napa Junction Rd/ SR 29	
11/25/19	Yes	Donaldson Way/ SR 29	Anything that makes it safer to cross 29. It is a real obstacle for the community connecting to the wetlands and kids getting to middle school.
11/25/2019*	Yes	Napa Junction Rd/ SR 29	
12/15/19	Yes	Did Not Indicate	
12/15/19	Yes	Napa Junction Rd/ SR 29	
12/17/19	Yes	Napa Junction Rd/ SR 29	
12/17/19	Yes	W American Canyon/ SR 29	
12/17/19	Yes	Napa Junction Rd/ SR 29	
12/18/19	Yes	Donaldson Way/ SR 29	
12/23/19	Yes	Donaldson Way/ SR 29	
12/23/19	Yes	Did Not Indicate	
01/05/20	Yes	Napa Junction Rd/ SR 29	
01/05/20	Yes	W American Canyon/ SR 29	
01/09/20	Yes	Donaldson Way/ SR 29	
01/09/20	Yes	Napa Junction Rd/ SR 29	I am not sure what grade separated means, is it a tunnel or an overhead bridge?

** One response excluded due to duplicate comments recorded at the same location with same IP address used.*

Proposed Vine Trail Alignment

Proposed Class I Multi-Use Path, meaning a shared use path separated from vehicular traffic.



Proposed Vine Trail Alignment Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/49	Yes	
11/16/19	Yes	
11/25/19	Yes	
12/15/19	Yes	
12/17/19	Yes	
12/20/19	Yes	

Proposed Bay Trail Alignment

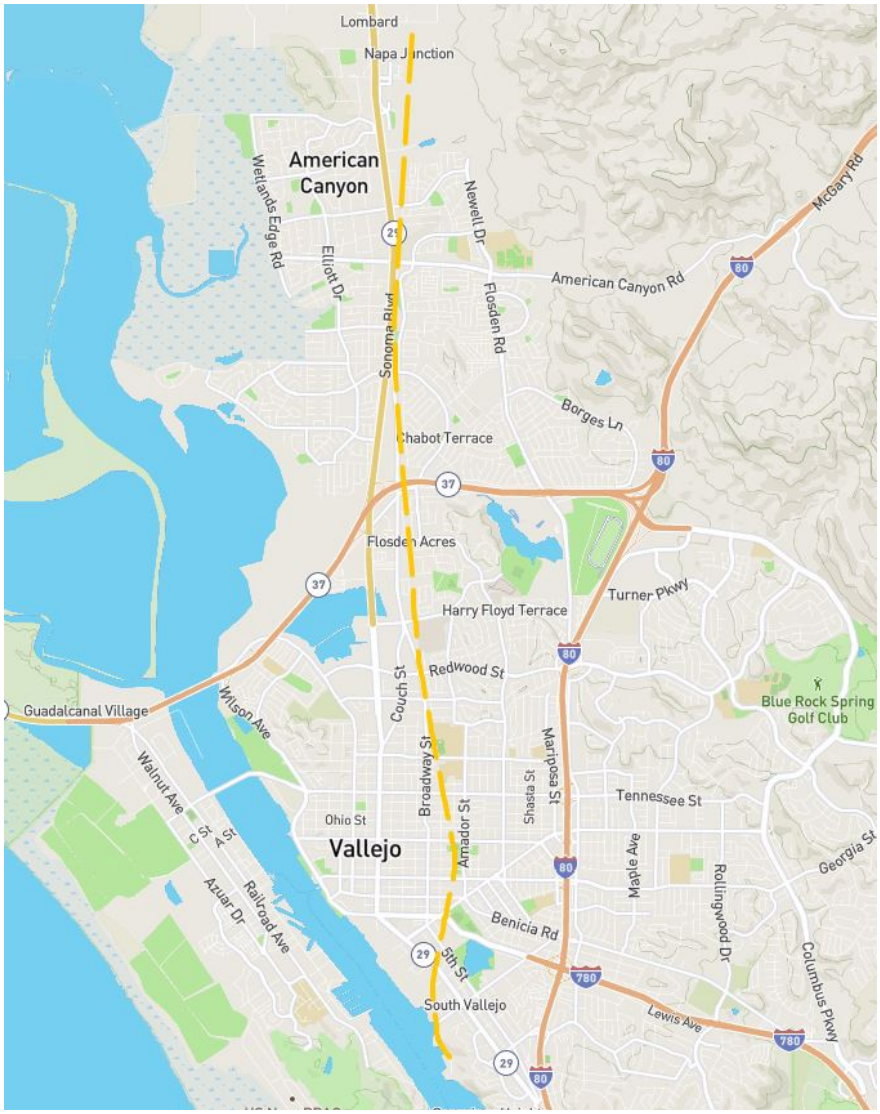
Proposed Class I Multi-Use Path, meaning a shared use path separated from vehicular traffic.

Proposed Bay Trail Alignment Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	N/A
11/25/19	Yes	N/A
12/15/19	Yes	N/A
12/17/19	Yes	N/A
12/17/19	Yes	N/A
12/20/19	Yes	N/A
01/09/19	No	I don't think cars and trucks and buses need to be on the bay trail. It should be for walking and biking, not vehicles

SMART Extension - American Canyon to Vallejo Ferry Terminal

This North-South SMART train extension would extend from Napa Junction in American Canyon to Vallejo Ferry Terminal.

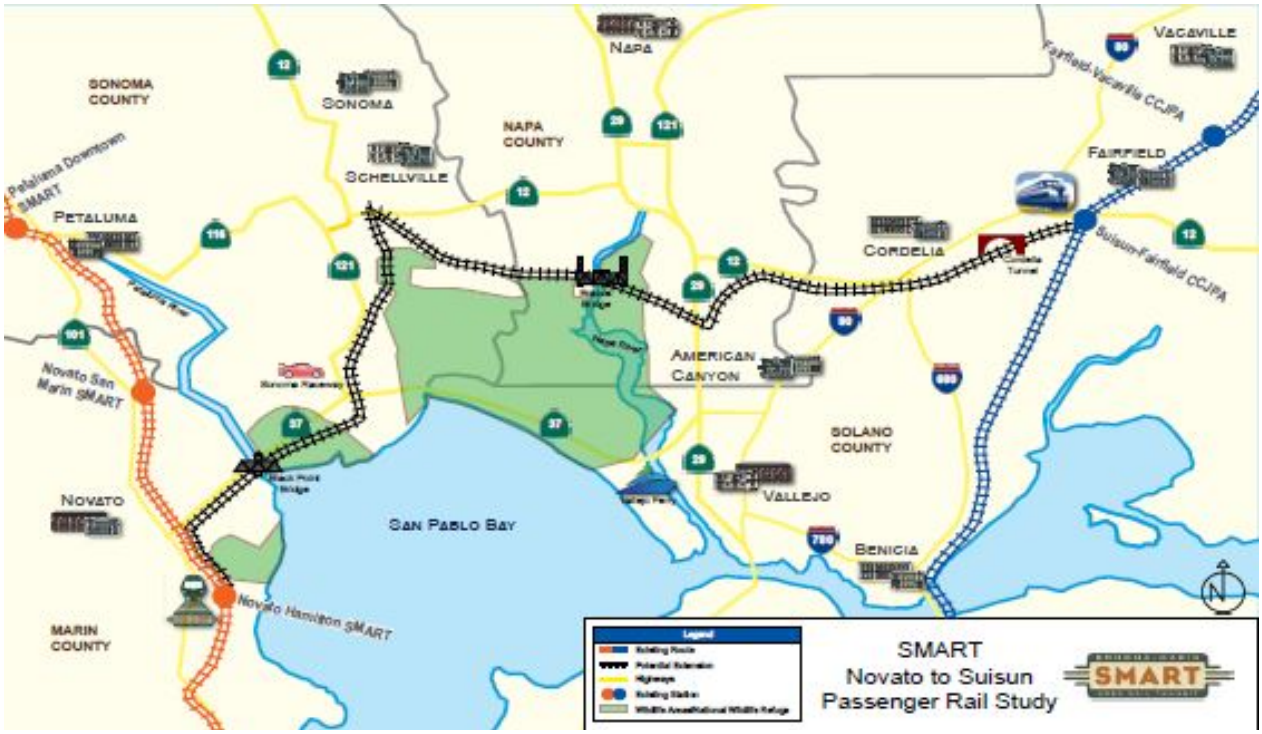


SMART Extension - American Canyon to Vallejo Ferry Terminal Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	I'm not sure	While it sounds like a good idea, there is already traffic congestion from normal traffic. If more people try to ride the train in the same area, it would cause more traffic.
11/19/19	Yes	This would be fantastic!
12/15/19	Yes	N/A
12/17/19	Yes	N/A
12/17/19	Yes	N/A
01/09/19	Yes	N/A

SMART Extension - Novato to Suisun City

This extension of SMART train lines would extend from Novato to Suisun City, passing through Napa County, providing east-west rail connectivity for travelers in the SR 12, SR 37 and SR 29 corridors. The extension would include extensive upgrades to existing tracks, several bridges, and grade crossings. Station improvements would include upgrades to existing facilities at Novato-Hamilton and Suisun-Fairfield, and construction of new stations between these existing facilities. A passenger rail communication system would also need to be implemented.

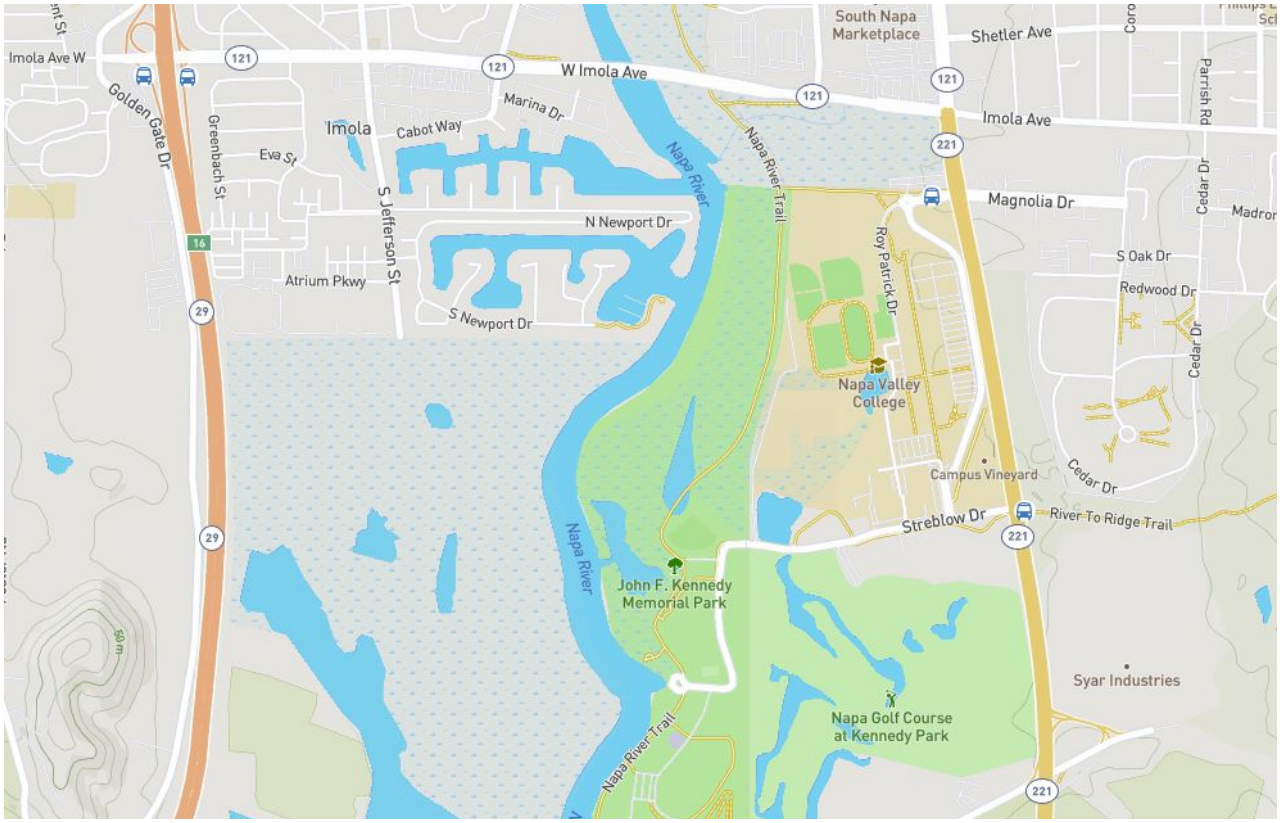


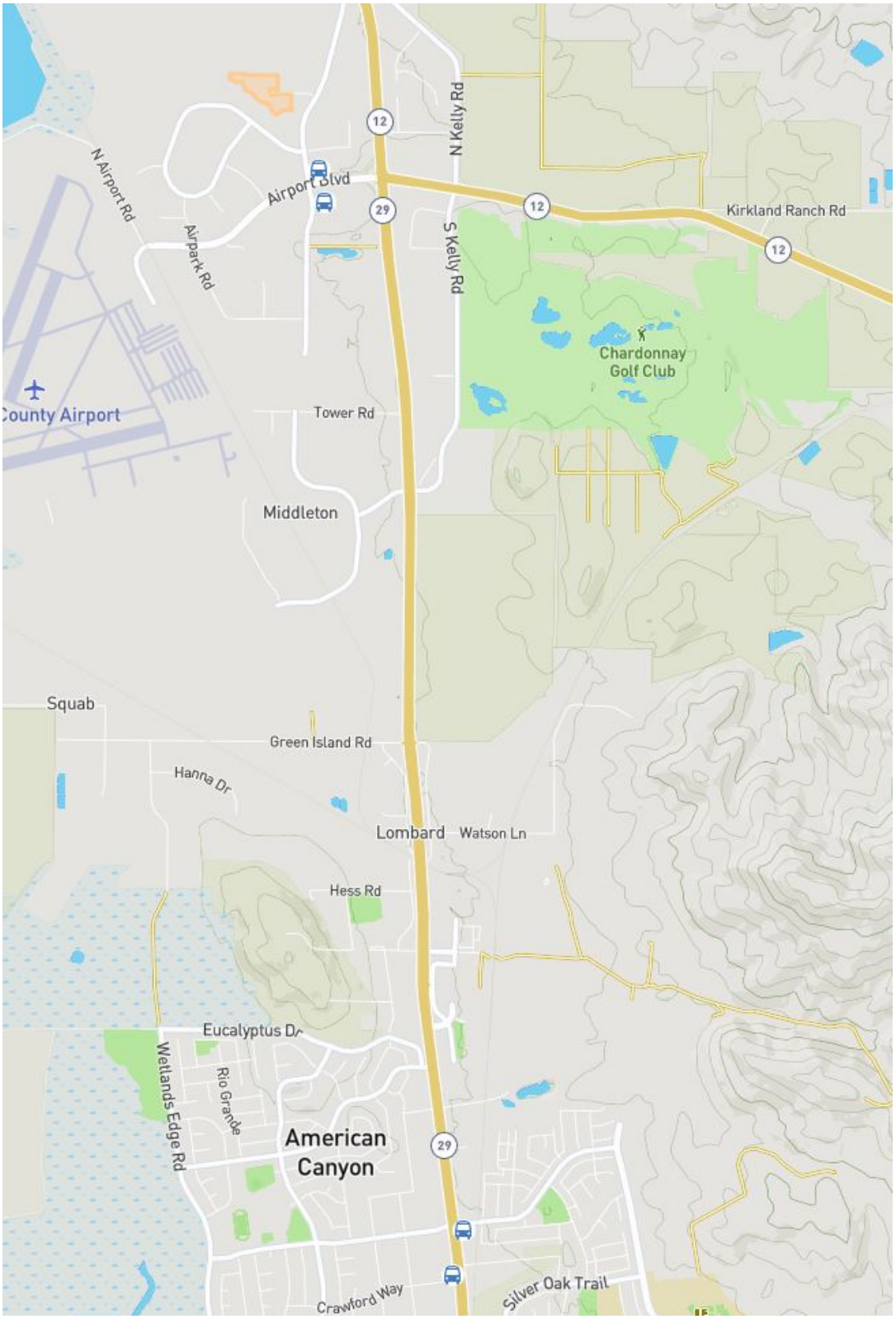
SMART Extension – Novato to Suisun City Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	N/A
11/19/19	Yes	This would be a great connection!
12/15/19	Yes	N/A
12/17/19	Yes	N/A
12/20/19	I'm not sure	N/A
01/09/19	I'm not sure	Would there be additional shuttle buses to get people to and from the Smart Train to their jobs up valley or points in Sonoma County? Or from their homes up valley to the Smart Train? Will this reduce traffic if they still have to drive to and from the Smart Train? I don't see how that would reduce traffic in American Canyon

Bus Stop Changes

Proposed bus stop changes and/ or upgrades would include benches; newly constructed or improved bus shelters; real time travel information; way finding and transit route information. Some locations would include Wi-Fi; bike storage; and improved adjacent pedestrian facilities and lighting.




N Airport Rd
Airport Blvd
N Kelly Rd
S Kelly Rd
Kirkland Ranch Rd
Airpark Rd
Chardonnay Golf Club
County Airport
Tower Rd
Middleton
Squab
Green Island Rd
Hanna Dr
Lombard
Watson Ln
Hess Rd
Eucalyptus Dr
Wetlands Edge Rd
Rio Grande
American Canyon
Crawford Way
Silver Oak Trail
12
29

Bus Stop Changes Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	A lot of people use the bus to commute. These are good improvements.
11/19/19	Yes	N/A
11/25/19	Yes	N/A
12/15/2019*	Yes	N/A
12/17/19	Yes	N/A
01/09/19	Yes	Anything that improves public transportation is a good idea

** One response excluded due to duplicate comments recorded with same IP address used.*

Bus on Shoulder

This improvement includes use of shoulder width for bus service. This treatment gives priority space to buses, allowing for increased efficiency and improved transit service. Use of shoulders by buses would be implemented where feasible along the corridor.

(a)

(b)

(c)

(d)

Bus on Shoulder Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/25/19	Yes	N/A
12/23/19	I'm not sure	I feel this will only encourage reckless drivers to use the bus lane to get ahead of traffic. I have nearly been hit while using the crosswalks at HW29 and Donaldson on multiple occasions by drivers who use the shoulder to cut ahead of traffic and turn onto Donaldson during a red light, without even looking to see if anyone is crossing. Giving these people the option of an "official" lane would encourage more to do this. Also, based on my knowledge of the bus routes in the area, this would only really affect RT29 since RT11 cuts through the streets from mini drive to Rio Del Mar, then through Walmart's parking lot. Of course, I can only speak of the potential bus lanes within the main portion of American Canyon, and it may be different heading out towards Napa.
01/09/19	No	N/A

11X Bus Service

The Route 11X would be served by 40 foot buses. Bus stops within the corridor study area for the Route 11 Express would include:

- Napa Valley College
- Devlin Road/Airport Boulevard
- Future American Canyon Park & Ride
- American Canyon Post Office

11X Bus Service Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	N/A
12/15/19	Yes	N/A
12/17/19	Yes	N/A
01/09/19	Yes	N/A

New Route 29 Bus Service

The new Route 29 would be served by 40 foot buses. Bus stops within the corridor study area for the new Route 29 would include:

- Imola Avenue Park & Ride
- American Canyon Post Office
- SR-37/Fairgrounds Park & Ride

New Route 29 Bus Service Improvement Survey Responses

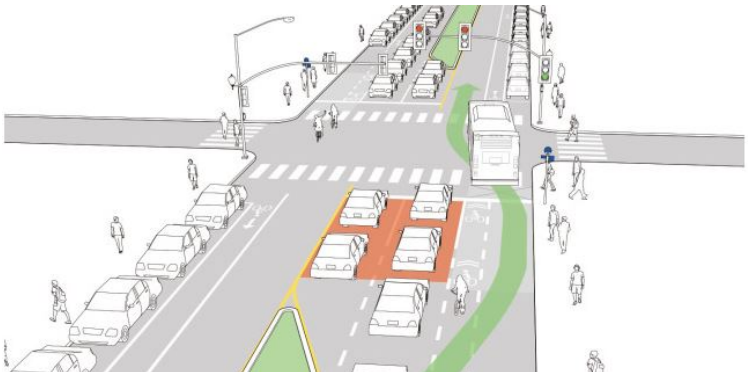
Comment Date	Support for Improvement?	Additional Comment
11/15/19	No	N/A
11/16/19	Yes	N/A
11/16/19	Yes	N/A
11/19/19	Yes	N/A
12/15/19	Yes	N/A
12/17/19	Yes	N/A
01/09/19	Yes	N/A

Queue Jump

Queue Jump locations would provide dedicated lane space for buses to traverse around queued vehicles at particular locations. Queue jumps reduce delay for buses caused by intersections, and reduce travel time and variability.

These locations include:

- SR 29 & Napa Junction Road (American Canyon)
- SR 29 & Donaldson Way (American Canyon)
- SR 29 & American Canyon Road (American Canyon)
- SR 29 & SR 12/ Airport Boulevard (Napa)



Queue Jump Lanes

Queue Jump Lanes Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	No	It is an accident waiting to happen. People pay less attention on the road now and days.
11/25/19	Yes	If you want to give people a reason to choose the bus you must do something to make it appealing. Your rates are not low so your times and routs should make it worth it.
12/15/19	Yes	N/A
12/15/19	Did not Indicate	Hwy 29 Needs 3 lanes in each direction.
12/17/19	Yes	N/A
12/18/19	Yes	Would this also be implemented on school buses?
12/20/19	I'm not sure	N/A
12/23/19	No	N/A
01/09/19	No	I don't see how having buses cut through traffic in a 1/4 to 1/2 mile space is efficient

Transit Signal Priority

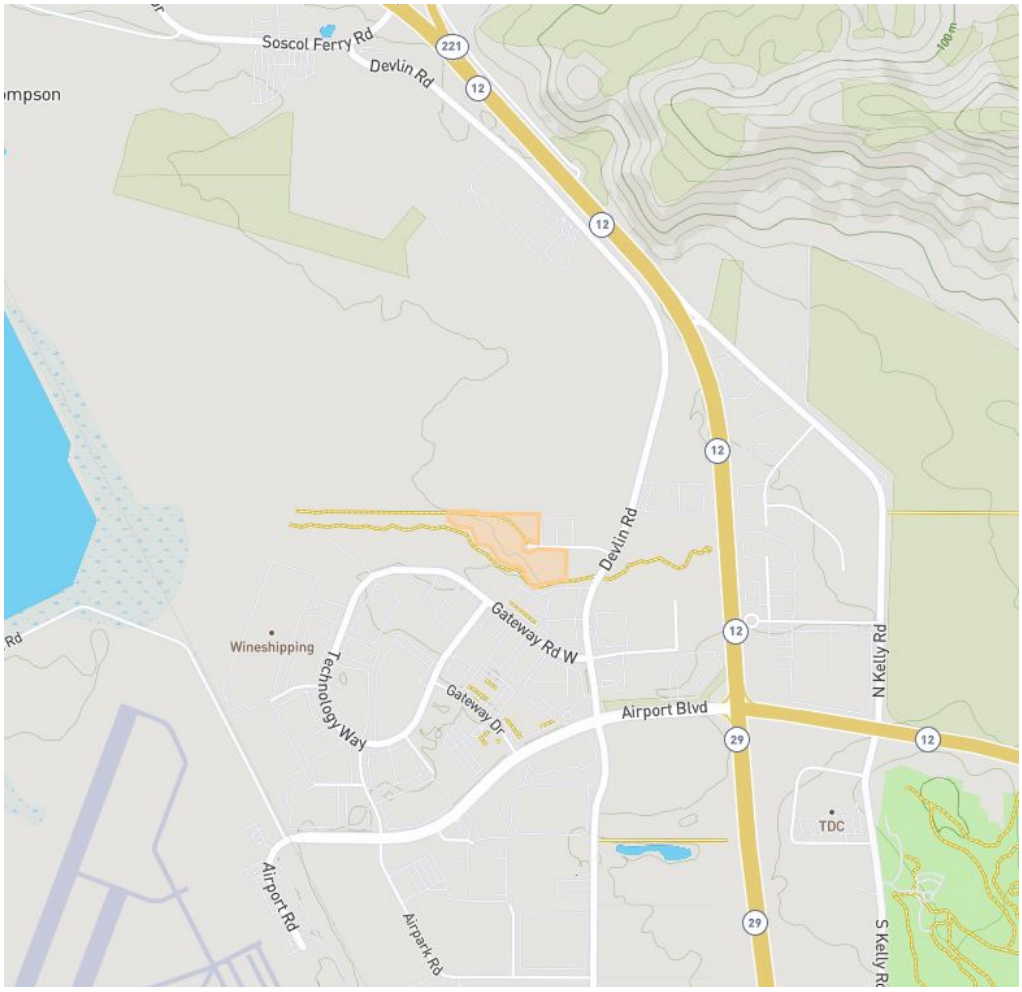
Transit signal priority (TSP) reduce travel time and increase bus reliability by giving priority to buses at intersections. Installation of equipment is needed on buses to activate TSP and utilize this technology.

Transit Signal Priority Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	No	N/A
11/19/19	Yes	N/A
11/22/19	Yes	N/A
11/25/19	I'm not sure	N/A
12/17/19	I'm not sure	N/A
12/18/19	Yes	Would this also apply to school buses?
12/20/19	I'm not sure	N/A
12/20/19	I'm not sure	N/A
01/05/19	No	N/A
01/05/19	Yes	N/A
01/09/19	I'm not sure	will you be adding an additional lane just for buses and widen 29 even more? How does that keep pedestrians safe if the hwy is even wider?

Future NVTA Maintenance Facility/Transportation Management Center

The new NVTA Vine Transit Maintenance facility is proposed to replace the existing facility at 720 Jackson Street. The new facility would be constructed on undeveloped land at the terminus of Sheehy Court, approximately 900 feet west of its intersection with Devlin Road, in unincorporated Napa County. The eight-acre site would provide for maintenance for up to eight bays, an administrative building, parking for 93 transit vehicles up to 60 feet long, 75 visitor and employee parking spaces, and host a Transportation Management Center (TMC). The TMC would coordinate transportation communication within the corridor.



Future NVTA Maintenance Facility/Transportation Management Center Improvement Survey Responses

Comment Date	Support for Improvement?	Additional Comment
11/16/19	Yes	It sounds like something that is needed
12/15/19	Yes	N/A
12/20/19	I'm not sure	N/A
01/09/19	Yes	N/A

Variable Message Sign – Integrated Corridor Management

Variable message signage (VMS) is a traffic control device capable of displaying one or more alternative messages. As a component of the Integrated Corridor Management (ICM) improvement package, VMS would be used for incident management and route diversion to divert and control traffic throughout the corridor. This may result in lowered congestion and delay on more commonly traversed routes.

Proposed locations include:

- SR 29 Southbound at Soscol Ferry Road, .5 miles north of the intersection
- SR 29 Southbound at Airport Blvd, .5 miles north of the intersection
- SR 29 Southbound at Tower Rd, .5 miles north of the intersection
- SR 29 at American Canyon Road, .5 miles south of the intersection
- SR 29 at Donaldson Way E, 300 feet north of intersection
- SR 29 at Paoli Loop Road, 0.5 miles south of intersection
- SR 29 at Lincoln Ave, .5 miles south of the intersection

VMS (variable message signs)

No.	Main Street	Cross Street	Location	Directio
1	SR 29	Soscol Ferry Rd	0.5 miles north of intersection	SB
2	SR 29	Airport Blvd	0.5 miles north of intersection	SB
3	SR 29	Tower Rd	0.5 miles north of intersection	SB
4	SR 29	American Canyon Rd	0.5 miles south of intersection	NB
5	SR 29	Donaldson Way E	300 ft north of intersection	NB
6	SR 29	Paoli Loop Rd	0.5 miles south of intersection	NB
7	SR 29	Lincoln Ave	0.5 miles south of intersection	NB

Variable Message Sign – Integrated Corridor Management Improvement Survey Responses

Comment Date	Feature Location	Support for Improvement?	Additional Comment
11/15/19	VMS 4 (NB)	Yes	N/A
11/16/19	Did Not Indicate	I'm not sure	N/A
11/25/19	VMS 6 (NB)	I'm not sure	Unless there is another way to get up or down Valley this could be a waste of money
12/15/19	Did Not Indicate	No	N/A
12/17/19	VMS 4 (NB)	Yes	N/A
12/17/19	VMS 1 (SB)	Yes	N/A
12/17/19	VMS 6 (NB)	Yes	N/A
12/20/19	Did Not Indicate	Yes	N/A
01/05/19	VMS 1 (SB)	Yes	N/A
01/05/19	VMS 3 (SB)	Yes	N/A
01/05/19	VMS 2 (SB)	Yes	N/A
01/05/19	VMS 4 (NB)	Yes	N/A
01/09/19	VMS 4 (NB)	No	Too many signs cause traffic to slow even more to read them.
01/09/19	VMS 4 (NB)	No	I don't think we need more flashing signs and confusion on Hwy 29. The signs would cause people to slow down to read the signs which will only cause more confusion and delay

Traffic Monitoring Detectors – Integrated Corridor Management

Traffic monitoring detectors include improvements such as underground loop and radar detectors, which monitor traffic conditions and communicate with the TMC for incidence management.

Proposed locations include:

- SR 29 near 231 Devlin Rd, Napa, CA 94558
- SR 29/Airport Blvd, 0.37 mi north of intersection
- SR 29/Airport Blvd, 850 ft south of intersection
- SR 29/Tower Road, 350 ft north of intersection
- SR 29/S Kelly Road, 1200 ft south of intersection
- SR 29/Donaldson Way E, 830 ft north of intersection
- SR 29/Eucalyptus Dr, 200 ft north of intersection
- SR 29/Overpass near Paoli Loop Rd
- SR 29/Paoli Loop Rd, 1000 ft north of intersection
- SR 29/S Kelly Rd, 430 ft south of intersection
- SR 29/Tower Road, 1100 ft north of intersection
- SR 29/Airport Blvd, 250 ft north of intersection
- SR 29/N Kelly Road, 0.27 mi south of intersection

Traffic Monitoring Station

No.	Main Street	Cross Street	Location	Directio
1	SR 29	n/a	Near 231 Devlin Rd, Napa, CA 94558	SB
2	SR 29	Airport Blvd	0.37 mi north of intersection	SB
3	SR 29	Airport Blvd	850 ft south of intersection	SB
4	SR 29	Tower Rd	350 ft north of intersection	SB
5	SR 29	S Kelly Rd	1200 ft south of intersection	SB
6	SR 29	Donaldson Way E	830 ft north of intersection	NB
7	SR 29	Eucalyptus Dr	200 ft north of intersection	NB
8	SR 29	n/a	Overpass near Paoli Loop Rd	NB
9	SR 29	Paoli Loop Rd	1000 ft north of intersection	NB
10	SR 29	S Kelly Rd	430 ft south of intersection	NB
11	SR 29	Tower Rd	1100 ft north of intersection	NB
12	SR 29	Airport Blvd	250 ft north of intersection	NB
13	SR 29	N Kelly Rd	0.27 mi south of intersection	NB

Traffic Monitoring Detectors – Integrated Corridor Management Improvement Survey Responses

Comment Date	Feature Location	Support for Improvement?	Additional Comment
11/16/19	TMS 6 (NB)	Yes	N/A
11/19/19	TMS 11 (NB)	Yes	N/A
12/15/19	TMS 6 (NB)	Yes	N/A
12/17/19	TMS 3 (SB)	I'm not sure	N/A
12/17/19	TMS 6 (NB)	I'm not sure	N/A
12/17/19	TMS 6 (NB)	Yes	N/A
01/05/19	TMS 7 (NB)	Yes	N/A
01/05/19	TMS 11 (NB)	Yes	N/A
01/09/19	TMS 8 (NB)	Yes	N/A
01/09/19	TMS 6 (NB)	No	N/A

Trailblazer Signage – Integrated Corridor Management

Trailblazer signs provide way finding information on roadways, providing guidance to roadway users in accessing routes connections and destinations. The signage at the proposed locations below will provide various detour and route information to manage circulation and direct traffic throughout the corridor.

Proposed locations include:

- Soscol Ferry Road/Devlin Road, 250 feet east of intersection
- Devlin Road/Airport Blvd, 300 feet north of intersection
- Airport Blvd/Devlin Road, 300 feet east of intersection
- Tower Road/Devlin Road, 300 feet east of intersection
- Devlin Road/S Kelly Road, 650 feet north of the intersection
- S Kelly Road/Devlin Road, 300 feet east of intersection
- Devlin Road/Green Island Road, 300 feet north of intersection
- American Canyon Road/Newell Dr, 500 feet west of intersection
- Newell Dr/Donaldson Way E, 300 feet south of intersection
- S Kelly Road/Rio Del Mar, 300 feet south of intersection
- Rio Del Mar/South Kelly Road, 300 feet east of intersection
- Paoli Loop Road/S Kelly Road, 300 feet east of intersection
- S Kelly Road extension/S Kelly Road, 300 feet south of intersection
- S Kelly Road/ S Kelly Road extension, 300 feet west of intersection
- S Kelly Road/Lincoln Ave, 300 feet south of intersection
- Lincoln Ave/S Kelly Road, 500 feet west of intersection

Trailblazer Sign					
No.	Main Street	Cross Street	Location	Directio	Info Displayed
1	Soscol Ferry Rd	Devlin Rd	250 ft east of intersection	WB	Detour To Devlin Rd
2	Devlin Rd	Airport Blvd	300 ft north of intersection	SB	To SR 29 **OR** Go Straight
3	Airport Blvd	Devlin Rd	300 ft east of intersection	WB	Detour To Devlin Rd
4	Devlin Rd	Tower Rd	300 ft north of intersection	SB	To SR 29 **OR** Go Straight
5	Tower Rd	Devlin Rd	300 ft east of intersection	WB	Detour To Devlin Rd
6	Devlin Rd	S Kelly Rd	650 ft north of intersection	SB	To SR 29 **OR** Go Straight
7	S Kelly Rd	Devlin Rd	300 ft east of intersection	WB	Detour To Devlin Rd
8	Devlin Rd	Green Island Rd	300 ft north of intersection	SB	To SR 29
9	American Canyon Rd	Newell Dr	500 ft west of intersection	NB	Detour To Newell Dr
10	Newell Dr	Donaldson Way E	300 ft south of intersection	NB	To SR 29 **OR** Go Straight
11	S Kelly Rd	Rio Del Mar	300 ft south of intersection	NB	To SR 29 **OR** Go Straight
12	Rio Del Mar	S Kelly Rd	300 ft west of intersection	NB	Detour To Newell Dr
13	Paoli Loop Rd	S Kelly Rd	300 ft east of intersection	NB	To SR 29 **OR** Keep on S Kelly Rd
14	S Kelly Rd Extension	S Kelly Rd	300 ft south of intersection	NB	To SR 29
15	S Kelly Rd	S Kelly Rd Extension	300 ft west of intersection	NB	Keep on S Kelly Rd
16	S Kelly Rd	Lincoln Ave	300 ft south of intersection	NB	To SR 29 **OR** To SR 29
17	Lincoln Ave	S Kelly Rd	500 ft west of intersection	NB	Detour To S Kelly Rd

Trailblazer Signage – Integrated Corridor Management Improvement Survey Responses

Comment Date	Feature Location	Support for Improvement?	Additional Comment
11/16/19	Did Not Indicate	Yes	N/A
11/19/19	Sign 5 (SB)	I'm not sure	An example of this would be great. There may be concern over re-routing traffic through local destinations. Including traffic calming measures on local routes would improve safety in these locations. The alternate routes (Devlin, Newell) should have traffic calming.
12/15/19	Did Not Indicate	No	N/A
12/17/19	Sign 6 (SB)	Yes	N/A
12/17/19	Sign 17 (NB)	Yes	N/A
12/20/19	Did Not Indicate	Yes	N/A
01/05/19	Sign 11 (NB)	Yes	N/A
01/09/19	Did Not Indicate	Yes	S Kelly Road/Devlin Road, 300 feet eat of intersection Do you mean Eat? or EAST?

CCTV Cameras - Integrated Corridor Management

A CCTV Camera is a closed-circuit television camera. These would be used in conjunction with variable message signs and traffic monitoring stations to monitor and manage traffic conditions throughout the corridor.

Proposed locations include:

- SR 29/Soscol Ferry Road at the west side of road near the intersection
- SR 29 at the west side of road near 231 Devlin Rd, Napa, CA 94558
- SR 29/Airport Blvd at west side of road near intersection
- SR 29/Tower Road at west side of road near intersection
- SR 29/South Kelly Road at west side of road near intersection
- SR 29/American Canyon Road at east side of road near intersection
- SR 29/ Donaldson Way E at east side of road near intersection
- SR 29/Rio Del Mar at east side of road near intersection
- SR 29/Paoli Loop Road at east side of road near intersection
- SR 29/South Kelly Road at east side of road near intersection
- SR 29/Lincoln Ave at east side of road near intersection

CCTV Camera

No.	Main Street	Cross Street	Location	Directio
1	SR 29	Soscol Ferry Rd	West side of road near intersection	SB
2	SR 29	n/a	West side of road near 231 Devlin Rd, Napa, CA 94558	SB
3	SR 29	Airport Blvd	West side of road near intersection	SB
4	SR 29	Tower Rd	West side of road near intersection	SB
5	SR 29	S Kelly Rd	West side of road near intersection	SB
6	SR 29	American Canyon Rd	East side of road near intersection	NB
7	SR 29	Donaldson Way E	East side of road near intersection	NB
8	SR 29	Rio Del Mar	East side of road near intersection	NB
9	SR 29	Paoli Loop Rd	East side of road near intersection	NB
10	SR 29	S Kelly Rd	East side of road near intersection	NB
11	SR 29	Lincoln Ave	East side of road near intersection	NB

CCTV Cameras - Integrated Corridor Management Improvement Survey Responses

Comment Date	Feature Location	Support for Improvement?	Additional Comment
11/16/19	Camera 9 (NB)	Yes	N/A
11/16/19	Did Not Indicate	I'm not sure	N/A
11/19/19	Camera 11 (NB)	Yes	N/A
12/15/19	Camera 11 (NB)	Yes	N/A
12/15/19	Did Not Indicate	Yes	N/A
12/20/19	Camera 7 (NB)	Yes	N/A
12/29/19	Camera 9 (NB)	Yes	N/A
01/05/19	Camera 9 (NB)	Yes	N/A
01/09/19	Camera 9 (NB)	No	N/A

SR 29

COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

COMMUNITY MEETING #1

November 12, 2019

Welcome!

Project Team

- Napa Valley Transportation Authority
- Consultant Team
- City of American Canyon
- City of Napa
- County of Napa
- Caltrans
- Stakeholder Advisory Committee

SR 29
COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

Project Goals and Scope

Pivot Off of Corridor Planning to Date

- SR 29 Corridor Gateway Study
- Napa Countywide Bicycle Plan Update
- Napa Countywide Pedestrian Plan
- Napa Short Range Transit Plan

Goals

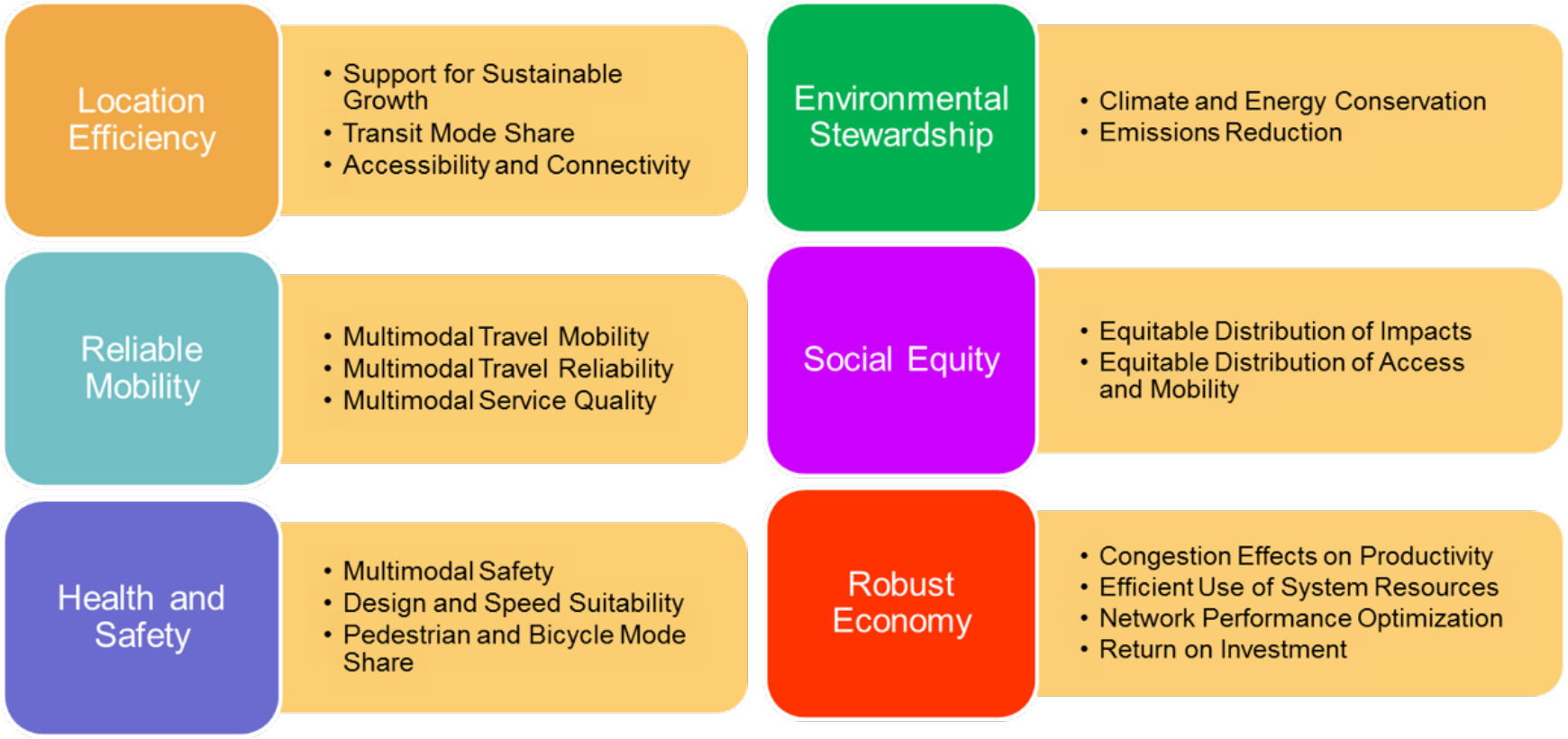
- Identify a prioritized list of multimodal improvements
- Develop implementable multimodal infrastructure plan
- Get Projects Funded!
- SB-1 Solutions for Congested Corridors Guidelines
- Caltrans Corridor Analysis Guidelines

Project Scope

- Identify improvements that address known corridor deficiencies
- Seek community and stakeholder input on the improvement concepts
- Develop technical information to support competitive grant applications.

Project Goals and Scope

Smart Mobility Framework



Project Goals and Scope

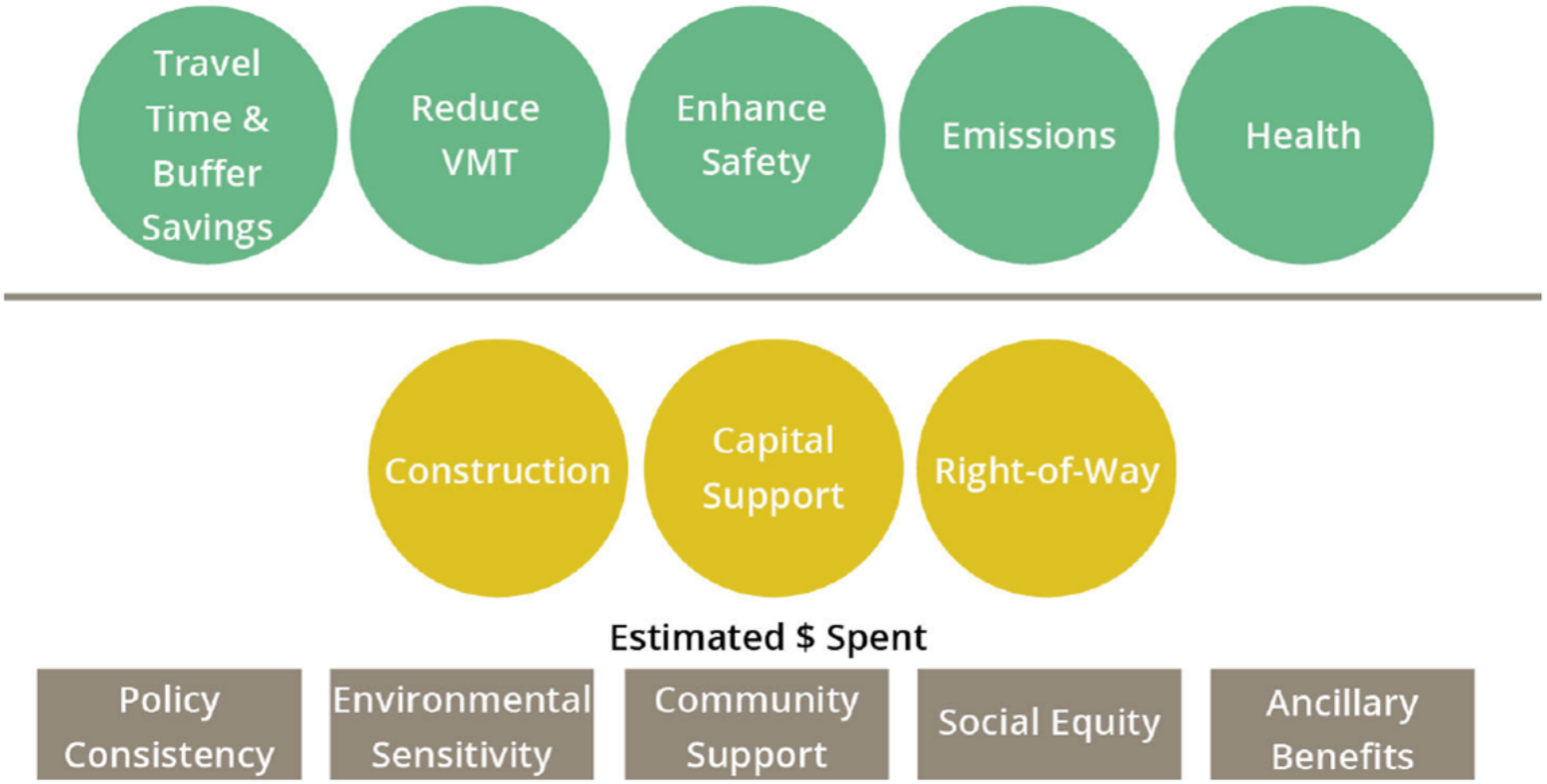
Performance Based

Analysis Purpose	Measure of Effectiveness	Model/Analysis Tool										Monetize for Benefit/Cost
		Solano-Napa ABM	Microsimulation	Level of Traffic Stress	NCHRP 552 Method	HSM Part C CMFs	SB-T Emissions Calculator	GIS Analysis	Online Mapping Tools	Literature Review	NPMRDS/PeMS	
Baseline Travel Demand	Trips, Ridership, VMT	■										Yes
Future Travel Demand	Trips, Ridership, VMT	■										Yes
Roadway Operations	Delay and Buffer Time		■								■	Yes
Transit Ridership	Ridership, VMT	■							■	■		Yes
Pedestrian/Bike Connectivity	Access Indices			■				■				No
Pedestrian/Bike Mode Shift	Trips, VMT				■			■				Yes
Safety	Collision Reduction & Rates	■				■		■				Yes
Air Quality	Emissions (Criteria & GHG)	■	■		■		■					Yes
EJ/Social Equity	Access, Benefit/Burden	■		■				■	■			No
Economic Development	GRP, Jobs, Income							■		■	■	No
Health	Vehicle Miles Traveled	■			■				■			Yes
Adaptation	Network Vulnerability							■	■	■		No

Legend ■ *Direct or Indirect Application*

Project Goals and Scope

Benefit Cost



Data Collection

Traffic Counts

- Intersection turn movement counts
- Passenger car and truck speed data (12 months – NPMRDS)

Collision History

- 2014-2018 SWITRS Data
- Collision by Severity
- Pedestrian and Bicycle

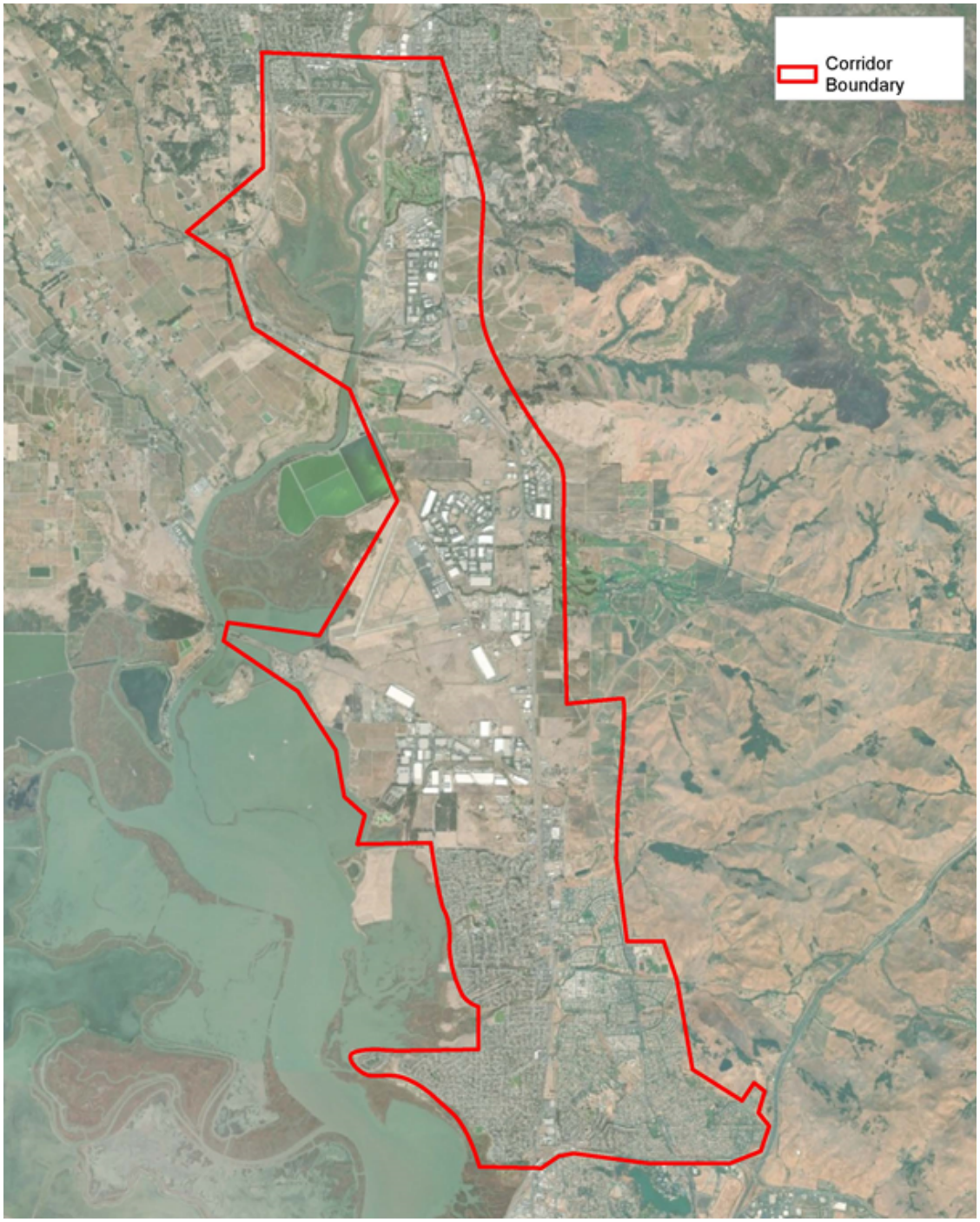
Transit Ridership

- NVTA

Infrastructure Characteristics

- Level of Traffic Stress (Bicycle Connectivity)

Plan Area



Community Outreach

- Project Webpage

  www.SR29CorridorPlan.com
- Stakeholder Advisory Committee
- Community Workshops
  - Seek input on improvements the community will support (November: Workshop #1)
  - Seek input on Preferred Improvement Package (February/March: Workshop #2)
- Tonight's Community Workshop
  - Introduce You to the Study
  - Describe how to stay engaged
  - Interactive Stations – Visit the Segment Stations and Provide Your Input (30 min)
  - Live Click Question & Answer (25 min)

Interactive Stations

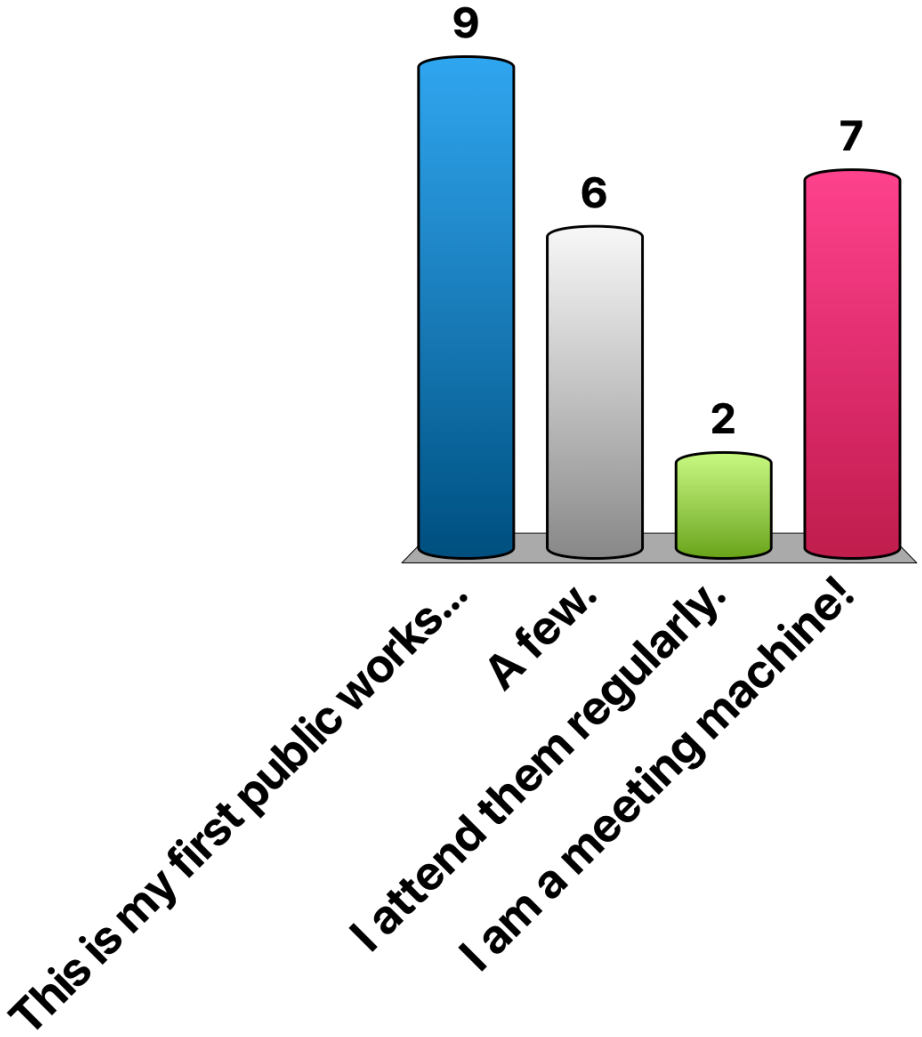
- Please visit all four stations!
- Improvement Concept Stations – We want your input!
  - Station 1. SR 29 Parallel Roadway Capacity Improvements
  - Station 2. SR 29 Multimodal and Intersection Improvements
  - Station 3. Transit Improvements
  - Station 4. Bicycle Improvements
  - Station 5. Pedestrian Improvements
  - Station 6. Intelligent Transportation Improvements

- Interactive Web-based Tool Station
  - Try it out!

- Background Information Station
  - Station 7 and 8: Data Inventories of Study Area
  - Collision History
  - Bicycle: Level of Traffic Stress
  - Congestion and Travel Time Reliability

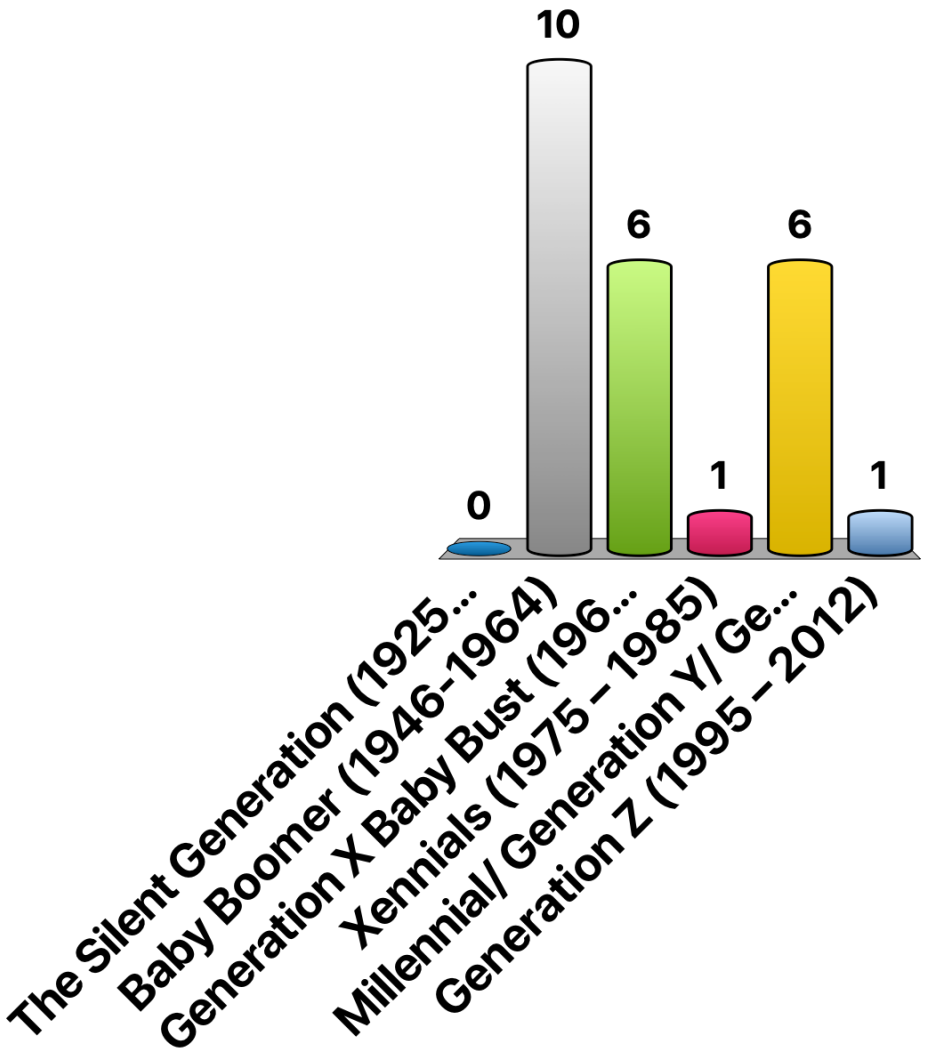
How many public workshops have you attended in the past?

1. This is my first public workshop.
2. A few.
3. I attend them regularly.
4. I am a meeting machine!



What age group do you belong to?

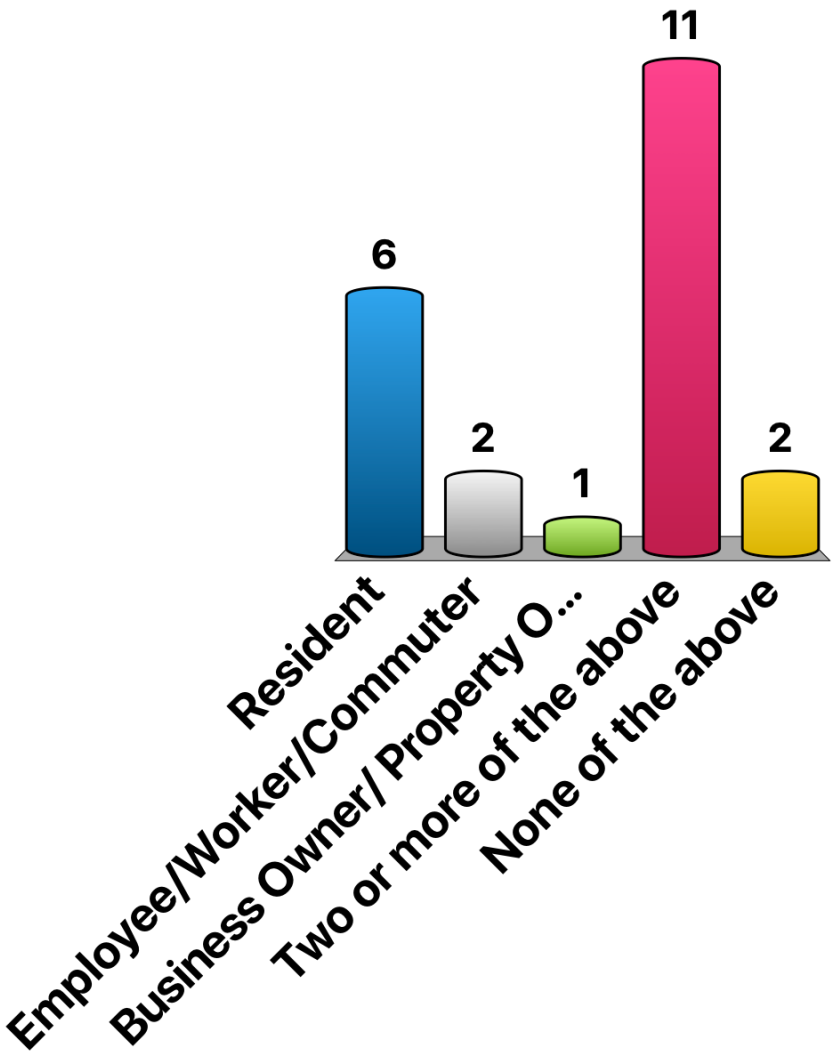
1. The Silent Generation (1925 – 1945)
2. Baby Boomer (1946-1964)
3. Generation X Baby Bust (1965-1979)
4. Xennials (1975 – 1985)
5. Millennial/ Generation Y/ Gen Next (1980 – 1994)
6. Generation Z (1995 – 2012)



SR 29
COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

I am a ____ in the SR 29 Corridor community.

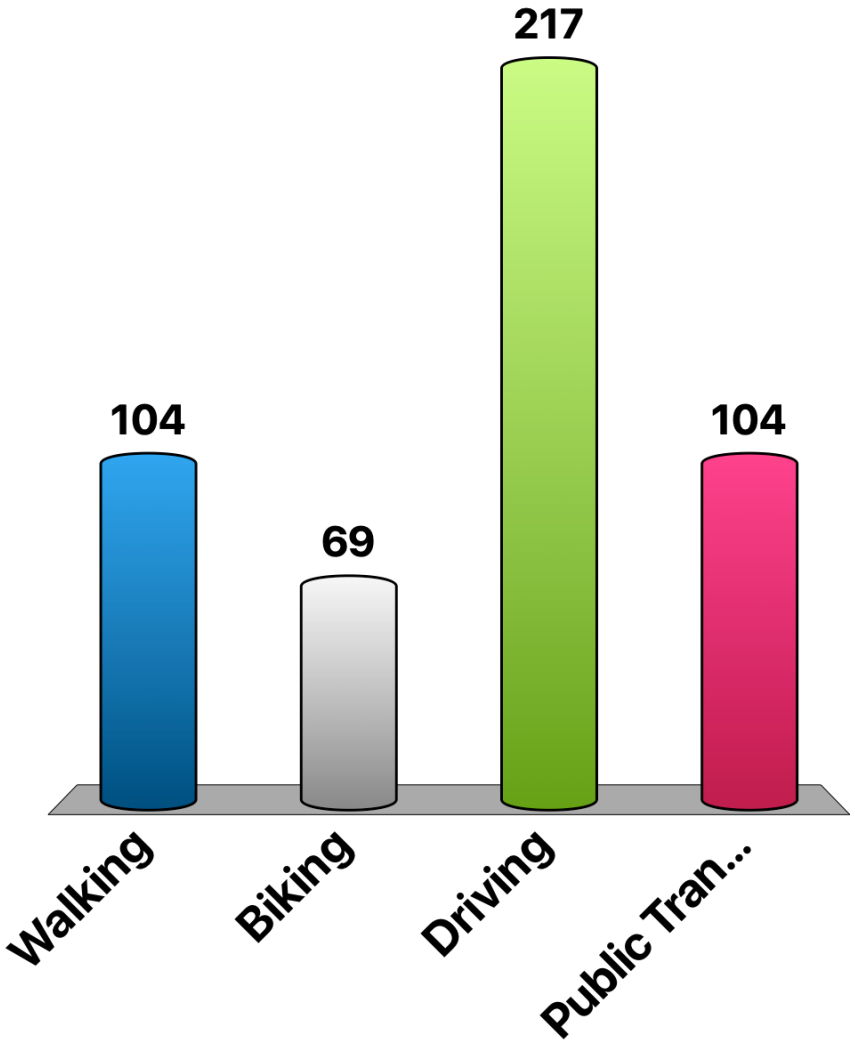
1. Resident
2. Employee/Worker/ Commuter
3. Business Owner/ Property Owner
4. Two or more of the above
5. None of the above



SR 29
COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

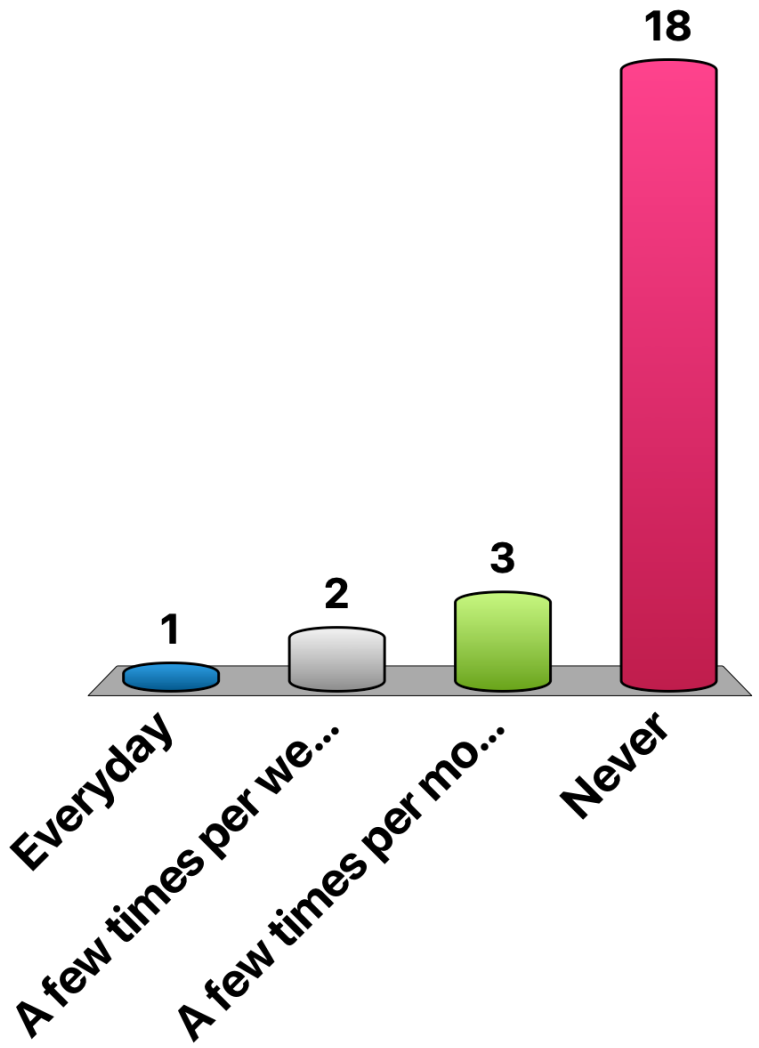
Rank the following transportation modes in the order of your use:

1. Walking
2. Biking
3. Driving
4. Public Transit



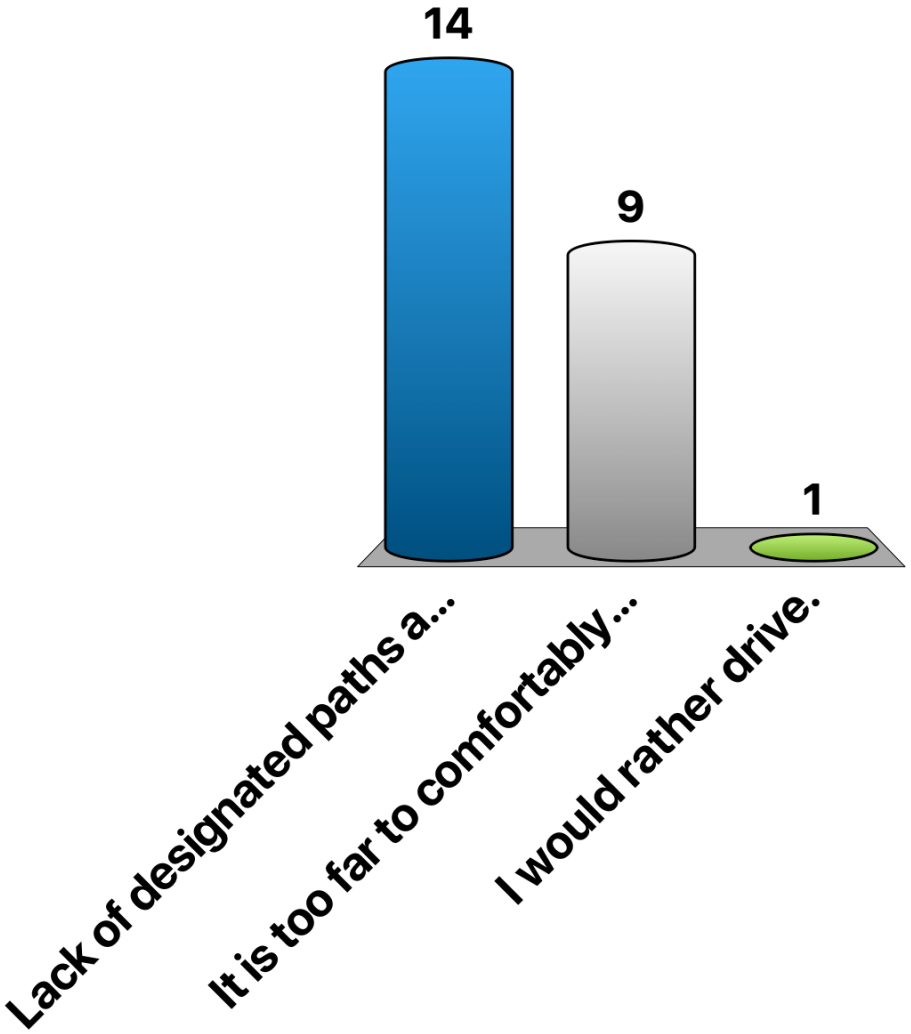
How often do you travel as a pedestrian along SR29?

1. Everyday
2. A few times per week
3. A few times per month
4. Never



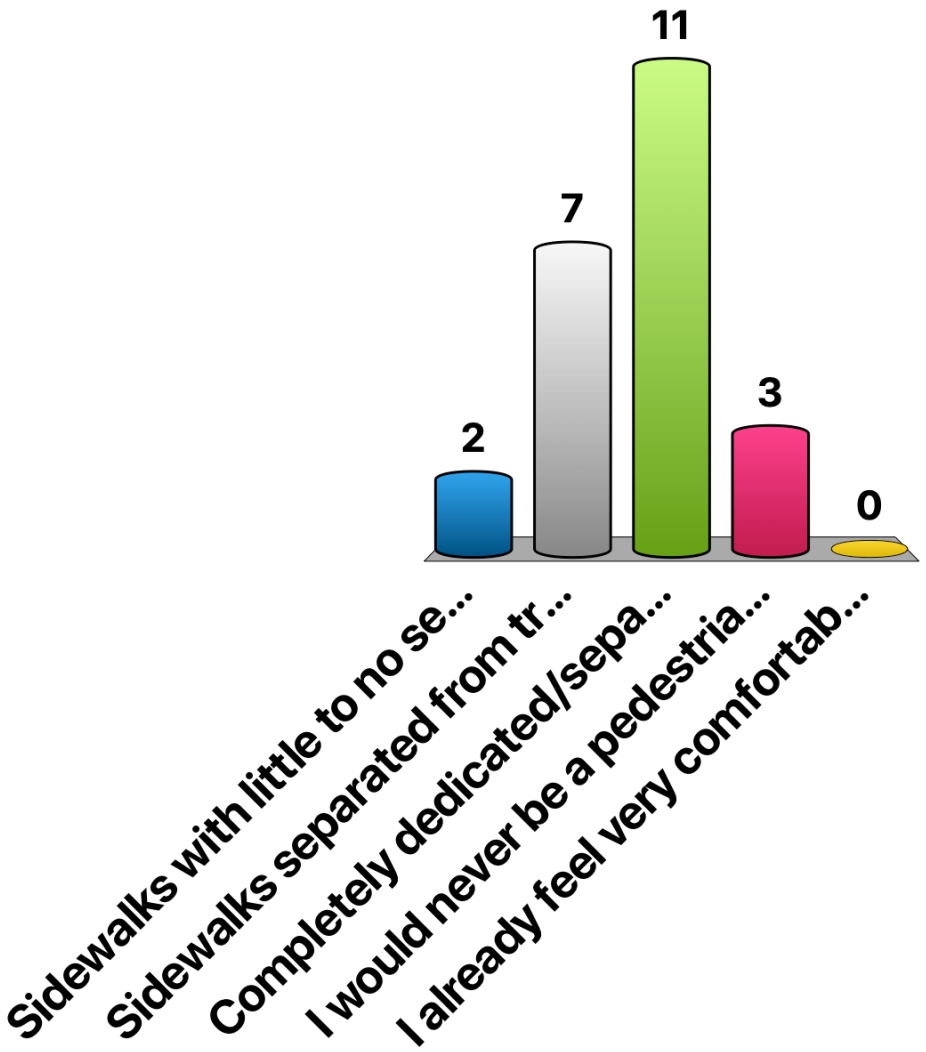
If you choose not to – why?

1. Lack of designated paths and/or fear for safety.
2. It is too far to comfortably walk to my destination.
3. I would rather drive.



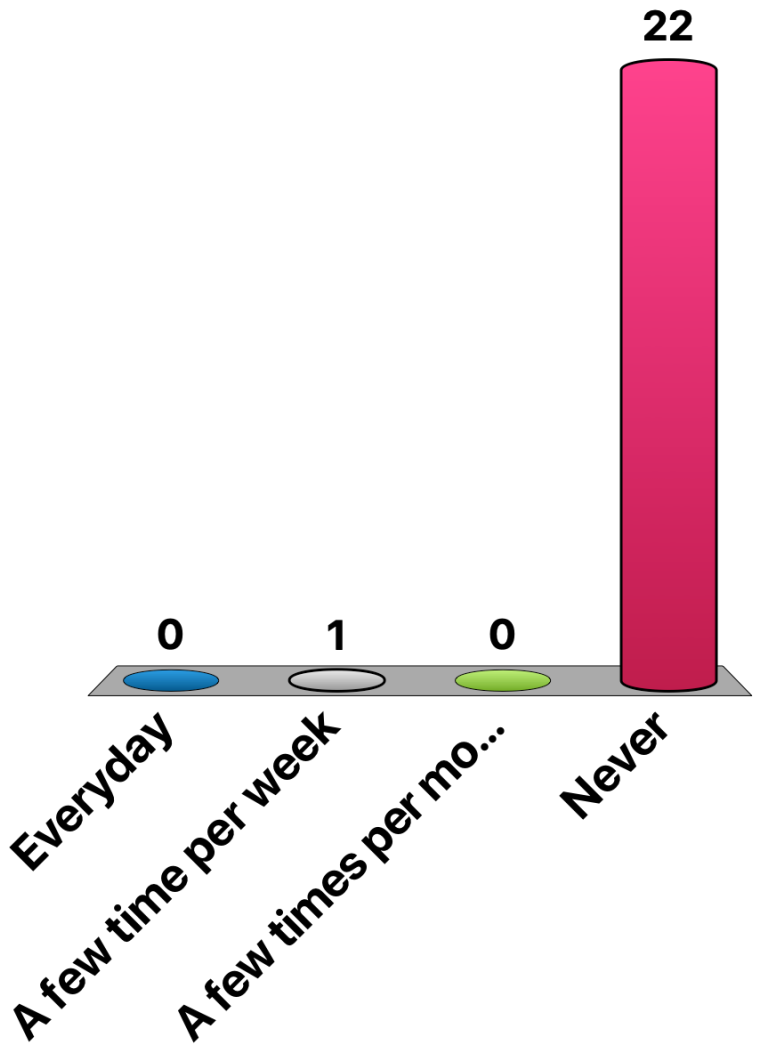
Which of the following improvements would you prefer implemented in order to feel comfortable?

1. Sidewalks with little to no separation from traffic
2. Sidewalks separated from traffic with landscaped planting strips
3. Completely dedicated/separated paved path
4. I would never be a pedestrian in this corridor
5. I already feel very comfortable within this corridor



How often do you bike on SR29?

1. Everyday
2. A few time per week
3. A few times per month
4. Never



SR 29
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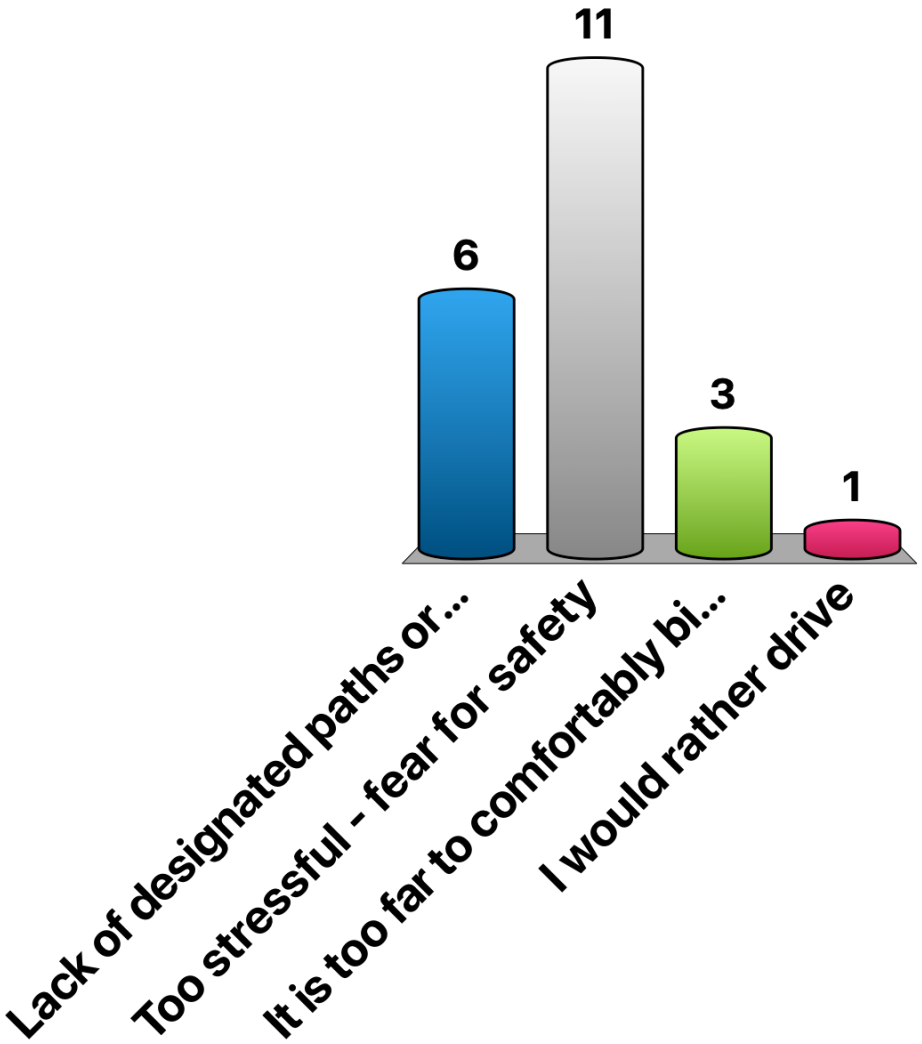
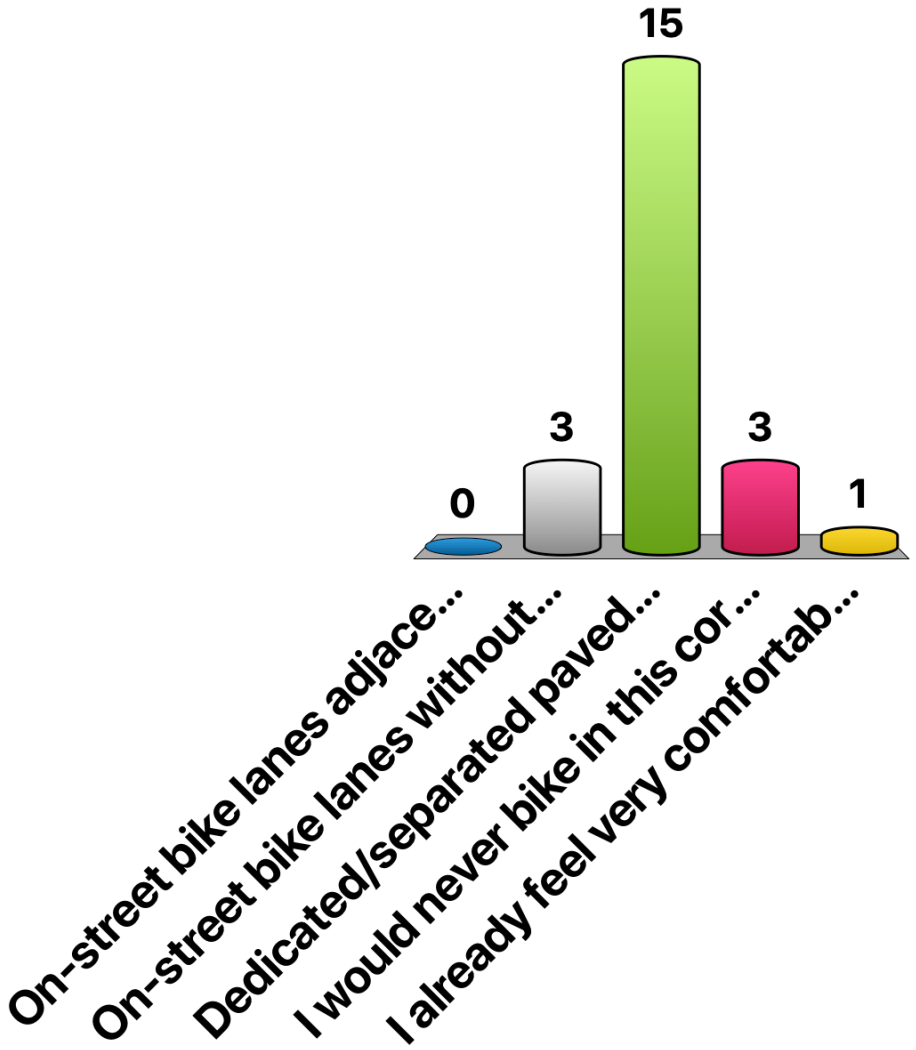
If you choose not to bike – why?

1. Lack of designated paths or connections
2. Too stressful - fear for safety
3. It is too far to comfortably bike to my typical destinations
4. I would rather drive



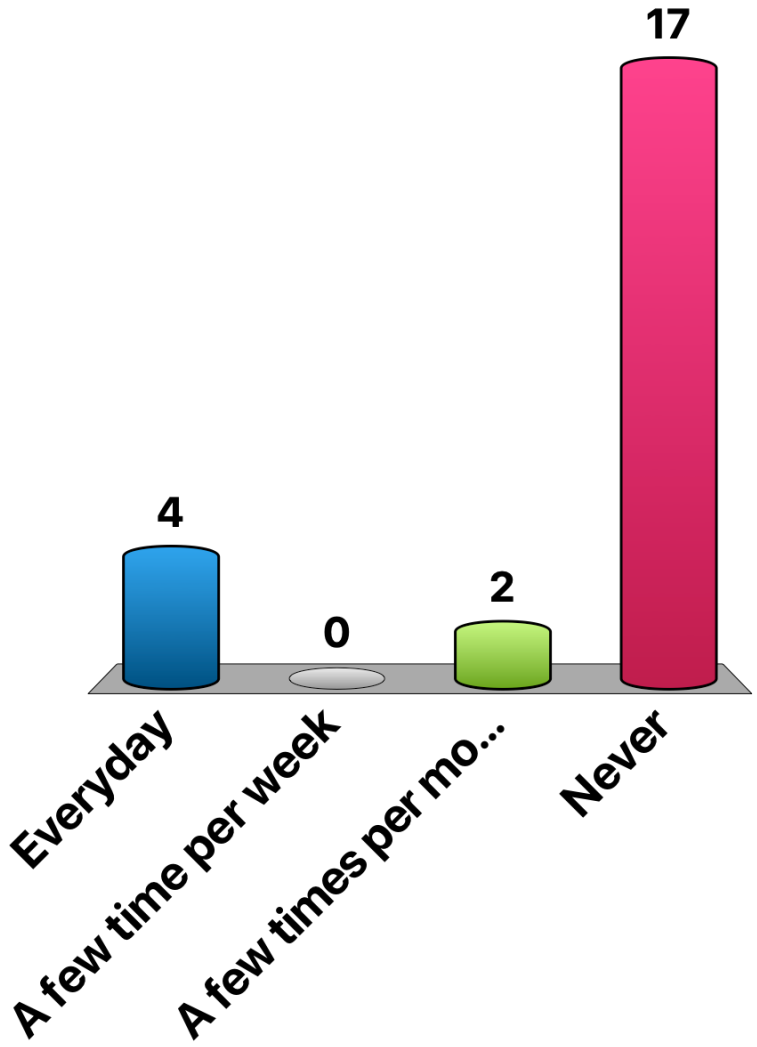
What improvements would you like to see in order to feel safer biking?

1. On-street bike lanes adjacent to parking
2. On-street bike lanes without adjacent parking
3. Dedicated/separated paved path
4. I would never bike in this corridor
5. I already feel very comfortable biking within the corridor



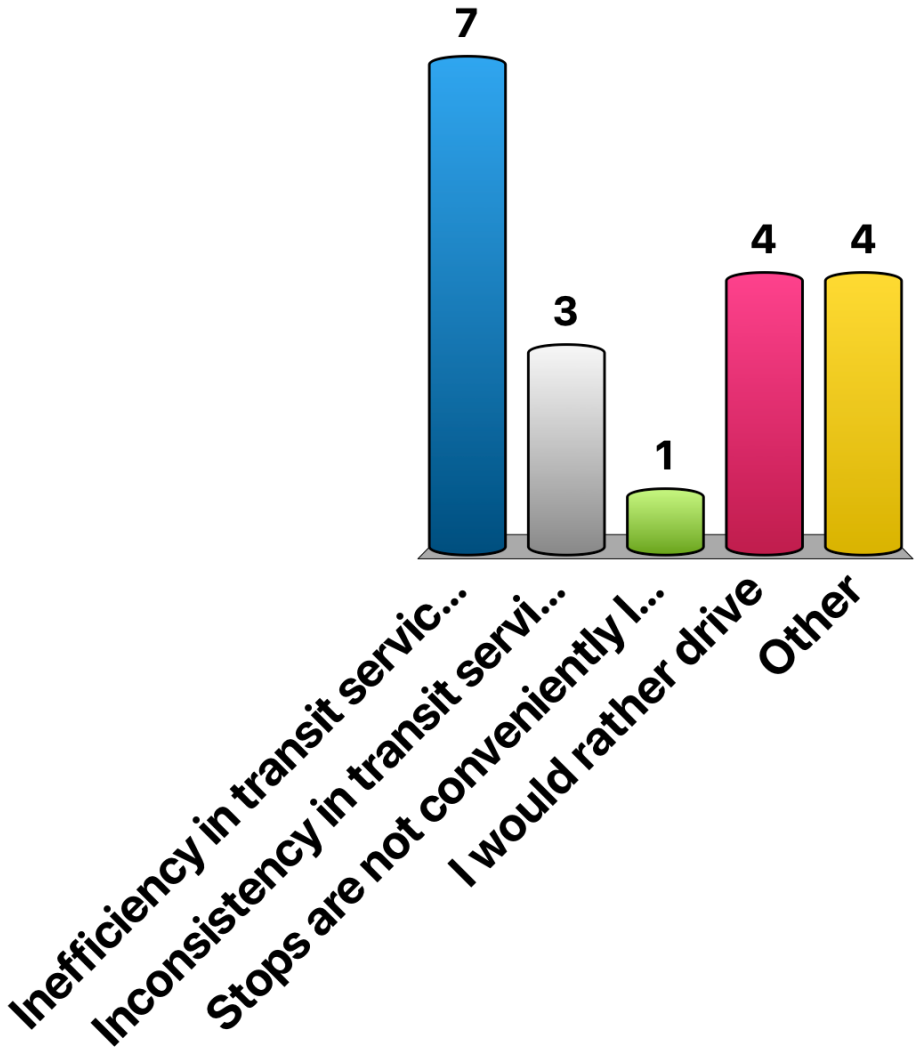
How often do you use public transit in the corridor?

1. Everyday
2. A few time per week
3. A few times per month
4. Never



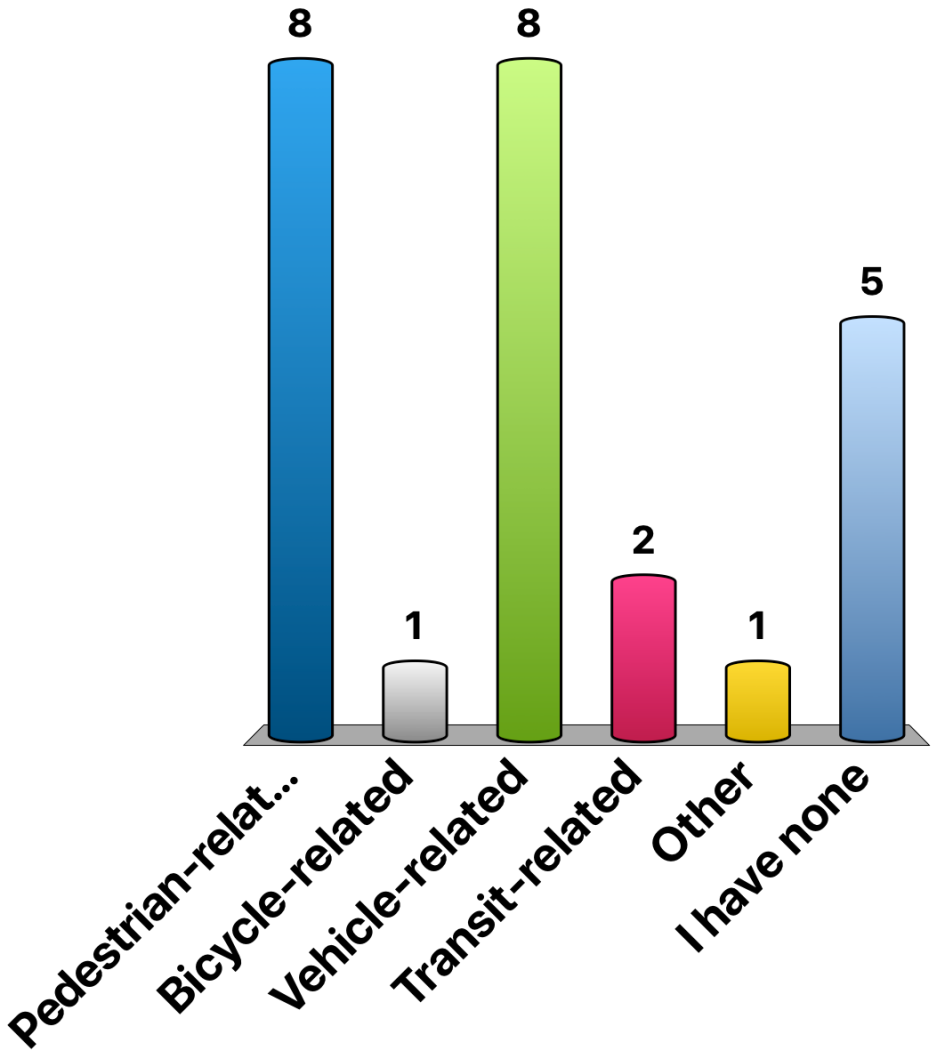
If you choose not to use public transit– why?

1. Inefficiency in transit service – it takes too long to arrive at my destination
2. Inconsistency in transit service – the bus does not arrive on time often enough
3. Stops are not conveniently located near my residence or destination
4. I would rather drive
5. Other



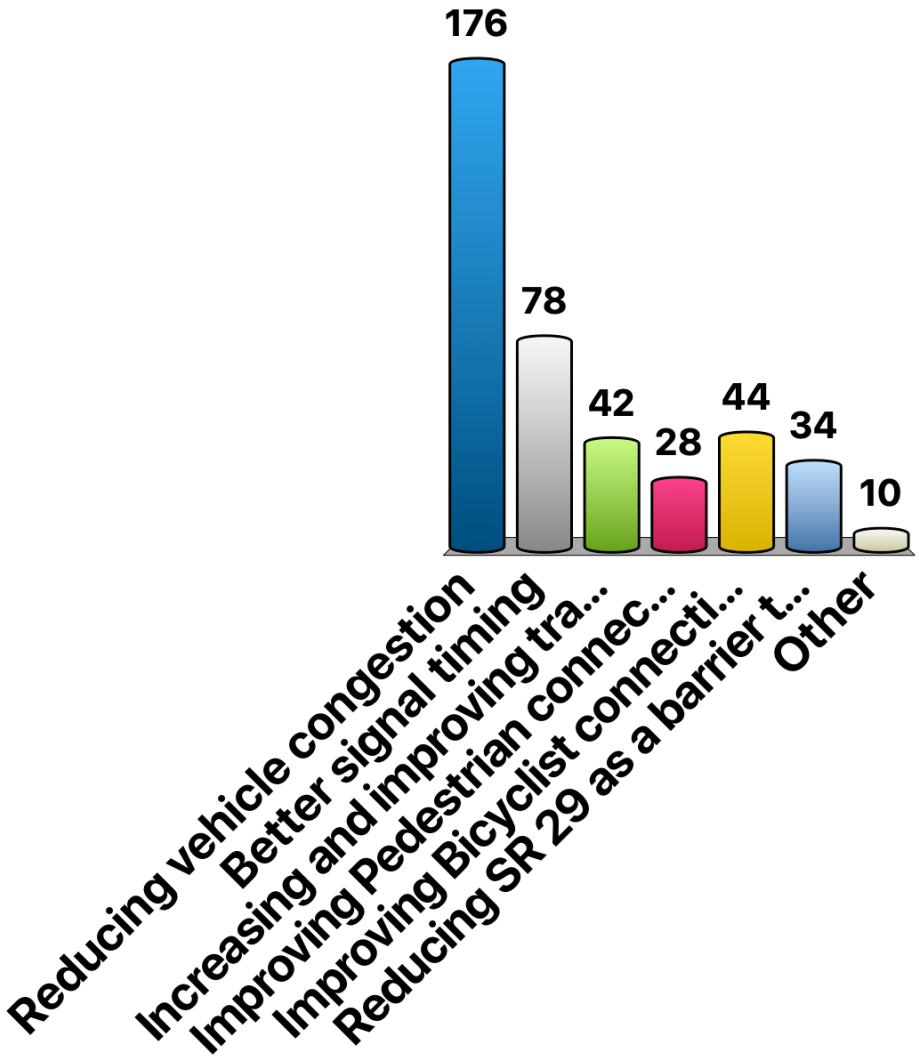
How would you describe your primary safety concern in the corridor?

1. Pedestrian-related
2. Bicycle-related
3. Vehicle-related
4. Transit-related
5. Other
6. I have none



What are your top three priorities?

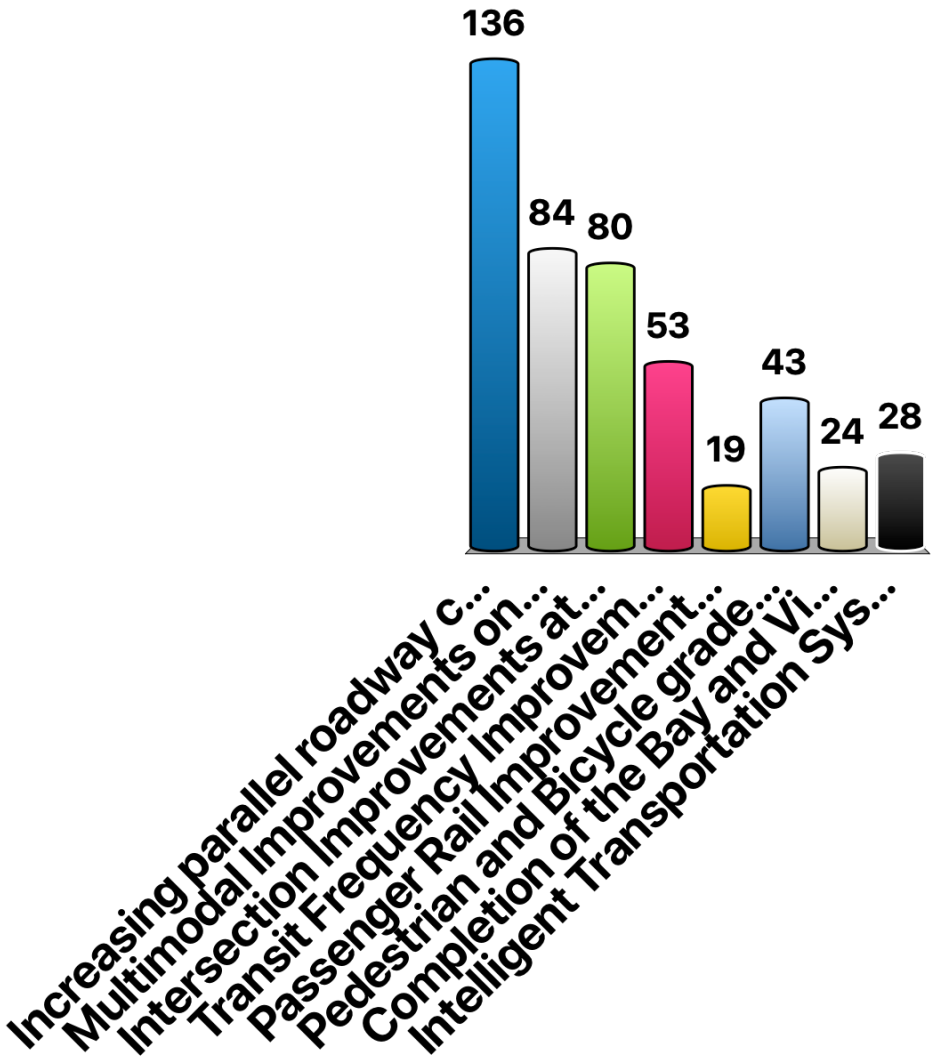
1. Reducing vehicle congestion
2. Better signal timing
3. Increasing and improving transit service
4. Improving Pedestrian connectivity
5. Improving Bicyclist connectivity
6. Reducing SR 29 as a barrier to east-west pedestrian and bike movements
7. Other



SR 29
COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

What are your top FOUR priorities?

1. Increasing parallel roadway capacity – Devlin and Newell-S Kelly Extensions
2. Multimodal Improvements on SR 29 (from SR 37 to Soscol Junction)
3. Intersection Improvements at – Soscol Junction; Airport; Carneros
4. Transit Frequency Improvements on SR 29 including Queue Jumps and Part-Time Use of Shoulder for Transit Vehicles
5. Passenger Rail Improvements – SMART Train
6. Pedestrian and Bicycle grade-separated crossings
7. Completion of the Bay and Vine Trails
8. Intelligent Transportation System – Integrated Corridor Management – ties real time information for transit vehicles and operations of SR 29, Devlin and Newell-S Kelly Extensions.



SR 29

COMPREHENSIVE MULTIMODAL CORRIDOR PLAN

THANKS FOR YOUR PARTICIPATION

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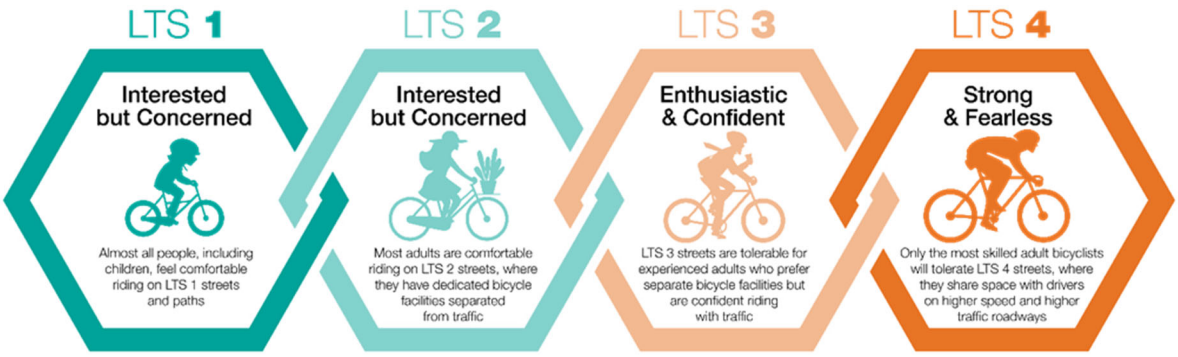
Appendix E: Bicycle LTS Methodology

Overview

Based on the methodology presented in the Mineta Transportation Institute's *Report 11-19 Low Stress Bicycling and Network Connectivity* (2012), Bicycle LTS quantifies the stress level of a given roadway segment by considering a variety of criteria, including street width (number of lanes), speed limit or prevailing speed, presence and width of bike lanes, and the presence and width of parking lanes. Bicycle LTS is suitability rating system of the safety, comfort, and convenience of transportation facilities from the perspective of different subsets of the population. Moreover, the methodology allows planning practitioners to assess gaps in connectivity that may discourage active users from traversing roadways. Due to the size of the study corridor, Bicycle LTS was utilized as a proxy to analyze traffic stress conditions for bicyclists and pedestrians.

Bicycle LTS scores roadway facilities into one of four classifications or ratings for measuring the effects of traffic-based stress on bicycle riders, with 1 being the lowest stress or most comfortable, and 4 being the highest stress or least comfortable. Generally, LTS score of 1 indicates the facility provides a traffic stress tolerable by most children and to multi-use paths that are separated from motorized traffic. An LTS score of 4 indicates a stress level tolerable by only the most experienced cyclists who are comfortable with high-volume and high-speed, mixed traffic environments. The figure below provides explanation of how each LTS score relates to members of the population and categories of cyclist.



Criteria & Assumptions

Segment LTS

The Mineta BLTS methodology utilizes street widths as a surrogate for traffic volumes. In the LTS analysis presented herein, daily volumes were output from the SNABM model and analyzed in place of street width for Segment LTS, as seen in (Insert Table #)

Table 1: Bicycle LTS Criteria – Mixed Traffic Roadway Segments

Speed Limit	AADT			
	Up to 5,000	5,001-12,000	12,001-15,000	More than 15,000
Up to 25 mph	LTS 1	LTS 2	LTS 3	LTS 4
30 mph	LTS 1 or 2[1]	LTS 3	LTS 3	LTS 4
35 mph or more	LTS 3	LTS 4	LTS 4	LTS 4

[1]All functionally classified local Santa Maria roads were scored LTS 1 based on assumed low volumes and speeds.

Approach LTS

Based on the Mineta methodology, only approaches with right turn markings were included in the analysis of approach LTS. The criteria used for analyzing approaches along roadways segments with Class II bike lanes are displayed in Table X and criteria for approaches along mixed traffic roadway segments are displayed in Table X.

Table 2: Bicycle LTS Criteria for Pocket Bike Lanes

Configuration	Level of Traffic Stress
Single right-turn lane up to 150 ft. long starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤15 mph.	LTS ≥ 2
Single right-turn lane longer than 150 ft. starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤20 mph.	LTS ≥ 3
Single right-turn lane in which the bike lane shifts to the left but the intersection angle and curb radius are such that turning speed is ≤15 mph.	LTS ≥ 3
Single right-turn lane with any other configuration; dual right-turn lanes; or right-turn lane along with an option (through-right) lane.	LTS ≥ 4

Table 3: Bicycle LTS Criteria - Mixed Traffic in the Presence of a Right-turn Lane

Configuration	Level of Traffic Stress
Single right-turn lane with length ≤ 75 feet and intersection angle and curb radius limit turning speed to 15 mph	(no effect on LTS)
Single right-turn lane with length between 75 and 150 feet, and intersection angle and curb radius limit turning speed to 15 mph	LTS ≥ 3
Otherwise	LTS ≥ 4

Intersection LTS

Additionally, crossing/ intersection LTS was not analyzed in this analysis. Being the main crossing barrier to examine in this study, SR 29 is already known to be a high stress crossing barrier due to high traffic volumes and speeds.

Appendix F: Induced Demand Analysis Results and Methodology

February 24, 2019

To:	Jim Damkowitch PT	Project:	SR 29 CMCP
From:	Paige Thornton	Ref/Job No.:	11187559
CC:		File No.:	

Subject: NCHRP 552: Induced Demand/ Bicycle Mode Shift Benefit Analysis

1. Introduction

To estimate the induced demand associated with the bicycle improvements proposed in the State Route 29 Comprehensive Multimodal Corridor Plan, the project team utilized the National Cooperative Highway Research Program (NCHRP) 552 methodology provided in the *Guidelines for Analysis of Investment in Bicycle Facilities*. The facilities included in the benefit analysis presented herein include the Class I path gap closures along the Bay Trail and Vine Trail alignments. The employed methodology, estimated benefits and associated benefit-cost ratio is described in the following sections.

1.1 Methodology

The analysis quantifies the induced demand mode shift (induced demand) associated with the proposed improvements, and monetizes the annualized mobility, health, recreation and decreased auto use benefits provided by the projected mode shift at high, moderate and low estimates. Bicyclists are more likely to utilize a facility if they live within a 1.5 mile buffer than if they live outside of this distance. Moreover, the highest likelihood of a member of the population to use the facility exists if they live within a .5 mile buffer around the facility. The NCHRP 552 methodology suggests that bicycle commute mode share can be utilized to estimate the number of existing and future bicycle ridership based on the population, and low, moderate, and high likelihood multipliers at 1.5 mile, 1 mile, and .5 mile buffers that surround a facility. Each buffer area—at 0.5, 1 and 1.5 mile buffers from the proposed improvements was created using a network-based analysis in a GIS environment. Benefit values are based on the following assumptions:

- Existing cyclists near a new facility will shift from a nearby facility to a new facility
- The new facility will induce new cyclists as a function of the number of existing cyclists relative to the attractiveness of the proposed facilities

To estimate future ridership, the population near the improvements was calculated using block level population data from the 2010 Decennial U.S. Census, Solano-Napa Activity Based Model (SNABM), and distance buffers of 0.5 miles, 1 mile and 1.5 miles based on the NCHRP Report 552 methodology. 2010 population estimates were utilized as baseline population estimates. Population growth rates were calculated

using the land use data by TAZ found in the 2015 and 2040 SNAB Models and applied to the baseline to estimate future population. The total population within each buffer distance range near the proposed improvements was estimated by multiplying the proportion of area of each buffer to the area of the whole block by the estimated block population.

Using the estimated population and the sketch planning method presented in Appendix A of NCHRP Report 552, existing bicycle rates and the mobility, health, recreation, and decreased auto use benefits at high, moderate and low levels were estimated.

2. Induced Demand Results

Induced demand takes into account percentage of child and adult population, bicycle commute mode share, percentage of children who bicycle, and the population within three buffer distances, 0.5 miles, 1.0 miles, and 1.5 miles, of the proposed facility. These variables are incorporated into the equations provided in the NCHRP methodology.

The results of the estimated induced demand analysis is reported below. Appendix F provides a detailed explanation of the analysis procedures and results. The induced demand results are shown separately for the Solano and Napa County portions of the study area in Table 2-1 and Table 2-2.

Table 2-3 presents the new adult, children commuter and total bicyclists estimated to induce with implementation of the proposed improvements for the study area.

Table 2-1: Napa County Induced Demand Results

Napa County Portion Induced Demand Results	
Total New Commuters, 2400m	55
Total New Commuters, 1600m	151
Total New Commuters, 800m	109
Total New Adult Cyclists, High 2400m	161
Total New Adult Cyclists, High 1600m	444
Total New Adult Cyclists, High 800m	320
Total New Adult Cyclists, Moderate 2400m	73
Total New Adult Cyclists, Moderate 1600m	201
Total New Adult Cyclists, Moderate 800m	145
Total New Adult Cyclists, Low 2400m	43
Total New Adult Cyclists, Low 1600m	118
Total New Adult Cyclists, Low 800m	85
Total New Child Cyclists, 2400m	73
Total New Child Cyclists, 1600m	202
Total New Child Cyclists, 800m	146
Total New Cyclists, High	**1660**
Total New Cyclists, Moderate	**1155**
Total New Cyclists, Low	**982**

Table 2-2: Solano County Induced Demand Results

Solano County Portion Induced Demand Results	
Total New Commuters, 2400m	12
Total New Commuters, 1600m	36
Total New Commuters, 800m	33
Total New Adult Cyclists, High 2400m	44
Total New Adult Cyclists, High 1600m	127
Total New Adult Cyclists, High 800m	117
Total New Adult Cyclists, Moderate 2400m	22
Total New Adult Cyclists, Moderate 1600m	62
Total New Adult Cyclists, Moderate 800m	57
Total New Adult Cyclists, Low 2400m	10
Total New Adult Cyclists, Low 1600m	28
Total New Adult Cyclists, Low 800m	26
Total New Child Cyclists, 2400m	33
Total New Child Cyclists, 1600m	94
Total New Child Cyclists, 800m	86
Total New Cyclists, High	**582**
Total New Cyclists, Moderate	**435**
Total New Cyclists, Low	**358**

Table 2-3: Study Area Induced Demand Results

Study Area Induced Demand Results	
Total New Commuters, 2400m	67
Total New Commuters, 1600m	186
Total New Commuters, 800m	142
Total New Adult Cyclists, High 2400m	205
Total New Adult Cyclists, High 1600m	571
Total New Adult Cyclists, High 800m	437
Total New Adult Cyclists, Moderate 2400m	95
Total New Adult Cyclists, Moderate 1600m	263
Total New Adult Cyclists, Moderate 800m	202
Total New Adult Cyclists, Low 2400m	53
Total New Adult Cyclists, Low 1600m	147
Total New Adult Cyclists, Low 800m	111
Total New Child Cyclists, 2400m	106
Total New Child Cyclists, 1600m	296
Total New Child Cyclists, 800m	232
Total New Cyclists, High	**2243**
Total New Cyclists, Moderate	**1590**
Total New Cyclists, Low	**1340**

3. Induced Demand Benefit

The SR 29 study area encompasses portions of both Napa and Solano Counties. Because the NCHRP 552 methodology takes into account bicycle commute mode share and the percentage of adult versus children comprising the population, the analysis presented herein was completed separately for the two portions of the study area. Table 3-1 provides a summary of the annualized benefits associated with the proposed improvements, monetized to represent the estimated mobility, health, recreation, and decreased auto use benefits for the portion of the study area in Napa County, while Table 3-2 presents this for the Solano County portion. Table 3-3 provides the total estimated benefit associated with the bicycle improvements proposed throughout the entire study area, which range from $7,002,733 at the low end and $10,410,489 at the high end. Additionally, the annualized benefits described in Table 3-1 Table 3-2, and Table 3-3 should be adjusted to account for a 20-year life cycle. Assuming a 20-year life span, and incorporating a four percent discount rate or P/A Factor to reflect the present worth of future dollars, the 20 year adjusted benefit for the study area is estimated to total $145,225,683. The demand and benefit calculation worksheets are provided in a separate attachment to this memo.

Table 3-1 Bicycle Mode Shift Benefits – Napa County Study Area Portion

Bicycle Facility Benefits	
Annual Mobility Benefit, Off-Street Trail	$ 2,689,048
Annual Health Benefit	
High Estimate	$ 212,480
Moderate Estimate	$ 147,840
Low Estimate	$ 125,696
Annual Recreation Benefit	
High Estimate	$ 4,912,900
Moderate Estimate	$ 3,069,650
Low Estimate	$ 2,438,200
Annual Decreased Auto Use Benefit	$ 13,783.97
Total Annual Benefit, High	$ 7,828,212
Total Annual Benefit, Moderate	$ 5,920,322
Total Annual Benefit, Low	$ 5,266,728

Table 3-2 Bicycle Mode Shift Benefits – Solano County Study Area Portion

Bicycle Facility Benefits	
Annual Mobility Benefit	
Mobility Benefit, Off-Street Trail	$ 675,531
Annual Health Benefit	
High Estimate	$ 74,496
Moderate Estimate	$ 55,680
Low Estimate	$ 45,824
Annual Recreation Benefit	
High Estimate	$ 1,828,650
Moderate Estimate	$ 1,292,100
Low Estimate	$ 1,011,050
Annual Decreased Auto Use Benefit	$ 3,599.64
Total Annual Benefit, High	$ 2,582,276
Total Annual Benefit, Moderate	$ 2,026,910
Total Annual Benefit, Low	$ 1,736,004

Table 3-3 Bicycle Mode Shift Benefits - Total Study Area

Bicycle Facility Benefits	
Annual Mobility Benefit	
Mobility Benefit, Off-Street Trail	$ 3,364,579
Annual Health Benefit	
High Estimate	$ 286,976
Moderate Estimate	$ 203,520
Low Estimate	$ 171,520
Annual Recreation Benefit	
High Estimate	$ 6,741,550
Moderate Estimate	$ 4,361,750
Low Estimate	$ 3,449,250
Annual Decreased Auto Use Benefit	$ 17,383.61
Total Annual Benefit, High	$ 10,410,489
Total Annual Benefit, Moderate	$ 7,947,233
Total Annual Benefit, Low	$ 7,002,733

4. Benefit-Cost Results

The monetized benefits of the induced demand resulting from improvements were compared against the estimated costs of improvements to calculate a benefit-cost ratio, or return on investment, of the improvements. Table 4-1 reflects the benefit-cost (B/C) using the existing year benefit projection, as well as the B/C using the adjusted 20-year estimates for the comprehensive study area. When the benefit cost is adjusted for a 20-year life cycle, including initial construction and operations and maintenance costs, as well as the compounded benefits over the life cycle, the B/C ratio increases from .24 to 2.83. This shows that the benefit cost is estimated to be robust when the life cycle of the improvements are accounted for.

Table 4-1 Induced Demand Life Cycle Benefit-Cost Summary

Total Annualized Benefit	2020 Benefit	2020 Cost	B/C	Expected Life (Years)	20 Year Adjusted Benefit	20 Year Adjusted Cost	B/C
Bicycle Mode Shift Benefit	$10,410,489	$43,400,000	0.24	20	$145,225,683	$51,400,000	2.83

*Notes:
1. Mode Shift to Bike Transportation induced demand benefit calculated using NCHRP 552 methodology.
2. 20-year life cycle cost estimated using planning-level cost estimates include 20 year life cycle of Class I Paths
3. 20-year benefit estimated by multiplying the annualized benefit by a factor of 20 and applying a 4% year of year discount rate to account for the present worth of future dollars

Demand

Jurisdiction:	**Napa County - SR 29 CMCP**	
Total Population:	27,453	Within a mile
Total Commuters:		Within a mile
Total Population Under 18 Years Old	5,902	Napa County 2013-2017 ACS 5-Year Estimates Age and Sex (child population 21.5%)
Commuter Percentage		
Adult Population Percentage	78.50%	
Existing Bicycle Commuters (if known)		
Total Bicyclist Commuters		
Bicycle Commute Mode Share:	0.80%	Napa County U.S. Census Jcommuting Characteristics By Sex (2013-2017)
Children Bicycle Percentage (NHTS 2001)	5.00%	
Population near Facility, 2400m	45,534	1.5 miles
Population near Facility, 1600m	42,802	1 mile
Population near Facility, 800m	26,637	1/2 mile
Total Bicyclist Commuters, 2400m	364	
Total Bicyclist Commuters, 1600m	342	
Total Bicyclist Commuters, 800m	213	
Adult Population near Facility, 2400m	35,744	
Adult Population near Facility, 1600m	33,600	
Adult Population near Facility, 800m	20,910	
Adult Bicycling Rate, High	3.00%	
Adult Bicycling Rate, Moderate	1.36%	
Adult Bicycling Rate, Low	0.80%	
Total Adult Bicycling Rates, High 2400m	1,072	
Total Adult Bicycling Rates, High 1600m	1,008	
Total Adult Bicycling Rates, High 800m	627	
Total Adult Bicycling Rates, Moderate 2400m	486	
Total Adult Bicycling Rates, Moderate 1600m	457	
Total Adult Bicycling Rates, Moderate 800m	284	
Total Adult Bicycling Rates, Low 2400m	286	
Total Adult Bicycling Rates, Low 1600m	269	
Total Adult Bicycling Rates, Low 800m	167	
Total Child Cyclists, 2400m	489	
Total Child Cyclists, 1600m	460	
Total Child Cyclists, 800m	286	
Likelihood Multiplier, 2400m	0.15	
Likelihood Multiplier, 1600m	0.44	
Likelihood Multiplier, 800m	0.51	
Total New Commuters, 2400m	55	
Total New Commuters, 1600m	151	
Total New Commuters, 800m	109	
Total New Adult Cyclists, High 2400m	161	
Total New Adult Cyclists, High 1600m	444	
Total New Adult Cyclists, High 800m	320	
Total New Adult Cyclists, Moderate 2400m	73	
Total New Adult Cyclists, Moderate 1600m	201	
Total New Adult Cyclists, Moderate 800m	145	
Total New Adult Cyclists, Low 2400m	43	

Total New Adult Cyclists, Low 1600m	118
Total New Adult Cyclists, Low 800m	85
Total New Child Cyclists, 2400m	73
Total New Child Cyclists, 1600m	202
Total New Child Cyclists, 800m	146
Total New Cyclists, High	**1,660**
Total New Cyclists, Moderate	**1,155**
Total New Cyclists, Low	**982**

Demand

	Vallejo - SR 29	
Jurisdiction:	**CMCP**	
Total Population:	14,053	Within a mile
Total Commuters:		Within a mile
Total Population Under 18 Years Old	2,951	City of Vallejo 2013-2017 ACS 5 Year Estimates= 15.5%
Commuter Percentage		
Adult Population Percentage	79.00%	
Existing Bicycle Commuters (if known)		
Total Bicyclist Commuters		
Bicycle Commute Mode Share:	0.40%	City of Vallejo (.4%) U.S Census Commuting Characteristics 2013-2017 ACS 5-Year Estimates
Children Bicycle Percentage (NHTS 2001)	5.00%	
Population near Facility, 2400m	20,730	1.5 miles
Population near Facility, 1600m	20,337	1 mile
Population near Facility, 800m	16,114	1/2 mile
Total Bicyclist Commuters, 2400m	83	
Total Bicyclist Commuters, 1600m	81	
Total Bicyclist Commuters, 800m	64	
Adult Population near Facility, 2400m	16,376	
Adult Population near Facility, 1600m	16,067	
Adult Population near Facility, 800m	12,730	
Adult Bicycling Rate, High	1.80%	
Adult Bicycling Rate, Moderate	0.88%	
Adult Bicycling Rate, Low	0.40%	
Total Adult Bicycling Rates, High 2400m	295	
Total Adult Bicycling Rates, High 1600m	289	
Total Adult Bicycling Rates, High 800m	229	
Total Adult Bicycling Rates, Moderate 2400m	144	
Total Adult Bicycling Rates, Moderate 1600m	141	
Total Adult Bicycling Rates, Moderate 800m	112	
Total Adult Bicycling Rates, Low 2400m	66	
Total Adult Bicycling Rates, Low 1600m	64	
Total Adult Bicycling Rates, Low 800m	51	
Total Child Cyclists, 2400m	218	
Total Child Cyclists, 1600m	214	
Total Child Cyclists, 800m	169	
Likelihood Multiplier, 2400m	0.15	
Likelihood Multiplier, 1600m	0.44	
Likelihood Multiplier, 800m	0.51	
Total New Commuters, 2400m	12	
Total New Commuters, 1600m	36	
Total New Commuters, 800m	33	
Total New Adult Cyclists, High 2400m	44	
Total New Adult Cyclists, High 1600m	127	
Total New Adult Cyclists, High 800m	117	
Total New Adult Cyclists, Moderate 2400m	22	
Total New Adult Cyclists, Moderate 1600m	62	
Total New Adult Cyclists, Moderate 800m	57	
Total New Adult Cyclists, Low 2400m	10	

Total New Adult Cyclists, Low 1600m	28
Total New Adult Cyclists, Low 800m	26
Total New Child Cyclists, 2400m	33
Total New Child Cyclists, 1600m	94
Total New Child Cyclists, 800m	86
Total New Cyclists, High	**582**
Total New Cyclists, Moderate	**435**
Total New Cyclists, Low	**358**

Napa

Mobility Benefit

Existing Commuters		920
Total New Commuters		314
Value of Time	$	13.65
Weeks per Year		47
Day per Week		5
Trips		2
Number Minutes Commuter Willing to Spend to Access Facility		
Off-Street Trail		20.38
Bicycle Lane without Parking		18.02
Bicycle Lane with Parking		15.83
Off-Street Trail per Trip Benefit	$	4.64
Bicycle Lane without Parking per Trip Benefit	$	4.10
Bicycle Lane with Parking per Trip Benefit	$	3.60
Annual Mobility Benefit, Off-Street Trail	$	2,689,048.27

Solano

Mobility Benefit

Existing Commuters		229
Total New Commuters		81
Value of Time	$	13.65
Weeks per Year		47
Day per Week		5
Trips		2
Number Minutes Commuter Willing to Spend to Access Facility		
Off-Street Trail		20.38
Bicycle Lane without Parking		18.02
Bicycle Lane with Parking		15.83
Off-Street Trail per Trip Benefit	$	4.64
Bicycle Lane without Parking per Trip Benefit	$	4.10
Bicycle Lane with Parking per Trip Benefit	$	3.60
Annual Mobility Benefit, Off-Street Trail	$	675,530.77

Napa

Health Benefit

Total New Cyclists, High	1660
Total New Cyclists, Moderate	1155
Total New Cyclists, Low	982
Annual Per Capita Cost Savings from Physical Activity	$128
Annual Health Benefit, High	$212,480
Annual Health Benefit, Moderate	$147,840
Annual Health Benefit, Low	$125,696

Solano

Health Benefit

Total New Cyclists, High	582
Total New Cyclists, Moderate	435
Total New Cyclists, Low	358
Annual Per Capita Cost Savings from Physical Activity	$128
Annual Health Benefit, High	$74,496
Annual Health Benefit, Moderate	$55,680
Annual Health Benefit, Low	$45,824

Napa

Recreation Benefit

Total New Cyclists, High	1660
Total New Cyclists, Moderate	1155
Total New Cyclists, Low	982
Total New Commuters, 2400m	314
Total New Recreation Cyclists, High	1346
Total New Recreation Cyclists, Moderate	841
Total New Recreation Cyclists, Low	668
Value of an Hour of Recreation	$10
Annual Recreation Benefit, High	$ 4,912,900
Annual Recreation Benefit, Moderate	$ 3,069,650
Annual Recreation Benefit, Low	$ 2,438,200

Solano

Recreation Benefit

Total New Cyclists, High	582
Total New Cyclists, Moderate	435
Total New Cyclists, Low	358
Total New Commuters, 2400m	81
Total New Recreation Cyclists, High	501
Total New Recreation Cyclists, Moderate	354
Total New Recreation Cyclists, Low	277
Value of an Hour of Recreation	$10
Annual Recreation Benefit, High	$ 1,828,650
Annual Recreation Benefit, Moderate	$ 1,292,100
Annual Recreation Benefit, Low	$ 1,011,050

Napa

Decreased Auto Use Benefit

Total New Commuters	314
Net Benefit Per Mile, Urban	$ 0.13
Net Benefit Per Mile, Suburban	$ 0.08
Net Benefit Per Mile, Small Town/Rural	$ 0.01
Average Round Trip Length*	9.34

*2017 NHTS Average Vehicle Trip Length by Census Designated Region - "Pacific"

Weeks per Year	47
Days a Week	5
Annual Decreased Auto Use Benefit	$ 13,783.97

Solano

Decreased Auto Use Benefit

Total New Commuters	82
Net Benefit Per Mile, Urban	$ 0.13
Net Benefit Per Mile, Suburban	$ 0.08
Net Benefit Per Mile, Small Town/Rural	$ 0.01
Average Round Trip Length*	9.34

*2017 NHTS Average Vehicle Trip Length by Census Region "Pacific"

Weeks per Year	47
Days a Week	5
Annual Decreased Auto Use Benefit	$ 3,599.64

Napa

Bicycle Facility Benefits		
Annual Mobility Benefit, Off-Street Trail	$	2,689,048
Annual Health Benefit		
High Estimate	$	212,480
Moderate Estimate	$	147,840
Low Estimate	$	125,696
Annual Recreation Benefit		
High Estimate	$	4,912,900
Moderate Estimate	$	3,069,650
Low Estimate	$	2,438,200
Annual Decreased Auto Use Benefit	$	13,783.97
Total Annual Benefit, High	$	7,828,212
Total Annual Benefit, Moderate	$	5,920,322
Total Annual Benefit, Low	$	5,266,728

Solano

Bicycle Facility Benefits		
Annual Mobility Benefit, Off-Street Trail	$	675,531
Annual Health Benefit		
High Estimate	$	74,496
Moderate Estimate	$	55,680
Low Estimate	$	45,824
Annual Recreation Benefit		
High Estimate	$	1,828,650
Moderate Estimate	$	1,292,100
Low Estimate	$	1,011,050
Annual Decreased Auto Use Benefit	$	3,599.64
Total Annual Benefit, High	$	2,582,276
Total Annual Benefit, Moderate	$	2,026,910
Total Annual Benefit, Low	$	1,736,004

Total

Bicycle Facility Benefits		
Annual Mobility Benefit, Off-Street Trail	$	3,364,579
Annual Health Benefit		
High Estimate	$	286,976
Moderate Estimate	$	203,520
Low Estimate	$	171,520
Annual Recreation Benefit		
High Estimate	$	6,741,550
Moderate Estimate	$	4,361,750
Low Estimate	$	3,449,250
Annual Decreased Auto Use Benefit	$	17,383.61
Total Annual Benefit, High	$	10,410,489
Total Annual Benefit, Moderate	$	7,947,233
Total Annual Benefit, Low	$	7,002,733

Appendix G: Transit Ridership Projection

Route A Trips

Time	Riders
7:10	1
8:10	2
9:10	2
10:10	2
11:10	2
12:10	3
13:10	4
14:10	2
15:10	3
16:10	2
17:10	2

Route B Trips

Time	Riders
6:52	4
7:22	4
7:52	6
8:22	6
8:52	5
9:22	5
9:52	4
10:22	5
10:52	5
11:22	4
11:52	6
12:22	5
12:52	6
13:22	3
13:52	4
14:22	5
14:52	4
15:22	5
15:52	3
16:22	2
16:52	2
17:22	2
17:52	2
18:22	2
18:52	4

Route C

Time	Riders
6:30	2
7:00	3
7:30	16
8:00	8
8:30	7
9:00	3
9:30	6
10:00	9
10:30	7
11:00	9
11:30	9
12:00	7
12:30	10
13:00	4
13:30	7
14:00	8
14:30	9
15:00	5
15:30	9
16:00	8
16:30	6
17:00	3
17:30	4
18:00	3
18:30	3

Route D

Time	Riders
6:50	10
7:20	8
7:50	6
8:20	5
8:50	11
9:20	6
9:50	7
10:20	7
10:50	5
11:20	6
11:50	5
12:20	6
12:50	6
13:20	9
13:50	14
14:20	7
14:50	6
15:20	11
15:50	4
16:20	7
16:50	4
17:20	3
17:50	3
18:20	3

Route E

Time	Riders
6:50	2
7:50	2
8:50	8
9:50	5
10:50	6
11:50	8
12:50	11
13:50	11
14:50	13
15:50	9
16:50	5
17:50	4
18:50	3

Route F

Time	Riders
6:50	5
7:20	9
7:50	3
8:20	4
8:50	3
9:20	5
9:50	4
10:20	4
10:50	4
11:20	4
11:50	6
12:20	6
12:50	8
13:20	5
13:50	4
14:20	5
14:50	6
15:20	6
15:50	5
16:20	5
16:50	4
17:20	4
17:50	4
18:20	2

Route G

Time	Riders
6:50	5
7:20	9
7:50	2
8:20	3
8:50	3
9:20	3
9:50	2
10:20	7
10:50	3
11:20	4
11:50	2
12:20	2
12:50	6
13:20	2
13:50	2
14:20	4
14:50	4
15:20	2
15:50	5
16:20	2
16:50	4
17:20	3
17:50	2
18:20	1

Route H

Time	Riders
7:10	8
8:10	5
9:10	4
10:10	5
11:10	7
12:10	7
13:10	5
14:10	5
15:10	5
16:10	5
17:10	4

Route 10N

Time	Riders
5:25	12
6:25	19
7:25	15
8:25	16
9:10	20
10:10	18
11:10	21
12:10	26
13:10	30
14:10	29
15:10	32
16:10	24
17:10	14
18:10	13
19:10	11
20:10	8

Route 10 S

Time
6:00
7:00
8:00
9:10
10:10
11:10
12:10
13:10
14:10
15:10
16:10
17:10
18:10
19:10
20:10
21:10

Riders
14
22
22
24
20
25
20
25
30
32
23
15
14
5
4
3

Route 11 N

Time	Riders
5:30	23
6:30	28
7:30	36
8:30	31
9:30	25
10:30	29
11:30	23
12:30	21
13:30	26
14:40	29
15:40	19
16:40	13
17:40	15
18:40	14
19:40	7
20:40	6

Route 11 S

Time	Riders
5:30	11
6:30	14
7:30	26
8:30	33
9:30	22
10:30	23
11:30	27
12:30	26
13:30	26
14:30	38
15:30	32
16:40	39
17:40	15
18:40	14
19:40	7
20:40	12

Route 10X N

Time	Riders
6:45	5
7:50	3
8:50	5
16:35	7
17:35	3
18:35	2

Route 10X S

Time	Riders
6:30	3
7:30	4
8:30	11
16:00	2
17:00	3
18:00	6

Route 11X N

Time	Riders
6:25	29
6:55	6
7:45	7
17:45	5
18:50	5
19:10	12

Route 11x S

Time	Riders
4:30	2
5:25	3
5:55	2
6:40	4
16:25	5
17:25	6
17:55	6

Route 21 E

Time	Riders
6:00	3
7:15	3
8:15	5
9:15	5
10:15	5
11:15	6
12:15	6
13:15	7
14:15	7
15:15	8
16:20	9
17:20	7
18:15	6

Route 21 W

Time	Riders
6:15	10
7:15	4
8:15	8
9:15	5
10:15	9
11:15	3
12:15	5
13:15	4
14:15	5
15:20	4
16:15	4
17:20	3
18:20	1

Route 29 N

Time	Riders
5:45	5
6:20	8
6:50	6
7:20	6
7:50	4
8:50	22
10:15	7
12:45	6
15:30	14
16:30	16
17:20	17
17:50	11
18:15	8
18:35	5

Route 29 S

Time	Riders
4:30	7
5:00	11
5:30	12
6:00	11
6:30	13
7:00	11
9:00	12
11:30	11
14:00	9
15:00	7
15:50	6
16:15	6
16:50	4
17:20	3

Future Transit Ridership Estimation, Peak Period

Routes	AM	PM
29-N	58	77
29-S	88	35
11X-N	42	22
11X-S	11	17

Future Transit Ridership Estimation, Peak Period

Routes	AM	PM
29-N	75.4	100.1
29-S	114.4	45.5
11X-N	54.6	28.6
11X-S	14.3	22.1

Future Transit Ridership Estimation, Peak Period Adjusted for proposed Recommendations

Routes	AM	PM
29-N	226.2	300.3
29-S	343.2	136.5
11X-N	163.8	85.8
11X-S	42.9	66.3

Existing Transit Ridership Estimation, Annualized

Routes	AM	PM
29-N	15,080	20,020
29-S	22,880	9,100
11X-N	10,920	5,720
11X-S	2,860	4,420

Future Transit Ridership Estimation, Annualized

Routes	AM	PM
29-N	58,812	78,078
29-S	89,232	35,490
11X-N	42,588	22,308
11X-S	11,154	17,238

Transit Ridership Delta Between Existing and Future, Annualized

	Service Period	
Route	AM	PM
29-N	43,732	58,058
29-S	66,352	26,390
11X-N	31,668	16,588
11X-S	8,294	12,818

Notes:

11x estimations adjusted by multiplying by 3 to reflect the proposed service expansion from one to three hours

VMT Reduction Associasted with Transit Ridership Projections		
Annual VMT Reduction*		
	AM	PM
11X-N	295,779	154,932
11X-S	77,466	119,720
	AM	PM
29-N	408,457	542,262
29-S	246,483	619,728

Daily VMT Reduction		
	AM	PM
11X-N	1138	596
11X-S	298	460
	AM	PM
29-N	1571	2086
29-S	948	2384

Notes:
*Assumes 260 days (weekday service only)
9.34 = 2017 NHTS Average Vehicle Trip Length by Census Region "Pacific" for VMT calculation

Appendix H: Safety Benefit Calculation Worksheets

Project Summary

		Intersection Locations	CM 1 (Convert to Rooundabout)	Total Benefit	Total Cost	B/C Ratio	Maximum HSIP Funding Eligibility		Running Benefit Total	Running Cost Total	Running B/C	Notes
Intersection	1	SR 29/Soscol Ferry Rd/SR 221	S18	$ 32,873,551	$ 58,000,000	0.6	100%	$ 58,000,000	$ 32,873,551	$ 58,000,000	0.6	Signal
Intersection	2	Devlin Rd/Airport Blvd	S18	$ 4,519,821	$ 6,622,000	0.7	100%	$ 6,622,000	$ 37,393,372	$ 64,622,000	0.6	Signal
Intersection	3	SR 29/Airport Blvd/SR 12	S18	$ 34,348,581	$ 129,102,714	0.3	100%	$ 129,102,714	$ 71,741,953	$ 193,724,714	0.4	Signal
Intersection	4	SR 12 / S Kelly Rd	S18	$ 20,884,800	$ 8,722,000	2.4	100%	$ 8,722,000	$ 92,626,753	$ 202,446,714	0.5	Signal
				$ 92,626,753	**$ 202,446,714**	**0.5**		**$ 202,446,714**				

		Roadway Segment Locations	CM 1 (Install pathway (R36) and Install Bike Lane (R37))	Total Benefit	Total Cost	B/C Ratio	Maximum HSIP Funding Eligibility		Running Benefit Total	Running Cost Total	Running B/C	Notes	
Roadway Segment	R1	SR 37 to Eucalyptus Dr	R37	$ 13,895,040	$ 49,352,520	0.3	90%	44417268	$ 13,895,040	$ 49,352,520	0.3	Separated Shared Use Path	bike lane
Roadway Segment	R2	Napa Junction Rd to Paoli Loop Rd	R37	$ -	$ 763,000	0.0	90%	686700	$ 13,895,040	$ 50,115,520	0.3	Separated Shared Use Path	bike lane
Roadway Segment	R3	S Kelly Rd to Soscol Junction	R36	$ 2,900,661	$ 37,098,880	0.1	90%	33388992	$ 16,795,701	$ 87,214,400	0.2	Buffered Bike lane	bike lane
				$ 16,795,701	**$ 87,214,400**	**0.2**		**$ 78,492,960**					

	Total Benefit	Total Cost	B/C Ratio	Maximum HSIP Funding Eligibility
PROJECT GRAND TOTAL	**$ 109,422,454**	**$ 289,661,114**	**0.4**	**$ 280,939,674**
Annual Benefit	**$ 5,471,123**			

*Convert to Roundabout must be the only CM when analyzed in HSIPAnalyzer2018

ADT Estimation

Roundabout Locations ADT Estimation	AM					PM				
	Peak Volume		k factor	Estimated ADT		Peak Volume		k factor	Estimated ADT	
	Major St	Minor St		Major St	Minor St	Major St	Minor St		Major St	Minor St
SR 29/Soscol Ferry Rd/SR 221				69000	42500					
Devlin Rd/Airport Blvd	766	315	7.75%	9880	4060	950	600	6.68%	14220	8980
SR 29/Airport Blvd/SR 12				69000	6000					
SR 12 / S Kelly Rd		468	20.00%	6000	2340		294			

ADT Used for Benefit Calc		
Major St	Minor St	Resulting Benefit from
69000	42500	$ **32,873,551**
12050	6520	$ **4,519,821**
69000	6000	$ **34,348,581**
6000	2340	$ **20,884,800**

Countermeasure Benefit-Cost Calculation

Countermeasure Details					Collisions By Severity						CRF		Crash Cost	Effective CRF		Benefit						
Code	Description	Collision Types	CRF	Expected Life (years)	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Data Period Total Collision Cost	Years 1-10	Years 10-20	Per 10 Years	Years 1-10	Years 10-20	Years 1-10	Years 10-20	Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
S18	Convert intersection to roundabout (from signal)	All	50%	20	0	5	1	25	44	$9,743,200	0.50	0.50	$19,486,400	0.50	0.50	$9,743,200	$9,743,200	$19,486,400	One intersection	Varies by location	2	#VALUE!	#VALUE!
																		$19,486,400				**#VALUE!**	#VALUE!

Years of data: 5.00

Instructions:

1. Rename this tab with the following convention:
[location type]-[ID #]
where [location type] is "Intx" for Intersection and "Seg" for roadway segment, and [ID #] is the study ID number.

2. Fill out the Study location ID, CM Code columns, and units deployed columns in the **'Project Summary'** tab. Those values will populate in this tab automatically, and are highlighted in BEIGE.

3. **WHITE** cells have formulas, and populate automatically.

4. *'Collisions by Severity'* data is referenced in from another spreadsheet (see below). But can be entered manually as well.

5. Enter 'Years of Data'. Should be a number between 3 and 5 to qualify for HSIP funding.

*The countermeasures selected must be of the same location type (S, NS, or R). If CMs with different location types are entered, the text in the *'Code'* cells will turn **RED**.

*Rows 9 through 25 contain logic tables that determine the cost and benefit outputs of this tab. Do NOT edit!

*Do NOT insert any additional rows or columns in this tab!

*Unit costs are based on the cost estimates located in the spreadsheet linked below, and are NOT LINKED:
'K:\PRJ\2601\T2601\Countermeasures\[CM Cost Estimates.xlsx]Cost Estimate Summary Table'

*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PRJ\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot Tables'

Collisions by Type and Severity

		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	0	5	1	25	44
	Night	0	4	0	5	8
	P & B	0	1	0	0	0
S	All	0	5	1	25	44
	Night	0	4	0	5	8
	P & B	0	1	0	0	0
Emergency Vehicle						
R	All	0	7	4	41	86
	Night	0	1	1	5	8
	P & B	0	0	0	0	0

Compounding CRF Logic Table *do not edit

	All	P & B	Night	Animal	Emergency Vehicle
CM1	1	0	0	0	0
CM2	#N/A	#N/A	#N/A	#N/A	#N/A
CM3	0	0	0	0	0
	All	**P & B**	**Night**	**Animal**	**Emergency Vehicle**
1st 10 **RF Prod**	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000
2nd 10 **RF Prod**	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000

*Benefit for CMs with 'All' Crash Type are calculated before CMs with other crash types.
*Other Crash Types do not compound with each other, the benefits are calculated independently.

Check logic for CM are matching

S	N	0
0	R	0
0	S	1
		1

Study Location Determination from Excel tab name

N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Intx-1

Intx-1
1
Intx
Intersection1

LRSM Costs

	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	$2,000,000	$2,000,000	$126,500	$71,900	$11,800
Signalized Intersection (S)	$1,460,000	$1,460,000	$126,500	$71,900	$11,800
Non-Signalized Intersection (NS)	$2,310,000	$2,310,000	$126,500	$71,900	$11,800

9743200 4E+07

Countermeasure Benefit-Cost Calculation

Countermeasure Details					Collisions By Severity										
Code	Description	Collision Types	CRF	Expected Life (years)	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
S18	Convert intersection to roundabout (from signal)	All	Varies	20	0	0	0	0	8	#VALUE!	One intersection	es by location	1	#VALUE!	#VALUE!
0	#N/A	#N/A	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	-	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A	$ -	0	$ -	#DIV/0!
										#VALUE!				**#VALUE!**	#VALUE!

Instructions:

1. Rename this tab with the following convention:
[location type]-[ID #]
where [location type] is "Intx" for Intersection and "Seg" for roadway segment, and [ID #] is the study ID number.

2. Fill out the Study location ID, CM Code columns, and units deployed columns in the **'Project Summary'** tab. Those values will populate in this tab automatically, and are highlighted in BEIGE.

3. **WHITE** cells have formulas, and populate automatically.

4. *'Collisions by Severity'* data is referenced in from another spreadsheet (see below). But can be entered manually as well.

5. Enter 'Years of Data'. Should be a number between 3 and 5 to qualify for HSIP funding.

*The countermeasures selected must be of the same location type (S, NS, or R). If CMs with different location types are entered, the text in the *'Code'* cells will turn **RED**.

*Rows 9 through 25 contain logic tables that determine the cost and benefit outputs of this tab. Do NOT edit!

*Do NOT insert any additional rows or columns in this tab!

*Unit costs are based on the cost estimates located in the spreadsheet linked below, and are NOT LINKED:
'K:\PRJ\2601\T2601\Countermeasures\[CM Cost Estimates.xlsx]Cost Estimate Summary Table'

*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PRJ\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot

Years of data: 5.00

Collisions by Type and Severity

		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	0	0	0	0	8
	Night	0	0	0	0	1
	P & B	0	0	0	0	0
S	All	0	0	0	0	8
	Night	0	0	0	0	1
	P & B	0	0	0	0	0
Emergency Vehicle						
R	All	0	0	0	0	8
	Night	0	0	0	0	0
	P & B	0	0	0	0	0

Check logic for CM are matching

S	N	0
0	R	0
0	S	1
		1

Study Location Determination from Excel tab name

N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Intx-2

Intx-2
2
Intx
Intersection2

LRSM Costs	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	$2,000,000	$2,000,000	$126,500	$71,900	$11,800
Signalized Intersection (S)	$1,460,000	$1,460,000	$126,500	$71,900	$11,800
Non-Signalized Intersection (NS)	$2,310,000	$2,310,000	$126,500	$71,900	$11,800

Countermeasure Benefit-Cost Calculation

Countermeasure Details					Collisions By Severity						CRF		Crash Cost	Effective CRF		Benefit						
Code	Description	Collision Types	CRF	Expected Life (years)	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Data Period Total Collision Cost	Years 1-10	Years 10-20	Per 10 Years	Years 1-10	Years 10-20	Years 1-10	Years 10-20	Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
S18	Convert intersection to roundabout (from signal)	All	50%	20	0	1	7	26	41	$4,698,700	0.50	0.50	$9,397,400	0.5000	0.5000	$4,698,700	$4,698,700	$9,397,400	One intersection	es by location	1	#VALUE!	#VALUE!
0	#N/A	#N/A	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	FALSE	0.00	0.00	$0	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	-	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	FALSE	0.00	0.00	$0	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
																		$9,397,400				**#VALUE!**	#VALUE!

Instructions:

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[location type]-[ID #]
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3. **WHITE** cells have formulas, and populate automatically.

4. *'Collisions by Severity'* data is referenced in from another spreadsheet (see below). But can be entered manually as well.

5. Enter 'Years of Data'. Should be a number between 3 and 5 to qualify for HSIP funding.

*The countermeasures selected must be of the same location type (S, NS, or R). If CMs with different location types are entered, the text in the *'Code'* cells will turn **RED**.

*Rows 9 through 25 contain logic tables that determine the cost and benefit outputs of this tab. Do NOT edit!

*Do NOT insert any additional rows or columns in this tab!

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'K:\PRJ\2601\T2601\Countermeasures\[CM Cost Estimates.xlsx]Cost Estimate Summary Table'

*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PRJ\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot

Years of data: 5.00

Collisions by Type and Severity

		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	0	1	7	26	41
	Night	0	1	5	11	21
	P & B	0	0	0	0	0
S	All	0	1	7	26	41
	Night	0	1	5	11	21
	P & B	0	0	0	0	0
Emergency Vehicle						
R	All	0	1	12	52	106
	Night	0	0	2	11	12
	P & B	0	0	0	0	0

Compounding CRF Logic Table *do not edit

	All	P & B	Night	Animal	Emergency Vehicle
CM1	1	0	0	0	0
CM2	#N/A	#N/A	#N/A	#N/A	#N/A
CM3	0	0	0	0	0
	All	**P & B**	**Night**	**Animal**	**Emergency Vehicle**
1st 10 **CRF Prod**	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000
2nd 10 **CRF Prod**	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000

*Benefit for CMs with 'All' Crash Type are calculated before CMs with other crash types.
*Other Crash Types do not compound with each other, the benefits are calculated independently.

Check logic for CM are matching

S	N	0
0	R	0
0	S	1
		1

Study Location Determination from Excel tab name

N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Intx-3

Intx-3
3
Intx
Intersection3

LRSM Costs

	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	**$2,000,000**	**$2,000,000**	**$126,500**	**$71,900**	**$11,800**
Signalized Intersection (S)	**$1,460,000**	**$1,460,000**	**$126,500**	**$71,900**	**$11,800**
Non-Signalized Intersection (NS)	**$2,310,000**	**$2,310,000**	**$126,500**	**$71,900**	**$11,800**

Countermeasure Benefit-Cost Calculation

Countermeasure Details					Collisions By Severity										
Code	Description	Collision Types	CRF	Expected Life (years)	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
S18	Convert intersection to roundabout (from signal)	All	Varies	20	0	1	3	7	27	#VALUE!	One intersection	es by location	1	#VALUE!	#VALUE!
0	#N/A	#N/A	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	-	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A	$ -	0	$ -	#DIV/0!
										#VALUE!				**#VALUE!**	#VALUE!

Instructions:

1. Rename this tab with the following convention:
[location type]-[ID #]
where [location type] is "Intx" for Intersection and "Seg" for roadway segment, and [ID #] is the study ID number.

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3. **WHITE** cells have formulas, and populate automatically.

4. *'Collisions by Severity'* data is referenced in from another spreadsheet (see below). But can be entered manually as well.

5. Enter 'Years of Data'. Should be a number between 3 and 5 to qualify for HSIP funding.

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*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PRJ\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot

Years of data: 5.00

Collisions by Type and Severity

		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	0	1	3	7	27
	Night	0	0	1	2	4
	P & B	0	0	0	0	0
S	All	0	1	3	7	27
	Night	0	0	1	2	4
	P & B	0	0	0	0	0
Emergency Vehicle						
R	All	0	1	3	7	27
	Night	0	0	0	0	0
	P & B	0	0	0	0	0

Check logic for CM are matching

S	N	0
0	R	0
0	S	1
		1

Study Location Determination from Excel tab name

N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Intx-4

Intx-4
4
Intx
Intersection4

LRSM Costs	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	$2,000,000	$2,000,000	$126,500	$71,900	$11,800
Signalized Intersection (S)	$1,460,000	$1,460,000	$126,500	$71,900	$11,800
Non-Signalized Intersection (NS)	$2,310,000	$2,310,000	$126,500	$71,900	$11,800

Countermeasure Benefit-Cost Calculation

Countermeasure Details					*do not edit*	Collisions By Severity						CRF		Crash Cost	Effective CRF		Benefit		Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
Code	Description	Collision Types	CRF	Expected Life (years)		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Data Period Total Collision Cost	Years 1-10	Years 10-20	Per 10 Years	Years 1-10	Years 10-20	Years 1-10	Years 10-20						
R37	Install sidewalk/pathway (to avoid walking along roadway)	P & B	80%	20	RP & B	2	0	1	3	0	$4,342,200	0.80	0.80	$8,684,400	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	#N/A	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	FALSE	0.00	0.00	$0	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	-	0%	#N/A	0-	#N/A	#N/A	#N/A	#N/A	#N/A	FALSE	0.00	0.00	$0	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
																			$0				$0	-

Years of data: 5.00

Instructions:

1. Rename this tab with the following convention:
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4. *'Collisions by Severity'* data is referenced in from another spreadsheet (see below). But can be entered manually as well.

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*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PR\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot Tables'

Collisions by Type and Severity

			Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	NAll	3	7	26	93	72
	Night	NNight	3	4	7	38	30
	P & B	NP & B	2	3	4	8	0
S	All	SAll	3	7	26	93	72
	Night	SNight	3	4	7	38	30
	P & B	SP & B	2	3	4	8	0
Emergency Vehicle		SEmergency Vehicle					
R	All	RAll	6	19	55	256	343
	Night	RNight	2	3	8	40	39
	P & B	RP & B	2	0	1	3	0

Compounding CRF Logic Table *do not edit

	All	P & B	Night	Animal	Emergency Vehicle
CM1	0	1	0	0	0
CM2	#N/A	#N/A	#N/A	#N/A	#N/A
CM3	0	0	0	0	0
	All	P & B	Night	Animal	Emergency Vehicle
1st 10 CRF Prod	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000
2nd 10 CRF Prod	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000

*Benefit for CMs with 'All' Crash Type are calculated before CMs with other crash types.
*Other Crash Types do not compound with each other, the benefits are calculated independently.

Check logic for CM are matching

R	N	0
0	R	1
0	S	0
		1

Study Location Determination from Excel tab name

N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Seg-R1

Seg-R1
R1
Seg
Roadway SegmentR1

LRSM Costs

	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	$2,000,000	$2,000,000	$126,500	$71,900	$11,800
Signalized Intersection (S)	$1,460,000	$1,460,000	$126,500	$71,900	$11,800
Non-Signalized Intersection (NS)	$2,310,000	$2,310,000	$126,500	$71,900	$11,800

Countermeasure Benefit-Cost Calculation

Countermeasure Details					Collisions By Severity										
Code	Description	Collision Types	CRF	Expected Life (years)	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
R37	Install sidewalk/pathway (to avoid walking along roadway)	P & B	80%	20	0	0	0	0	0	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	#N/A	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	-	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A	$ -	0	$ -	#DIV/0!
										$0				**$0**	-

Instructions:

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4. *'Collisions by Severity'* data is referenced in from another spreadsheet (see below). But can be entered manually as well.

5. Enter 'Years of Data'. Should be a number between 3 and 5 to qualify for HSIP funding.

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*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PRJ\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot

Years of data: 5.00

Collisions by Type and Severity

		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	0	2	4	17	9
	Night	0	1	1	6	2
	P & B	0	0	0	0	0
S	All	0	2	4	17	9
	Night	0	1	1	6	2
	P & B	0	0	0	0	0
Emergency Vehicle						
R	All	0	2	4	26	14
	Night	0	0	0	2	3
	P & B	0	0	0	0	0

Check logic for CM are matching

R	N	0
0	R	1
0	S	0
		1

Study Location Determination from Excel tab name

N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Seg-R

Seg-R2
R2
Seg
Roadway SegmentR2

LRSM Costs	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	$2,000,000	$2,000,000	$126,500	$71,900	$11,800
Signalized Intersection (S)	$1,460,000	$1,460,000	$126,500	$71,900	$11,800
Non-Signalized Intersection (NS)	$2,310,000	$2,310,000	$126,500	$71,900	$11,800

Countermeasure Benefit-Cost Calculation

Countermeasure Details					Collisions By Severity						CRF		Crash Cost	Effective CRF		Benefit						
Code	Description	Collision Types	CRF	Expected Life (years)	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO	Data Period Total Collision Cost	Years 1-10	Years 10-20	Per 10 Years	Years 1-10	Years 10-20	Years 1-10	Years 10-20	Lifetime Benefit	Unit	Unit Cost	Units Deployed	Total CM Cost	B/C Ratio
R36	Install bike lanes	P & B	35%	20	1	0	0	1	0	$2,071,900	0.35	0.35	$4,143,800	0.0000	0.0000	$0	$0	$0	Per length (foot)	$ 9	0	$ -	#DIV/0!
0	#N/A	#N/A	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	FALSE	0.00	0.00	$0	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
0	#N/A	-	0%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	FALSE	0.00	0.00	$0	0.0000	0.0000	$0	$0	$0	#N/A	$ -	0	$ -	#DIV/0!
																		$0				**$0**	-

Instructions:

1. Rename this tab with the following convention:
[location type]-[ID #]
where [location type] is "Intx" for Intersection and "Seg" for roadway segment, and [ID #] is the study ID number.

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*Collision data is based on the pivot tables in the spreadsheet linked below:
'K:\PRJ\2601\T2601\Countermeasures\[CM Benefit-Cost Analysis.xlsx]Col. Severity Pivot

Years of data: 5.00

Collisions by Type and Severity

		Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NS	All	1	4	2	15	28
	Night	0	2	1	4	8
	P & B	0	0	0	0	0
S	All	1	4	2	15	28
	Night	0	2	1	4	8
	P & B	0	0	0	0	0
Emergency Vehicle						
R	All	2	9	29	123	243
	Night	0	2	6	15	36
	P & B	1	0	0	1	0

Compounding CRF Logic Table *do not edit

	All	P & B	Night	Animal	Emergency Vehicle
CM1	0	1	0	0	0
CM2	#N/A	#N/A	#N/A	#N/A	#N/A
CM3	0	0	0	0	0
	All	**P & B**	**Night**	**Animal**	**Emergency Vehicle**
1st 10 **CRF Prod**	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000
2nd 10 **CRF Prod**	#N/A	#N/A	#N/A	#N/A	#N/A
CRF Sum	#N/A	#N/A	#N/A	#N/A	#N/A
Compound Multiplier	0.0000	0.0000	0.0000	0.0000	0.0000

*Benefit for CMs with 'All' Crash Type are calculated before CMs with other crash types.
*Other Crash Types do not compound with each other, the benefits are calculated independently.

Check logic for CM are matching

R	N	0
0	R	1
0	S	0
		1

Study Location Determination from Excel tab name
N:\US\Roseville\Projects\561\11187559\Analysis\Safety\[HSIP Calculator Tool.xlsx]Seg-R

Seg-R3
R3
Seg
Roadway SegmentR3

LRSM Costs

	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	PDO
NSC Injury Scale	K	A	B	C	O
Collision_Severity Value	**1**	**2**	**3**	**4**	**0**
Roadway (R)	**$2,000,000**	**$2,000,000**	**$126,500**	**$71,900**	**$11,800**
Signalized Intersection (S)	**$1,460,000**	**$1,460,000**	**$126,500**	**$71,900**	**$11,800**
Non-Signalized Intersection (NS)	**$2,310,000**	**$2,310,000**	**$126,500**	**$71,900**	**$11,800**

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	Federal Funding Eligibility	Systemic Approach Opportunity?
S1	Lighting	Add intersection lighting (S.I.)	Night	40%	20	100%	Medium
S2	Signal Mod.	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	All	15%	10	100%	Very High
S3	Signal Mod.	Improve signal timing (coordination, phases, red, yellow, or operation)	All	15%	10	50%	Very High
S4	Signal Mod.	Provide Advanced Dilemma Zone Detection for high speed approaches	All	40%	10	100%	High
S5	Signal Mod.	Install emergency vehicle pre-emption systems	Emergency Vehicle	70%	10	100%	High
S6	Signal Mod.	Provide protected left turn phase (left turn lane already exists)	All	30%	20	100%	High
S7	Signal Mod.	Convert signal to mast arm (from pedestal-mounted)	All	30%	20	100%	Medium
S8	Operation/ Warning	Install raised pavement markers and striping (Through Intersection)	All	10%	10	100%	Very High
S9	Operation/ Warning	Install flashing beacons as advance warning (S.I.)	All	30%	10	100%	Medium
~~S10~~	~~Operation/ Warning~~	~~Install cameras to detect red-light running~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
S11	Operation/ Warning	Improve pavement friction (High Friction Surface Treatments)	All	40%	10	100%	Medium
S12	Geometric Mod.	Install raised median on approaches (S.I.)	All	25%	20	90%	Medium
S13	Geometric Mod.	Create directional median openings to allow (and restrict) left-turns and u-turns (S.I.)	All	50%	20	90%	Medium
~~S14~~	~~Geometric Mod.~~	~~Install right-turn lane (S.I.)~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
~~S15~~	~~Geometric Mod.~~	~~Install left-turn lane (signal has no left-turn phase - before and after)~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
~~S16~~	~~Geometric Mod.~~	~~Install left-turn lane (signal has a left-turn phase - before and after)~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
S17	Geometric Mod.	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)	All	55%	20	90%	Low
S18	Geometric Mod.	Convert intersection to roundabout (from signal)	All	Varies	20	100%	Low
S19	Ped and Bike	Install pedestrian countdown signal heads	P & B	25%	20	100%	Very High
S20	Ped and Bike	Install pedestrian crossing (S.I.)	P & B	25%	20	100%	High
S21	Ped and Bike	Install advance stop bar before crosswalk (Bicycle Box)	P & B	15%	10	100%	Very High
S22	Ped and Bike	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	P & B	60%	10	100%	Very High
S23	Geometric Mod.	Install pedestrian median fencing on approaches	P & B	35%	20	90%	Low
NS1	Lighting	Add intersection lighting (NS.I.)	Night	40%	20	100%	Medium
NS2	Control	Convert to all-way STOP control (from 2-way or Yield control)	All	50%	10	100%	High
NS3	Control	Install signals	All	25%	20	100%	Low
NS4A	Control	Convert intersection to roundabout (from all way stop)	All	Varies	20	100%	Low
NS4B	Control	Convert intersection to roundabout (from stop or yield control on minor road)	All	Varies	20	100%	Low
NS5	Operation/ Warning	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	All	15%	10	100%	Very High
NS6	Operation/ Warning	Upgrade intersection pavement markings (NS.I.)	All	25%	10	100%	Very High
NS7	Operation/ Warning	Install Flashing Beacons at Stop-Controlled Intersections	All	15%	10	100%	High
NS8	Operation/ Warning	Install flashing beacons as advance warning (NS.I.)	All	30%	10	100%	High
NS9	Operation/ Warning	Install transverse rumble strips on approaches	All	20%	10	90%	High
NS10	Operation/ Warning	Improve sight distance to intersection (Clear Sight Triangles)	All	20%	10	90%	High
NS11	Geometric Mod.	Install splitter-islands on the minor road approaches	All	40%	20	90%	Medium
NS12	Geometric Mod.	Install raised median on approaches (NS.I.)	All	25%	20	90%	Medium
NS13	Geometric Mod.	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	All	50%	20	90%	Medium
NS14	Geometric Mod.	Install right-turn lane (NS.I.)	All	20%	20	90%	Low
NS15	Geometric Mod.	Install left-turn lane (where no left-turn lane exists)	All	35%	20	90%	Low
NS16	Ped and Bike	Install raised medians / refuge islands (NS.I.)	P & B	45%	20	90%	Medium
NS17	Ped and Bike	Install pedestrian crossing at uncontrolled locations (new signs and markings only)	P & B	25%	10	100%	High
NS18	Ped and Bike	Install pedestrian crossing at uncontrolled locations (with enhanced safety features)	P & B	35%	20	100%	Medium
NS19	Ped and Bike	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	P & B	55%	20	100%	Low
NS20	Operation/ Warning	Improve pavement friction (High Friction Surface Treatments)	All	40%	10	100%	Medium
R1	Lighting	Add segment lighting	Night	35%	20	100%	Medium
R2	Remove/ Shield Obstacles	Remove or relocate fixed objects outside of Clear Recovery Zone	All	35%	20	90%	High
R3	Remove/ Shield Obstacles	Install Median Barrier	All	25%	20	100%	Medium
R4	Remove/ Shield Obstacles	Install Guardrail	All	25%	20	100%	High
R5	Remove/ Shield Obstacles	Install impact attenuators	All	25%	10	100%	High
R6	Remove/ Shield Obstacles	Flatten side slopes	All	30%	20	90%	Medium
R7	Remove/ Shield Obstacles	Flatten side slopes and remove guardrail	All	40%	20	90%	Medium
~~R8~~	~~Remove/ Shield Obstacles~~	~~Upgrade bridge railing~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
R9	Geometric Mod.	Install raised median	All	25%	20	90%	Medium
R10	Geometric Mod.	Install median (flush)	All	15%	20	90%	Medium
R11	Geometric Mod.	Install acceleration/ deceleration lanes	All	25%	20	90%	Low
~~R12~~	~~Geometric Mod.~~	~~Install climbing lane (where large difference between car and truck speed)~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~Low~~
R13	Geometric Mod.	Widen lane (initially less than 10 ft)	All	25%	20	90%	Medium
R14	Geometric Mod.	Add two-way left-turn lane (without reducing travel lanes)	All	30%	20	90%	Medium
R15	Geometric Mod.	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)	All	30%	20	90%	Medium
R16	Geometric Mod.	Widen shoulder (paved)	All	30%	20	90%	Medium
R17	Geometric Mod.	Widen shoulder (unpaved)	All	20%	20	90%	Medium
R18	Geometric Mod.	Pave existing shoulder	All	15%	20	90%	Medium
R19	Geometric Mod.	Improve horizontal alignment (flatten curves)	All	50%	20	90%	Low
R20	Geometric Mod.	Flatten crest vertical curve	All	25%	20	90%	Low
R21	Geometric Mod.	Improve horizontal and vertical alignments	All	60%	20	90%	Low
R22	Geometric Mod.	Improve curve superelevation	All	45%	20	90%	Medium
R23	Geometric Mod.	Convert from two-way to one-way traffic	All	35%	20	90%	Medium
R24	Geometric Mod.	Improve pavement friction (High Friction Surface Treatments)	All	40%	10	100%	High
~~R25~~	~~Geometric Mod.~~	~~Provide Tapered Edge for Pavement Edge Drop-off~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
R26	Operation/ Warning	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	All	15%	10	100%	Very High
R27	Operation/ Warning	Install chevron signs on horizontal curves	All	40%	10	100%	Very High
R28	Operation/ Warning	Install curve advance warning signs	All	25%	10	100%	Very High
R29	Operation/ Warning	Install curve advance warning signs (flashing beacon)	All	30%	10	100%	High
R30	Operation/ Warning	Install dynamic/variable speed warning signs	All	30%	10	100%	High

R31	Operation/ Warning	Install delineators, reflectors and/or object markers	All	15%	10	100%	Very High
R32	Operation/ Warning	Install edge-lines and centerlines	All	25%	10	100%	Very High
R33	Operation/ Warning	Install no-passing line	All	45%	10	100%	Very High
R34	Operation/ Warning	Install centerline rumble strips/stripes	All	20%	10	100%	High
R35	Operation/ Warning	Install edgeline rumble strips/stripes	All	15%	10	100%	High
R36	Ped and Bike	Install bike lanes	P & B	35%	20	90%	High
R37	Ped and Bike	Install sidewalk/pathway (to avoid walking along roadway)	P & B	80%	20	90%	Medium
R38	Ped & Bike	Install pedestrian crossing (with enhanced safety features)	P & B	30%	10	90%	Medium
R39	Ped and Bike	Install raised pedestrian crossing	P & B	35%	10	90%	Medium
R40	Animal	Install animal fencing	Animal	80%	20	90%	Medium
~~R41~~	~~Truck~~	~~Install truck escape ramp~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
R42	Geometric Mod.	Install pedestrian median fencing on approaches	P & B	35%	20	90%	Low
S							
Sa		Install bike ramps from bike lane to adjacent trail or facility on intersection approach	P & B				
Sb		Continue bike lane to stop bar. If approach has dedicated vehicle right turn lane, provide transition zone across right	P & B				
Sc		Move bike lane to the left of the exclusive right turn lane on intersection approach, with conflict markings in the me	P & B				
Sd		Add conflict markings to merge zone and in bike lane to intersection	P & B				
N							
R							

Struck-through countermeasures are not eligible in the current HSIP call for projects.

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **SR 29 Intersection Improvement 2**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)
Devlin Rd @ Airport Blvd

Project Description: (limited to 250 characters)
Convert to Roundabout

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☐ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project:	1

CM No. 1:	S18: Convert intersection to roundabout (from signal)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (S18)	% for OS*	% for NS**
+ -	1						%	%	100
		Weighted Average (%) Total ($)							

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: (e.g. enter 10 for 10%)	%	$0
Total Construction Cost (Con Items & Contingencies): (Rounded up to the nearest hundreds)		$0

I.3 Summary

1 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
S18	100%	0.00%	Yes (<15% cost) (Exception being requested)	☒

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 100.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Attention! Please see warning message(s) below. Move on to the next section ONLY when NO messages are displayed here.
1. Construction cost is $0.

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 100 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$0	%	$0	$0
Construction Items	$0 (Read only - from Section I)	%	$0	$0
Subtotal - Construction	**$0**	%	**$0**	**$0**
PROJECT TOTAL	$0	%	$0	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

1. The HSIP amount requested is less than $100k.
2. There is no HSIP amount for construction items.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. **For each location group:**

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 1 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	S (Signalized Intersections)
+ -	1	G1-1		

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 1

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S18: Convert intersection to roundabout (from signal)	S	0.5	20	All	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Additional information is required:

Since Roundabout is selected, the below additional information is required for calculating Roundabout benefit.

Roundabout Location	Please select:	Rural				
Intersection Type	Please select:	Four-leg Intersection				
Roundabout Lanes	Please select:	1 Lane				
ADT	Major Road:	12,050	Minor Road:	6,520	**Total**	**18,570**

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) All

Crash Data Table for Crash Type: ALL

No.	Location (from Table III.1)	Fatal (ALL)	Severe Injury (ALL)	Other Visible Injury (ALL)	Complaint of Pain (ALL)	PDO (ALL)	Total
1		0	0	0	0	8	8
	Total	0	0	0	0	8	8

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 0
1 countermeasures are eligible in benefit calculation. (S18)
Project location(s) are divided into 1 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 1 (S18) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: All: 0,0,0,0,8	$4,519,821	$0	$0	$4,519,821
Sum		**$4,519,821**	**$0**	**$0**	**$4,519,821**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	S18	$4,519,821		**4,519,821**
2		$0	$0	**0**
3		$0	$0	**0**
	Entire Project	**$4,519,821**	**$0**	**4,519,821**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 1
S18: Convert intersection to roundabout (from signal)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$0
HSIP Funds Requested:	$0
Max. Federal Reimbursement Ratio (FRR):	100%
Total Expected Benefit:	$4,519,821
Benefit Cost Ratio:	4,519,821.00

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **SR 29 Intersection Improvement 3**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)
SR 29 @ Airport Blvd / SR 12

Project Description: (limited to 250 characters)
Convert to Roundabout with crosswalks

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☐ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project: 1

CM No. 1: S18: Convert intersection to roundabout (from signal)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (S18)	% for OS*	% for NS**
+ -	1						%	%	100
		Weighted Average (%) Total ($)							

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: % $0
(e.g. enter 10 for 10%)

Total Construction Cost (Con Items & Contingencies): $0
(Rounded up to the nearest hundreds)

I.3 Summary

1 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
S18	100%	0.00%	Yes (<15% cost) (Exception being requested)	☒

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 100.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Attention! Please see warning message(s) below. Move on to the next section ONLY when NO messages are displayed here.
1. Construction cost is $0.

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 100 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$0	%	$0	$0
Construction Items	$0 (Read only - from Section I)	%	$0	$0
Subtotal - Construction	**$0**	%	**$0**	**$0**
PROJECT TOTAL	$0	%	$0	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

1. The HSIP amount requested is less than $100k.
2. There is no HSIP amount for construction items.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. **For each location group:**

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 1 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	S (Signalized Intersections)
+ -	1	G1-1		

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 1

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S18: Convert intersection to roundabout (from signal)	S	0.5	20	All	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Additional information is required:

Since Roundabout is selected, the below additional information is required for calculating Roundabout benefit.

Roundabout Location	Please select:	Rural				
Intersection Type	Please select:	Four-leg Intersection				
Roundabout Lanes	Please select:	2 Lanes				
ADT	Major Road:	69,000	Minor Road:	36,000	**Total**	**105,000**

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) All

Crash Data Table for Crash Type: ALL

No.	Location (from Table III.1)	Fatal (ALL)	Severe Injury (ALL)	Other Visible Injury (ALL)	Complaint of Pain (ALL)	PDO (ALL)	Total
1		0	1	7	26	41	75
	Total	0	1	7	26	41	75

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 0
1 countermeasures are eligible in benefit calculation. (S18)
Project location(s) are divided into 1 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 1 (S18) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: All: 0,1,7,26,41	$34,348,581	$0	$0	$34,348,581
Sum		**$34,348,581**	**$0**	**$0**	**$34,348,581**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	S18	34,348,581		**34,348,581**
2		$0	$0	**0**
3		$0	$0	**0**
	Entire Project	**34,348,581**	**$0**	**34,348,581**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 1
S18: Convert intersection to roundabout (from signal)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$0
HSIP Funds Requested:	$0
Max. Federal Reimbursement Ratio (FRR):	100%
Total Expected Benefit:	34,348,581
Benefit Cost Ratio:	34,348,581

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **SR 29 Intersection Improvement 4**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)
Kelly Rd @ SR 12

Project Description: (limited to 250 characters)
Convert to Roundabout

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☐ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project:	1

CM No. 1:	S18: Convert intersection to roundabout (from signal)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (S18)	% for OS*	% for NS**
+ -	1						%	%	100
		Weighted Average (%) Total ($)							

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: (e.g. enter 10 for 10%)	%	$0
Total Construction Cost (Con Items & Contingencies): (Rounded up to the nearest hundreds)		$0

I.3 Summary

1 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
S18	100%	0.00%	Yes (<15% cost) (Exception being requested)	☒

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 100.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Attention! Please see warning message(s) below. Move on to the next section ONLY when NO messages are displayed here.
1. Construction cost is $0.

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 100 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$0	%	$0	$0
Construction Items	$0 (Read only - from Section I)	%	$0	$0
Subtotal - Construction	**$0**	%	**$0**	**$0**
PROJECT TOTAL	$0	%	$0	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

1. The HSIP amount requested is less than $100k.
2. There is no HSIP amount for construction items.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. **For each location group:**

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 1 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	S (Signalized Intersections)
+ -	1	G1-1		

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 1

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S18: Convert intersection to roundabout (from signal)	S	0.5	20	All	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Additional information is required:

Since Roundabout is selected, the below additional information is required for calculating Roundabout benefit.

Roundabout Location	Please select:	Rural				
Intersection Type	Please select:	Four-leg Intersection				
Roundabout Lanes	Please select:	2 Lanes				
ADT	Major Road:	6,000	Minor Road:	2,340	**Total**	**8,340**

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) All

Crash Data Table for Crash Type: ALL

No.	Location (from Table III.1)	Fatal (ALL)	Severe Injury (ALL)	Other Visible Injury (ALL)	Complaint of Pain (ALL)	PDO (ALL)	Total
1		0	1	3	7	27	38
	Total	0	1	3	7	27	38

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 0
1 countermeasures are eligible in benefit calculation. (S18)
Project location(s) are divided into 1 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 1 (S18) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: All: 0,1,3,7,27	$20,884,800	$0	$0	$20,884,800
Sum		**$20,884,800**	**$0**	**$0**	**$20,884,800**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	S18	20,884,800		**20,884,800**
2		$0	$0	**0**
3		$0	$0	**0**
	Entire Project	**20,884,800**	**$0**	**20,884,800**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 1
S18: Convert intersection to roundabout (from signal)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$0
HSIP Funds Requested:	$0
Max. Federal Reimbursement Ratio (FRR):	100%
Total Expected Benefit:	20,884,800
Benefit Cost Ratio:	20,884,800

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **SR 29 Segment Improvement 1**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)
SR 29 (SR 37 to Eucalyptus Dr)

Project Description: (limited to 250 characters)
Install Class I multi-use path adjacent to highway

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☐ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project:	1

CM No. 1:	R37: Install sidewalk/pathway (to avoid walking along roadway)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (R37)	% for OS*	% for NS**
+ -	1						%	%	100
		Weighted Average (%) Total ($)							

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: (e.g. enter 10 for 10%)	%	$0
Total Construction Cost (Con Items & Contingencies): (Rounded up to the nearest hundreds)		$0

I.3 Summary

1 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
R37	90%	0.00%	Yes (<15% cost) (Exception being requested)	☒

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 90.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Attention! Please see warning message(s) below. Move on to the next section ONLY when NO messages are displayed here.
1. Construction cost is $0.

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 90 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$0	%	$0	$0
Construction Items	$0 (Read only - from Section I)	%	$0	$0
Subtotal - Construction	**$0**	%	**$0**	**$0**
PROJECT TOTAL	$0	%	$0	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

1. The HSIP amount requested is less than $100k.
2. There is no HSIP amount for construction items.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. **For each location group:**

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 1 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	R (Roadways)
+ -	1	G1-1		

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 1

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: R (Roadways)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	R37: Install sidewalk/pathway (to avoid walking along roadway)	R	0.8	20	Ped & Bike	90%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) Ped & Bike

Crash Data Table for Crash Type: Pedestrians and Bicyclists Involved (P&B)

No.	Location (from Table III.1)	Fatal (P&B)	Severe Injury (P&B)	Other Visible Injury (P&B)	Complaint of Pain (P&B)	PDO (P&B)	Total
1		2	0	1	3	0	6
	Total	2	0	1	3	0	6

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 0
1 countermeasures are eligible in benefit calculation. (R37)
Project location(s) are divided into 1 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: R (Roadways) Number of location(s): 1 Number of selected countermeasure(s): 1 (R37) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: Ped & Bike: 2,0,1,3,0	$13,895,040	$0	$0	$13,895,040
Sum		**$13,895,040**	**$0**	**$0**	**$13,895,040**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	R37	13,895,040		**13,895,040**
2		$0	$0	**0**
3		$0	$0	**0**
	Entire Project	**13,895,040**	**$0**	**13,895,040**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 1
R37: Install sidewalk/pathway (to avoid walking along roadway)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$0
HSIP Funds Requested:	$0
Max. Federal Reimbursement Ratio (FRR):	90%
Total Expected Benefit:	13,895,040
Benefit Cost Ratio:	13,895,040

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **SR 29 Segment Improvement 2**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)
SR 29 (Napa Junction Rd to Paoli Loop Rd)

Project Description: (limited to 250 characters)
Install Class I multi-use path adjacent to highway

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☐ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project:	1

CM No. 1:	R37: Install sidewalk/pathway (to avoid walking along roadway)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (R37)	% for OS*	% for NS**
+ -	1						%	%	100
		Weighted Average (%) Total ($)							

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: (e.g. enter 10 for 10%)	%	$0
Total Construction Cost (Con Items & Contingencies): (Rounded up to the nearest hundreds)		$0

I.3 Summary

1 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
R37	90%	0.00%	Yes (<15% cost) (Exception being requested)	☒

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 90.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Attention! Please see warning message(s) below. Move on to the next section ONLY when NO messages are displayed here.
1. Construction cost is $0.

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 90 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$0	%	$0	$0
Construction Items	$0 (Read only - from Section I)	%	$0	$0
Subtotal - Construction	**$0**	%	**$0**	**$0**
PROJECT TOTAL	$0	%	$0	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

1. The HSIP amount requested is less than $100k.
2. There is no HSIP amount for construction items.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. **For each location group:**

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 1 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	R (Roadways)
+ -	1	G1-1		

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 1

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: R (Roadways)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	R37: Install sidewalk/pathway (to avoid walking along roadway)	R	0.8	20	Ped & Bike	90%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) Ped & Bike

Crash Data Table for Crash Type: Pedestrians and Bicyclists Involved (P&B)

No.	Location (from Table III.1)	Fatal (P&B)	Severe Injury (P&B)	Other Visible Injury (P&B)	Complaint of Pain (P&B)	PDO (P&B)	Total
1		0	0	0	0	0	0
	Total	0	0	0	0	0	0

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 0
1 countermeasures are eligible in benefit calculation. (R37)
Project location(s) are divided into 1 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: R (Roadways) Number of location(s): 1 Number of selected countermeasure(s): 1 (R37) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: Ped & Bike: 0,0,0,0,0	$0	$0	$0	$0
Sum		**$0**	**$0**	**$0**	**$0**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	R37	$0		**0**
2		$0	$0	**0**
3		$0	$0	**0**
	Entire Project	**$0**	**$0**	**0**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 1

R37: Install sidewalk/pathway (to avoid walking along roadway)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$0
HSIP Funds Requested:	$0
Max. Federal Reimbursement Ratio (FRR):	90%
Total Expected Benefit:	$0
Benefit Cost Ratio:	0.00

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **SR 29 Segment Improvement 3**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)
SR 29 (S Kelly Rd to Soscol Junction/SR221)

Project Description: (limited to 250 characters)
Install Class I Class II bike lane (buffered)

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☐ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project:	1

CM No. 1:	R36: Install bike lanes

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (R36)	% for OS*	% for NS**
+ -	1						%	%	100
		Weighted Average (%) Total ($)							

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: (e.g. enter 10 for 10%)	%	$0
Total Construction Cost (Con Items & Contingencies): (Rounded up to the nearest hundreds)		$0

I.3 Summary

1 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
R36	90%	0.00%	Yes (<15% cost) (Exception being requested)	☒

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 90.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Attention! Please see warning message(s) below. Move on to the next section ONLY when NO messages are displayed here.
1. Construction cost is $0.

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 90 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$0	%	$0	$0
Construction Items	$0 (Read only - from Section I)	%	$0	$0
Subtotal - Construction	**$0**	%	**$0**	**$0**
PROJECT TOTAL	$0	%	$0	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

1. The HSIP amount requested is less than $100k.
2. There is no HSIP amount for construction items.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. **For each location group:**

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 1 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	R (Roadways)
+ -	1	G1-1		

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 1

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: R (Roadways)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	R36: Install bike lanes	R	0.35	20	Ped & Bike	90%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) Ped & Bike

Crash Data Table for Crash Type: Pedestrians and Bicyclists Involved (P&B)

No.	Location (from Table III.1)	Fatal (P&B)	Severe Injury (P&B)	Other Visible Injury (P&B)	Complaint of Pain (P&B)	PDO (P&B)	Total
1		1	0	0	1	0	2
	Total	1	0	0	1	0	2

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 0
1 countermeasures are eligible in benefit calculation. (R36)
Project location(s) are divided into 1 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: R (Roadways) Number of location(s): 1 Number of selected countermeasure(s): 1 (R36) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: Ped & Bike: 1,0,0,1,0	$2,900,661	$0	$0	$2,900,661
Sum		**$2,900,661**	**$0**	**$0**	**$2,900,661**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	R36	$2,900,661		**2,900,661**
2		$0	$0	**0**
3		$0	$0	**0**
	Entire Project	**$2,900,661**	**$0**	**2,900,661**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 1
R36: Install bike lanes

Cost, FRR, Benefit and BCR:

Total Project Cost:	$0
HSIP Funds Requested:	$0
Max. Federal Reimbursement Ratio (FRR):	90%
Total Expected Benefit:	$2,900,661
Benefit Cost Ratio:	2,900,661.00