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MEMORANDUM

To: Tri-Valley Transportation Council Technical Advisory Committee (TVTC TAC)

From: Michael Schmitt, AICP CTP, PTP, RSP$_1$
Elizabeth Chau, P.E.

Date: May 5, 2022

Subject: TVTC SEP 2021 Update – AB 602 Supplemental Analysis

As the 2020 TVTC Nexus Study was adopted in August of 2021, prior to the implementation of Assembly Bill 602 (AB 602), the Nexus Study and its resultant fee program is not subject to its requirements. However, TVTC has undertaken this supplemental analysis to guide future analysis requirements and to help inform the TVTC how AB 602 may impact the program when the next Nexus Study update[1] is completed. This analysis was approved by TVTC Board on April 18, 2022.

Background

Assembly Bill 602 (AB 602)

Assembly Bill 602 was approved and signed into law on September 28, 2021. Among other things, this bill requires that impact fee nexus studies adopted on and after January 1, 2022 must, as appropriate, identify the existing level of service, the new level of service, and include an explanation as to why the new level of service is necessary for each public facility included in an impact fee program. It should be noted that the basis for the required level of service analyses is not specifically defined in AB 602 and that as a practical matter, level of service methods applied to various public facilities need to vary depending on the type of facility being analyzed and the information available.

AB 602 also requires that studies adopted after July 1, 2022 either calculate a fee levied or imposed on a housing development project proportionately to the square footage of the proposed units, or make specified findings explaining why square footage is not an appropriate metric to calculate the fee.

2020 Nexus Study

The performance analysis conducted in support of the 2020 TVTC Nexus Study analyzed the benefits of proposed projects in the aggregate based on specific improvement categories. This aggregate approach is an industry-accepted method when evaluating project impacts on a regional, system-wide basis. This method is especially appropriate where a fee program is targeted to regional improvements, as is the case with TVTC's fee program. These categories included roadway capacity, transit, safety, pedestrian/bicycle, intersection, and technology. Since these improvement

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[1] The next nexus study is required to be completed within 8 years (2029).

categories improve different aspects of the transportation system, differing methodologies and measures of effectiveness (MOEs) were necessary to appropriately evaluate their anticipated benefit to the transportation system. It should be noted that some projects have multiple beneficial project elements and thus could be analyzed using more than one analysis technique (i.e., a project can have both a congestion benefit and a safety benefit). However, for the purposes of this analysis, project analysis was limited to the basis which best reflects the primary benefit and/or purpose of the project.

Level of Service Analysis

Methodology

Table 1 summarizes the methodology and measure of effectiveness (MOE) that was used to evaluate existing and future conditions for public facilities included within the 2020 TVTC Nexus Study. As described in the prior section, the methodology and MOE selected were dependent on the type of public facility being analyzed and the data available.

Table 1: Methodology and Measure of Effectiveness

Improvement Type	Facility Type	Methodology	Measure of Effectiveness
Roadway Capacity	Freeway	HCM Freeway	LOS (Density)
	State Route	HCM Highway	LOS (Density)
	Arterial	ACTC Roadway Segment	LOS (V/C)
	Interchanges	HCM Intersection	LOS (Delay)
Transit	All Facility Type	TCQSM	Service Frequency LOS
Safety	All Facility Type	HSM Safety Performance Functions	Crash Rate
Pedestrian/ Bicycle	All Facility Type	Montgomery County Level of Traffic Stress	Level of Traffic Stress (LTS)
Intersection	-	HCM Intersection	LOS (Delay)
Technology	All Facility Type	Qualitative Assessment	Resultant Delay/Congestion Reduction

Note: HCM = Highway Capacity Manual, ACTC = Alameda County Transportation Commission, LOS = Level of Service, TCQSM = Transit Quality of Service Manual, HSM = Highway Safety Manual

Roadway Capacity

Analysis of roadway capacity projects was completed based on the HCM concept of Level of Service (LOS). The HCM LOS for a roadway facility is a qualitative measure used to describe operational conditions. LOS ranges from LOS A (free flow traffic with minimal delay) to LOS F (heavy congestion operating near or over capacity). As discussed in the following sections, Freeway, State Route, and Interchange projects were evaluated using methodologies defined in the HCM 6th Edition, while arterial roadway analyses were completed based on a volume/capacity (V/C) methodology commonly applied for project analyses undertaken by the Alameda County Transportation Commission (ACTC).

For existing conditions, AM (7-9) and PM (4-6) peak period traffic volumes were obtained from the Caltrans Traffic Census Program[2] or recent publicly accessible traffic studies conducted within the Tri-Valley area. These traffic counts were then evaluated to determine the highest AM and PM peak hours of traffic which is the basis of the analysis contained herein. Future 2040 No Build and 2040 Build peak hour volumes were developed using post-processed data from a version of the CCTA travel demand model updated to reflect input from the TVTC member jurisdictions. Further information on the travel demand model's development is provided within the 2020 TVTC Nexus Study. Generally speaking, forecast volumes were developed using the "difference method", which involves adding forecasted traffic growth (future minus existing estimated traffic volumes from the travel demand model) to an existing count.

In cases where a project is proposing a new roadway segment (C-4 Dublin Boulevard – North Canyons Parkway Extension and C-5 El Charro Road Widening), a parallel roadway segment was used as the basis for evaluating project need.

A minimum level of service standard of LOS F was used for roadway analyses.

Freeway

Freeway facilities were analyzed using the HCM 6th edition methodology for basic freeway segments. As shown in **Table 2**, LOS is determined based on the density of traffic flow.

Table 2: Freeway Facility Level of Service Criteria

Level of Service (LOS)	Density (pc/mi/ln)
A	≤ 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45 or v/c > 1.0

pc/mi/ln = passenger car per mile per lane; v/c = volume-to-capacity
Source: *Highway Capacity Manual*, 6th Edition

State Route

State Route facilities were analyzed using the HCM 6th edition methodology for multi-lane roadway segments. As shown in **Table 3**, LOS is determined based on density of traffic flow.

[2] Caltrans, https://dot.ca.gov/programs/traffic-operations/census, Accessed March 2022.

Table 3: Multilane Level of Service Criteria

Level of Service (LOS)	Density (pc/mi/ln)			
	FFS: 45 mph	FFS: 50 mph	FFS: 55 mph	FFS: 60 mph
A	≤ 11	≤ 11	≤ 11	≤ 11
B	> 11 – 18	> 11 – 18	> 11 – 18	> 11 – 18
C	> 18 – 26	> 18 – 26	> 18 – 26	> 18 – 26
D	> 26 – 35	> 26 – 35	> 26 – 35	> 26 – 35
E	> 35 – 45	> 35 – 43	> 35 – 41	> 35 – 40
F	> 45	> 43	> 41	> 40

Source: *Highway Capacity Manual*, 6th Edition

Arterial

Alameda County Transportation Commission (ACTC) and Contra Costa Transportation Authority (CCTA) evaluate arterials using different methodologies. ACTC's methodology is based on volume-to-capacity (v/c) ratios while CCTA evaluates arterials based on intersection level of service. This analysis was evaluated based on the ACTC methodology given the nature of the analysis requirements. During the design phase of a project, it is anticipated that more detailed operational analysis will be completed.

Arterial level of service analysis assumed a per-lane capacity of 800 vehicles per hour. The LOS criteria shown in **Table 4**.

Table 4: ACTC Rodway Segment Level of Service Criteria

Level of Service (LOS)	V/C
A	0.35
B	0.58
C	0.75
D	0.90
E	1.00
F	> 1.00

Source: *Alameda Congestion Management Program 2019*

Interchange

Interchanges were analyzed based on HCM intersection methodologies. The basis of the LOS criteria is shown in **Table 5**.

Table 5: Intersection Level of Service Criteria

Level of Service (LOS)	Signalized Delay (sec/veh)	Unsignalized[1] Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10.0 – 20.0	> 10.0 – 15.0
C	> 20.0 – 35.0	> 15.0 – 25.0
D	> 35.0 – 55.0	> 25.0 – 35.0
E	> 55.0 – 80.0	> 35.0 – 50.0
F	> 80.0	> 50.0

[1] For All-way stop-control intersection (AWSC), LOS is defined based on average intersection delay. For side-street stop-controlled intersections (SSSC), LOS is defined based on the worst movement delay.
Source: *Highway Capacity Manual*, 6th Edition

Transit

Transit projects were evaluated based on service frequency LOS from the *Transit Capacity and Quality of Service Manual* (TCQSM) under which LOS criteria varies depending on the type of transit service. As shown in **Table 6**, LOS for urban scheduled transit service[3] is determined on headway or the time between buses/trains. For intercity schedule transit services, commuter or express buses, LOS is determined on the number of trips provided each day.

For this analysis, all transit projects were evaluated on the basis of the urban scheduled transit service LOS criterion as the projects are anticipated to operate throughout the day on a fixed schedule. A level of service standard of LOS F was used for this analysis. In addition, other benefits such as increases in ridership, as well as resultant system-wide VMT reductions may also be evaluated.

Safety

The number of crashes per million vehicle miles travelled (crash/M-VMT) were calculated for the project segment based on the observed number of crashes within 5 years. The number of crashes for the future no build conditions were estimated based on the Safety Performance Functions (SPF) described in Highway Safety Manual (HSM) 2010. SPFs are regression equations that estimate the average crash frequency for a specific site type as a function of annual average daily traffic and the segment length. The reduction in crashes in the Future 2040 Build scenario were calculated by applying Crash Modification Factors (CMF) based on proposed safety improvements for each project.

For the purposes of this study and based on the observed data reviewed, a threshold designation was established for crashes per million-VMT of more than 1.

[3] Urban schedule transit service includes all scheduled service within a city, as well as service between cities within a larger metropolitan area.

Table 6: Transit Level of Service Criteria

Level of Service (LOS)	Urban Scheduled Transit Service		Intercity Scheduled Transit Service
	Headway (min)	Veh/hr	Trips/Day
A	< 10	> 6	> 15
B	10-14	5-6	12-15
C	15-20	3-4	8-11
D	21-30	2	4-7
E	31-60	1	2-3
F	> 60	< 1	0-1

Source: *Transit Capacity and Quality of Service Manual*

Pedestrian / Bicycle

Pedestrian / Bicycle improvements were evaluated using the modified level of traffic stress (LTS) methodology used in the Montgomery County Bicycle Master Plan[4] in Maryland. This methodology is based on the original LTS methodology developed in 2012 by the Mineta Transportation Institute and San Jose State University[5]. Both methodologies assign a traffic stress level base on street/traffic attributes (e.g. traffic speed, traffic volume, number of lanes, etc.). As shown in **Table 7**, the original LTS has four stress levels, while the Montgomery County methodology provides three additional stress levels. The Montgomery County methodology also includes criteria for separated bikeways, two-lane roads, and industrial streets. For the purpose of this analysis, a threshold of LTS 4 was used.

Table 7: Level of Traffic Stress (LTS) categories

Original LTS	Montgomery County LTS
LTS 1 – Very Low	LTS 0 – None
	LTS 1 – Very Low
LTS 2 – Low	LTS 2 – Low
LTS 3 – Moderate	LTS 2.5 – Moderate Low
	LTS 3 – Moderate High
LTS 4- High	LTS 4 – High
	LTS 5 – Very High

Source: Montgomery County, MD. *The Bicycle Master Plan Appendix D*, 2018

[4] Montgomery County, MD *The Bicycle Master Plan Appendix D*, 2018
[5] Mekuria, Maaza, Peter G. Furth, and Hilary Nixon, Low-Stress Bicycling and Network Connectivity, San Jose, CA: Mineta Transportation Institute, 2012

Crossings were evaluated based on the criteria summarized in **Table 8**, which is based on posted speed limit, if there is a median refuge, and the number of lanes of the street being crossed.

Table 8: Level of Traffic Stress Criteria - Crossing

Posted Speed Limit on Street being Crossed (mph)	# Lanes of Street Being Crossed					
	No Median Refuge			Median Refuge (≥ 6 ft wide)		
	2-3	4-5	6+	2-3	4-5	6+
≤ 25	LTS 1	LTS 2	LTS 4	LTS 1	LTS 1	LTS 2
30	LTS 2	LTS 2.5	LTS 4	LTS 1	LTS 2	LTS 2.5
35	LTS 2.5	LTS 3	LTS 4	LTS 1	LTS 2.5	LTS 3
≥ 40	LTS 3	LTS 4	LTS 4	LTS 2	LTS 2.5	LTS 4

Source: Montgomery County, MD. *The Bicycle Master Plan Appendix D*, 2018

Segments were evaluated based on criteria summarized in **Table 9,** which is based on posted speed limit and the type of buffer between the shared path and adjacent roadways.

Table 9: Level of Traffic Stress Criteria - Segment

Posted Speed Limit (mph)	Shared Use Path		
	Side path w/ Buffer < 5ft (and no railing OR many driveways)	Side path w/ Buffer ≥ 5ft (and no railing OR many driveways)	Independent Right-of-Way
≤ 25	LTS 1[A] or LTS 2	LTS 1	LTS 0
30	LTS 1[A] or LTS 2	LTS 1	LTS 0
35	LTS 1[A] or LTS 2	LTS 1	LTS 0
40	LTS 2	LTS 1[B] or LTS 2	LTS 0
≥ 45	LTS 2	LTS 1[B] or LTS 2	LTS 0

Note:
[A] LTS 1 is given if the road is residential and buffer is at last 5 feet wide.
[B] LTS 1 is given if the buffer is wide.
Source: Montgomery County, MD. *The Bicycle Master Plan Appendix D*, 2018

Intersection

Intersection improvements were evaluated using the HCM intersection methodology. As shown in **Table 5**, intersection LOS is based on delay. Existing AM (7-9) and PM (4-6) traffic volumes were obtained from recent publicly accessible traffic studies. Future 2040 No Build and 2040 Build volumes were developed based on the "difference method" previously described. A level of service standard of LOS F was used for this analysis.

Technology

Technology projects included in the 2020 TVTC Nexus Study include studies to evaluate and identify potential technology-based solutions. Since these are studies and not public facilities, no MOE or

thresholds were established at this time. AB 602 acknowledges that level of service analysis is not possible for certain types of projects. However, a qualitative assessment was conducted to determine how the technology being studies may result in delay or congestion reduction to offset the impacts related to future growth.

Results

This section presents a summary of results for each project.

Roadway Capacity

Freeway

Freeway analysis was used to evaluate the following projects:

- B-1 I-580/I-680 Interchange (westbound to southbound)
- C-3 Dublin Boulevard – North Canyons Parkway Extensions
- C-7 I-680 Express Lanes – Hwy 84 to Alcosta

Project B-1 evaluated multiple segments along I-580 and I-680. In the existing conditions, these segments operated at LOS D or LOS F. Even though some segments continue to operate at LOS F with the Project in 2040, there will be a reduction in volume-to-capacity ratio (v/c).

Even though **Project C-3** is a local roadway, the I-580 segment between Fallon Road and Airway Boulevard was analyzed because the Dublin Boulevard-North Canyon Parkway extension would divert local traffic from this freeway segment. In existing condition, the I-580 segment between Fallon Road and Airway Boulevard operates at an unacceptable LOS F. Even though some segments continue to operate at LOS F with the Project in 2040, there will be a reduction in v/c.

For **Project C-7**, future development will increase congestion along I-680 and will improve with the construction of the project.

State Route

State Route analysis was used to evaluate the state route portion (SR-84/Isabella Avenue) of **Projects A-2b SR 84/I-580 Interchange**. Future development will change the LOS from LOS B or better in existing condition to LOS C through LOS E in 2040 No Build condition. Project A-2b will improve LOS to LOS B or better.

Arterial

Arterial analysis was used to evaluate the following projects:

- A-2b SR 84/I-580 Interchange
- B-6 Jack London Boulevard Extension
- C-5 Camino Tassajara/Tassajara Road Widening Project (East of Blackhawk Drive to North Dublin Ranch Drive)
- Roadway capacity portion of Project B-8 El Charro Road Widening

Project A-2b evaluated Portola Avenue along the I-580 overpass. This segment operates at LOS F in existing and 2040 No Build conditions. Project A-2b will improve operations to acceptable levels of service.

Project B-6 evaluated Jack London Boulevard, east of El Charro Road. This segment operates at LOS F in the existing and 2040 No Build conditions. With the project, Jack London Boulevard may continue to operate at LOS F; however, there will be a reduction in v/c.

For Project B-8, future development will increase congestion along Camino Tassajara and will cause the roadway to operation at LOS F in 2040 No Build conditions. Project B-8 will improve operations to acceptable levels.

Since **Project C-5** will extend El Charro Road south of Stoneridge Road/Jack London Boulevard, a parallel route along Santa Rita Road was analyzed. Future development will increase congestion along Santa Rita Road and will cause the roadway to operate at LOS F. Project C-5 will improve operations to acceptable levels.

Interchange

Interchange analysis was used to evaluate the following projects:

- B-3 I-580/First Street Interchange Modification
- B-4 I-580/Vasco Road Interchange Modification
- B-5 I-580/Greenville Road Interchange Modification
- C-6 Sunol/680 Interchange Improvements
- C-9 Stoneridge/I-680 Interchange
- C-12 Hacienda/I-580 Interchange Improvements
- C-13 Fallon/El Charro Interchange Improvements

For **Project B-3**, the I-580/First Street interchange operates at LOS C or better in the existing condition. Future development will increase the delay at the interchange. Project B-3 will reduce delay compared to 2040 No Build conditions.

For **Project B-4**, the I-580/Vasco Road interchange operates at LOS E or better in the existing condition. Future development will cause this interchange to operation at LOS F in the PM peak. Project B-4 will improve operations to acceptable levels of LOS C or better.

For **Project B-5**, the I-580/Greenville Road interchange operates at LOS E or better in the existing condition. Future development will cause this interchange to operate at LOS F in PM peak. Project B-5 will improve operations to acceptable levels of LOS E or better.

For **Project C-6**, the I-680/Sunol Boulevard interchange operate at LOS F in the existing and 2040 No Build conditions. Project C-6 will improve operations to acceptable levels of LOS B or better.

For **Project C-9**, the I-680/Stoneridge Drive interchange operates at LOS B in the existing condition. Future development will increase delay at the interchange. Project C-9 will reduce delay compared to 2040 No Build conditions.

For **Project C-12**, the I-580/Hacienda Drive interchange operates at LOS C or better in the existing condition. Future development will increase delay at the interchange. Project C-12 will improve operations compared to 2040 No Build conditions.

For **Project C-13**, the I-580/Fallon Road interchange operates at LOS A or better in the existing condition. Future development will increase delay at the interchange. Project C-13 will improve operations compared to 2040 No Build conditions.

Transit

Transit projects include the following projects:

- A-11 Express Bus/Bus Rapid Transit (BRT) – Phase 2
- C-14 Valley Link Rail (Phase 1
- C-16 I-680 Express Bus Service

For **Project A-11**, both 10R and 30R routes have 15-minute headways (LOS C) in the existing condition. Without the improvements proposed in Project A-11, congestion from future development may increase the headway for these routes. Improvements proposed in Project A-11, such as transit signal priority, queue jumps, dedicated travel lanes may allow 10R and 30R to operate more quickly and efficiently.

Project C-14 would construct new stations and a transit line, so there is no LOS for existing or 2040 No Project conditions. It is anticipated that Valley Link would operate on similar headways as BART which is 15 minutes in the AM peak and 20 minutes in the PM peak, which equates to LOS C. In addition, the Valley Link EIR reports a 0.3% reduction in average weekday VMT between No Build and Build condition.

Project C-16 would establish a new express bus service, so there is no LOS for existing or 2040 No Project conditions. It is currently proposed that the bus would run on 20-minute headways during the peak period, which equates to LOS C.

Safety

Safety analysis evaluate the following projects:

- A-9a Crow Canyon Road Improvements Phase 1
- A-9b Crow Canyon Road Improvements Phase 2
- A-10a Vasco Road Safety Improvements Phase 1
- A-10b Vasco Road Safety Improvements Phase 2
- C-1 Tesla Road Safety Improvements
- C-2 Norris Canyon Road Safety Improvement

- Safety component for Project B-8 Camino Tassajara/Tassajara Road Widening Project (East of Blackhawk Drive to North Dublin Ranch Drive)

Project A-9a and **A-9b** were analyzed together because both projects are difference project phases within the same project limits. In existing conditions, the project segment along Crow Canyon has a crash rate of 0.59 and future development is anticipated to increase the crash rate to 0.62. It is anticipated that the safety improvements proposed in Projects A-9a and A-9b will reduce the crash rate to 0.06.

Project A-10a and **A-10b** were analyzed together because both projects are difference project phases within the same project limits. In existing conditions, the project segment along Vasco Road has a crash rate of 0.68 and future development is anticipated to increase the crash rate to 0.98. It is anticipated that the safety improvements proposed in Projects A-10a and A-10b will reduce the crash rate to 0.53.

For **Project B-8**, the project segment along Camino Tassajara/Tassajara Road has a crash rate of 0.83 in the existing condition and future development is anticipated to increase the crash rate over the threshold to 1.04. It is anticipated that the safety improvements proposed in Projects C-1 will reduce the crash rate to 0.76.

For **Project C-1**, the project segment along Tesla Road has a crash rate of 0.86 in the existing condition and future development is anticipated increase the crash rate over the threshold to 1.11. It is anticipated that the safety improvements proposed in Projects C-1 will reduce the crash rate to 0.62.

For **Project C-2**, the project segment along Norris Canyon Road exceeds the crash rate threshold in the existing condition with a rate of 1.20. Future development is anticipated to increase the rate to 1.63. It is anticipated that the safety improvements proposed in Projects C-2 will reduce the crash rate to 0.20.

Pedestrian / Bicycle

Pedestrian / Bicycle analysis was conducted for all of the Iron Horse Trail projects which include the following:

- C-11a Iron Horse Trail Bicycle-Pedestrian Overcrossing – Bollinger Canyon Road
- C-11b Iron Horse Trail Bicycle-Pedestrian Overcrossing – Crow Canyon Road
- C-11c Iron Horse Trail – Dublin
- C-11d Iron Horse Trail – Livermore
- C-11e Iron Horse Trail to Shadow Cliffs
- C-11f Iron House Trail Connection Improvements at Santa Rita Road
- C-11g Iron Horse Trail Bicycle/Pedestrian Overcrossing – Sycamore Valley Road
- C-11h Iron Horse Trail System-wide Improvements

The crossing at Bollinger Canyon Road (**Project C-11a)** has a LTS of 4 in the existing condition . The crossing will continue to have a LTS of 4 in the future conditions. Project C-11a will construct an overcrossing which will improve the LTS to LTS 0.

The crossing at Crow Canyon Road (**Project C-11b)** has a LTS of 4 in the existing condition. The crossing will continue to have a LTS of 4 in the future conditions. Project C-11b will construct an overcrossing which will improve the LTS to LTS 0.

The crossing at Dublin Road (**Project C-11c)** has a LTS of 4 in the existing condition. The crossing will continue to have a LTS of 4 in the future conditions. Project C-11c will construct an bicycle/pedestrian bridge which will improve the LTS to LTS 0.

Project C-11d will construct new trail segments, so there are no LTS for existing or 2040 No project conditions. Project C-11d will construct LTS 1 trail segment.

Project C-11e will construct new trail segments, so there are no LTS for existing or 2040 No project conditions. Project C-11e will construct LTS 1 trail segment.

Project C-11f will construct new trail segments, so there are no LTS for existing or 2040 No project conditions. Project C-11e will construct LTS 1 trail segment.

The crossing at Sycamore Valley Road (**Project C-11g)** has a LTS of 4 in the existing condition. The crossing will continue to have a LTS of 4 in the future conditions. Project C-11g will construct an overcrossing which will improve the LTS to LTS 0.

Project C-11h will provide system-wide improvements, such as closing existing gaps in the trail system, therefore it was assumed that there is no LTS for existing or 2040 No project conditions. Project C-11h will construct LTS 1 trail segment to fill in existing gaps and other improvements.

Intersection

Intersection analysis evaluate the following projects:

- C-4 Vasco Road at Dalton Avenue Intersection Improvements
- C-8 Santa Rita/I-580 Interchange

Project C-4 evaluated Vasco Road and Dalton Avenue intersection. This intersection operates at LOS F in existing and 2040 No Build conditions. Project C-4 will improve operations to acceptable levels.

Project C-8 evaluated Santa Rita Road and I-580 EB Ramps/Pimilico Drive intersection. This intersection operated at LOS D or better in existing conditions. Future development will increase congestion at this intersection. The project will improve operation compared to 2040 No Build conditions.

Technology

There are two technology projects: C-10 Innovate 680 and C-15 Technology Enhancements. Since these are studies and not public facilities, no MOE or thresholds were established at this time. However, a qualitative assessment was conducted to determine how the technology being studied may result in delay or congestion reductions or other benefits.

Project C-10 Innovate 680 consists of multiple components including transit infrastructure and service improvements, roadway improvements, and technology enhancement, this project has been categorized as a technology improvement because TVTDF funding is being requested only for the Advance Technology component of the project. Other project components are expected to be funded through alternative sources. The Advance Technology component consists of implementing three technology-related strategies to improve operation along the I-680 corridor. Strategies include providing an enhanced 511 mobile app and implementing a shared autonomous vehicles (SAV) program for first and last mile connectivity and access at Mobility Hubs, to shift travel away from single occupant vehicles by providing travelers with better information about mode choice opportunities, resultant travel time, cost per trip, and the availability of transit. Other technology strategies include integrating adaptive ramp metering and/or corridor/incident management systems which can help improve the efficiency and safety of the transportation system.

Project C-15 Technology Enhancements proposes to provide connectivity for transit and vehicles between local arterials and regional facilities. The project is expected to be completed in three phases - Feasibility, Design & Construction. The TVTDF will help fund the feasibility study phase of the study, since the details of the design and construction phase are unknown at this time. The feasibility study will focus on the first and last mile connectivity opportunities at key transit hubs and along major transit routes in the Tri-Valley area. Leveraging existing and emerging technology, such as connected and autonomous vehicles, may help increase safety and mobility for all modes. These technologies may also help with increasing transit ridership or expanding transit service to less-served areas, especially for communities that currently lack service. Given that the resultant projects are intended to offset the impacts of future development, the feasibility study is appropriate to include in the TVTC project list.

AB 602 Proportional Allocation

Future development is responsible for paying for its proportional use of public facilities, rather than the full unfunded cost of projects. Under AB 602s project-specific analysis methods , the proportional allocation of costs for certain projects under the 2020 TVTC Nexus Study would be lower.

$$AB\ 602\ Proportional\ Allocation\ \% = \frac{2040\ No\ Build\ Growth}{Existing\ Volume}$$

AB 602 proportional allocation calculations are included in **Attachment A**.

AB 602 Analysis Maximum Fee Rate

Table 10 presents the AB 602 maximum fee. Historically, TVTC jurisdictions have not applied the maximum fee schedule, therefore **Table 10** also presents the rate being proposed as part of the 2022

SEP update. As shown, in **Table 11**, the proposed 2022 SEP rates are less than the adjusted maximum fee rate under the AB 602 analysis methods. Maximum rate adjustment calculations are included in **Attachment B**.

Table 10: 2020 Nexus Fee Update Study Maximum Fee

Land Use	AB 602 Maximum Fee Rate	2022 SEP Proposed Rates
Single Family (DU)	$18,752	$6,596.40
Multi-Family (DU)	$11,056	$3,889.20
Retail (SF)	$36.04	$5.92
Office (SF)	$25.04	$8.81
Industrial (SF)	$14.42	$4.97
Other (avg AM/PM trips)	$21,679	$6,100.68

DU = Dwelling Units; SF = Square Feet

Attachment A – AB 602 Proportional Allocation Calculations
Attachment B – AB 602 Maximum Rate Adjustment Calculations

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Attachment A – AB 602 Proportional Allocation Calculations

EXHIBIT B

	Project	Methodology	Existing Volume	Future Volume	Growth	AB 602 Proportion Allocation%
A-1	Interstate 580 (I-580)/Interstate 680 (I-680) Interchange (southbound to eastbound)	Project Completed	-	-	-	-
A-2a	State Route 84 (SR 84) Expressway (I-580 to I-680)	Project Fully Funded	-	-	-	-
A-2b	SR 84/I-580 Interchange	Roadway Capacity – State Route Roadway Capacity - Arterial	12,800	22,100	9,300	73%
A-3	I-680 Auxiliary Lanes (Segment 2)	Project Completed	-	-	-	-
A-4	West Dublin/Pleasanton Bay Area Rapid Transit (BART) Station	Project Completed	-	-	-	-
A-5a	I-580 Eastbound Auxiliary Lane	Project Completed	-	-	-	-
A-5b	I-580 High Occupancy Vehicle (HOV) Lane Westbound	Project Completed	-	-	-	-
A-6	I-680 HOV Lanes, SR 84 to Top of Sunol Grade	Project Completed	-	-	-	-
A-7	I-580/Foothill Road/San Ramon Road Interchange Modifications	Project Completed	-	-	-	-
A-8	I-680/Alcosta Boulevard Interchange	Project Completed	-	-	-	-
A-9a	Crow Canyon Road Improvements Phase 1	Safety	-	-	-	100%
A-9b	Crow Canyon Road Improvements Phase 2	Safety	-	-	-	100%
A-10a	Vasco Road Safety Improvements Phase 1	Safety	-	-	-	100%
A-10b	Vasco Road Safety Improvements Phase 2	Safety	-	-	-	100%
A-11	Express Bus/Bus Rapid Transit (BRT) – Phase 2	Transit	-	-	-	100%
B-1	I-580/I-680 Interchange (westbound to southbound)	Roadway Capacity - Freeway	54,000	55,500	1,500	3%
B-2	Fifth Eastbound Lane on I-580 from Santa Rita Road to Vasco Road	Project Completed				-
B-3	I-580/First Street Interchange Modification	Roadway Capacity - Interchange	-	-	-	100%
B-4	I-580/Vasco Road Interchange Modification	Roadway Capacity - Interchange	-	-	-	100%
B-5	I-580/Greenville Road Interchange Modification	Roadway Capacity - Interchange	-	-	-	100%
B-6	Jack London Boulevard Extension	Roadway Capacity - Arterial	3,300	7,600	4,300	100%
B-7	El Charro Road Extension (Stoneridge Drive/Jack London Boulevard to Stanley Boulevard)	Project Removed - Incorporated into Project C-5	-	-	-	-
B-8	Camino Tassajara/Tassajara Road Widening Project (East of Blackhawk Drive to North Dublin Ranch Drive)	Roadway Capacity - Arterial Safety	-	-	-	100%
B-9	Danville Boulevard/Stone Valley Road I-680 Interchange Improvements	Project Completed	-	-	-	-
B-10	I-680 Southbound HOV Lane Gap Closure (North Main Street to Rudgear Road)	Project Completed	-	-	-	-
B-11a	I-680 HOV Direct Access Ramps	Project Removed	-	-	-	-
B-11b	I-680 Transit Corridor Improvements	Project Removed - Incorporated into Project C-10	-	-	-	-
C-1	Tesla Road Safety Improvements	Safety	-	-	-	100%
C-2	Norris Canyon Road Safety Improvement	Safety	-	-	-	99%
C-3	Dublin Boulevard – North Canyons Parkway Extensions	Roadway Capacity - Freeway	28,400	37,700	9,300	33%
C-4	Vasco Road at Dalton Avenue Intersection Improvements	Intersection	4,400	5,500	1,100	25%
C-5	El Charro Road Widening	Roadway Capacity - Arterial	-	-	-	100%
C-6	Sunol/680 Interchange Improvements	Roadway Capacity - Interchange	9,400	11,100	1,700	18%
C-7	I-680 Express Lanes – Hwy 84 to Alcosta	Roadway Capacity - Freeway	-	-	-	100%
C-8	Santa Rita/I-580 Interchange	Intersection	-	-	-	100%
C-9	Stoneridge/I-680 Interchange	Roadway Capacity - Interchange	-	-	-	100%
C-10	Innovate 680	Technology	-	-	-	100%
C-11a	Iron Horse Trail Bicycle-Pedestrian Overcrossing – Bollinger Canyon Road	Pedestrian/Bicycle	5,500	6,000	500	9%
C-11b	Iron Horse Trail Bicycle-Pedestrian Overcrossing – Crow Canyon Road	Pedestrian/Bicycle	5,600	6,400	800	14%
C-11c	Iron Horse Trail – Dublin	Pedestrian/Bicycle	7,600	8,300	700	9%
C-11d	Iron Horse Trail – Livermore	Pedestrian/Bicycle	-	-	-	100%

EXHIBIT B

	Project	Methodology	Existing Volume	Future Volume	Growth	AB 602 Proportion Allocation%
C-11e	Iron Horse Trail to Shadow Cliffs	Pedestrian/Bicycle	-	-	-	100%
C-11f	Iron House Trail Connection Improvements at Santa Rita Road	Pedestrian/Bicycle	-	-	-	100%
C-11g	Iron Horse Trail Bicycle/Pedestrian Overcrossing – Sycamore Valley Road	Pedestrian/Bicycle	4,000	6,000	2,000	50%
C-11h	Iron Horse Trail System-wide Improvements	Pedestrian/Bicycle	-	-	-	100%
C-12	Hacienda/I-580 Interchange Improvements	Roadway Capacity - Interchange	-	-	-	100%
C-13	Fallon/El Charro Interchange Improvements	Roadway Capacity - Interchange	-	-	-	100%
C-14	Valley Link Rail (Phase 1)	Transit	-	-	-	100%
C-15	Technology Enhancements	Technology	-	-	-	100%
C-16	I-680 Express Bus Service	Transit	-	-	-	100%

Note

Project B-6: Growth exceed 100%, therefore AB 602 proportion allocation was assumed to be 100%

Project C-2: Growth is based on the percentages of TVTC road users along project corridor.

Kimley»Horn

Attachment B – AB 602 Maximum Rate Adjustment Calculations

EXHIBIT B

	Project	Total Cost (2021$ Million)	AB 602 Proportion Allocation%	AB 602 TVTDF Eligible Cost (2021$ Million)*
A-1	Interstate 580 (I-580)/Interstate 680 (I-680) Interchange (southbound to eastbound)	-	-	-
A-2a	State Route 84 (SR 84) Expressway (I-580 to I-680)	$325.40	-	-
A-2b	SR 84/I-580 Interchange	$22.70	73%	$4.58
A-3	I-680 Auxiliary Lanes (Segment 2)	-	-	-
A-4	West Dublin/Pleasanton Bay Area Rapid Transit (BART) Station	-	-	-
A-5a	I-580 Eastbound Auxiliary Lane	-	-	-
A-5b	I-580 High Occupancy Vehicle (HOV) Lane Westbound	-	-	-
A-6	I-680 HOV Lanes, SR 84 to Top of Sunol Grade	-	-	-
A-7	I-580/Foothill Road/San Ramon Road Interchange Modifications	-	-	-
A-8	I-680/Alcosta Boulevard Interchange	-	-	-
A-9a	Crow Canyon Road Improvements Phase 1	$10.87	100%	$8.42
A-9b	Crow Canyon Road Improvements Phase 2	$58.77	100%	$57.08
A-10a	Vasco Road Safety Improvements Phase 1	$40.57	100%	$11.14
A-10b	Vasco Road Safety Improvements Phase 2	$31.20	100%	$28.62
A-11	Express Bus/Bus Rapid Transit (BRT) – Phase 2	$22.35	100%	$21.21
B-1	I-580/I-680 Interchange (westbound to southbound)	$1,785.65	3%	$34.69
B-2	Fifth Eastbound Lane on I-580 from Santa Rita Road to Vasco Road	-	-	-
B-3	I-580/First Street Interchange Modification	$61.00	100%	$7.93
B-4	I-580/Vasco Road Interchange Modification	$85.65	100%	$16.61
B-5	I-580/Greenville Road Interchange Modification	$86.00	100%	$18.92
B-6	Jack London Boulevard Extension	$28.16	100%	$10.08
B-7	El Charro Road Extension (Stoneridge Drive/Jack London Boulevard to Stanley Boulevard)	$72.48	-	-
B-8	Camino Tassajara/Tassajara Road Widening Project (East of Blackhawk Drive to North Dublin Ranch Drive)	$88.08	100%	$54.55
B-9	Danville Boulevard/Stone Valley Road I-680 Interchange Improvements	-	-	-
B-10	I-680 Southbound HOV Lane Gap Closure (North Main Street to Rudgear Road)	-	-	-
B-11a	I-680 HOV Direct Access Ramps	-	-	-
B-11b	I-680 Transit Corridor Improvements	$277.85	-	-
C-1	Tesla Road Safety Improvements	$13.19	100%	$13.19
C-2	Norris Canyon Road Safety Improvement	$24.49	99%	$24.24
C-3	Dublin Boulevard – North Canyons Parkway Extensions	$160.39	33%	$35.72
C-4	Vasco Road at Dalton Avenue Intersection Improvements	$3.39	25%	$0.85
C-5	El Charro Road Widening	$68.09	100%	$38.09
C-6	Sunol/680 Interchange Improvements	$16.60	18%	$1.37
C-7	I-680 Express Lanes – Hwy 84 to Alcosta	$527.57	100%	$300.72

EXHIBIT B

	Project	Total Cost (2021$ Million)	AB 602 Proportion Allocation%	AB 602 TVTDF Eligible Cost (2021$ Million)*
C-8	Santa Rita/I-580 Interchange	$10.33	100%	$2.63
C-9	Stoneridge/I-680 Interchange	$11.98	100%	$4.08
C-10	Innovate 680	$57.21	100%	$54.66
C-11a	Iron Horse Trail Bicycle-Pedestrian Overcrossing – Bollinger Canyon Road	$22.88	9%	$0.78
C-11b	Iron Horse Trail Bicycle-Pedestrian Overcrossing – Crow Canyon Road	$19.69	14%	$2.81
C-11c	Iron Horse Trail – Dublin	$11.60	9%	$0.00
C-11d	Iron Horse Trail – Livermore	$26.99	100%	$26.99
C-11e	Iron Horse Trail to Shadow Cliffs	$1.65	100%	$0.30
C-11f	Iron House Trail Connection Improvements at Santa Rita Road	$0.87	100%	$0.48
C-11g	Iron Horse Trail Bicycle/Pedestrian Overcrossing – Sycamore Valley Road	$19.78	50%	$9.89
C-11h	Iron Horse Trail System-wide Improvements	$85.60	100%	$85.60
C-12	Hacienda/I-580 Interchange Improvements	$39.13	100%	$34.50
C-13	Fallon/El Charro Interchange Improvements	$34.51	100%	$19.96
C-14	Valley Link Rail (Phase 1)	$258.25	100%	$258.25
C-15	Technology Enhancements	$0.33	100%	$0.33
C-16	I-680 Express Bus Service	$59.35	100%	$59.35
	TOTAL	**$4,470.60**		**$1,248.62**

*AB 602 TVTDF Eligible Cost also includes reduction in cost to account for external "cut-through" trips that is generated by growth outside the Tri-Valley area.