A G E N D A

(SPECIAL MEETING)

Sacramento Transportation Authority
Sacramento Abandoned Vehicle Service Authority (SAVSA)

700 H Street, Suite 1450 • Sacramento, California • 95814

WEDNESDAY **FEBRUARY 5, 2020** **1:30 PM**

Members: Larry Carr, Sue Frost, Garrett Gatewood, Eric Guerra, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Hume, Patrick Kennedy, Steve Miller, Don Nottoli, Susan Peters, Paul Sandhu, Jay Schenirer, Phil Serna, Darren Suen

Alternates: Nick Avdis, Steven Detrick, Shawn Farmer, Mike Kozlowski, Porsche Middleton, Donald Terry

This meeting of the Sacramento Transportation Authority is cablecast live on Metro Cable 14, the local government affairs channel on the Comcast, Consolidated Communications, and AT&T U-Verse cable systems. The meeting is closed-captioned and webcast at *www.sacmetrocable.tv*. Today's meeting will replay this Saturday at 2:00 p.m. and Sunday at 9:00 a.m. on Channel 14. Please check your local listings for more information.

Members of the audience wishing to address the Board may sign up electronically at the kiosk located in the back of the room. Please speak into the microphone when addressing the Board, and state your name for the record.

The Governing Boards of the Sacramento Transportation Authority and the Sacramento Abandoned Vehicle Service Authority (SAVSA) meet concurrently.

CALL TO ORDER / ROLL CALL / PLEDGE OF ALLEGIANCE

COMMENT ITEMS

1. Comments From The Public Regarding Matters Not On The Agenda

CONSENT ITEMS

2. Action Summary: January 9, 2020 STA Governing Board Meeting ◄ *Jennifer Doll*

Continued on back side →

SEPARATE ITEMS

3. Proposed Draft Measure A Ordinance and Transportation Expenditure Plan — Will Kempton

    - Sacramento Area Council of Governments / Sacramento Metropolitan Air Quality Management District Report on Air Quality Conformity and GHG Reduction Issues Associated with the Draft Expenditure Plan — *Representatives from SACOG/ Air District*

    - Continue Public Hearing on Draft Ordinance and Draft Expenditure Plan

4. Comments of Authority Members — *All*

◄ *Denotes items that require Board action*

FEBRUARY 9, 2020 **AGENDA ITEM # 2**

ACTION SUMMARY: JANUARY 9, 2019 STA GOVERNING BOARD MEETING

Action Requested: Approve

Key Staff: Jennifer Doll, Special Programs Manager

Recommendation

Approve the attached Action Summary of the January 9, 2019 meeting of the STA Governing Board.

Attachment

ACTION SUMMARY
SACRAMENTO TRANSPORTATION AUTHORITY
SACRAMENTO ABANDONED VEHICLE SERVICE AUTHORITY
700 "H" STREET - SUITE 1450
SACRAMENTO, CALIFORNIA 95814

THURSDAY **January 09, 2020** **1:30 PM**

MEMBERS: Larry Carr, Sue Frost, Garrett Gatewood, Eric Guerra, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Hume, Patrick Kennedy, Rich Lozano, Steve Miller, Don Nottoli, Jay Schenirer, Phil Serna, Darren Suen, Susan Peters (Chair)
(Director Carr was not present)

Alternates: Nick Avdis, Steven Detrick, Mike Kozlowski, Porsche Middleton, Paul Sandhu, Donald Terry

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Assistive listening devices are available for use by the public. See the Clerk of the Board for information.

Members of the audience wishing to address the Board should complete a speaker identification form located at the back of the room and give it to the Clerk. Please speak into the microphones when addressing the Board, and state your name for the record.

The Governing Boards of the Sacramento Transportation Authority and the Sacramento Abandoned Vehicle Service Authority meet concurrently.

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PLEDGE OF ALLEGIANCE

COMMENT ITEMS

1. Comments From The Public Regarding Matters Not On The Agenda

1:35 PM Board Action: Jeffrey Tardiguila addressed the Board regarding transportation needs.

2. Executive Director's Report

1:38 PM Board Action: Executive Director Will Kempton provided updates regarding Measure A, the Independent Taxpayer Oversight Committee and Senate Bill 1.

CONSENT ITEMS

1:42 PM Board Action: Jeff Harris/ Jay Schenirer - Approved the Consent Matters, Items 3 and 4, as recommended.

AYES: Sue Frost, Garrett Gatewood, Eric Guerra, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Hume, Patrick Kennedy, Steve Miller, Don Nottoli, Jay Schenirer, Phil Serna, Darren Suen, Susan Peters, Paul Sandhu
NOES: (None)
ABSTAIN: (None)
ABSENT: Larry Carr
RECUSAL: (None)
(PER POLITICAL REFORM ACT (§ 18702.5.))

3. Action Summary: December 12, 2019 STA Governing Board Meeting

1:40 PM Board Action: Approved as recommended.

4. Approval Of Resolution To Continue Completion Of Ten-year Review Process For Existing Measure A 2009

1:40 PM Board Action: Approved by Resolution No. **STA-20-0001** as recommended.

SEPARATE ITEMS

5. Measure A Transportation Expenditure Plan Development (Continued From December 9, 2019; Item No. 6)

- **Continue Public Hearing On Draft Expenditure Plan**
- **Presentation Of Draft Measure A 2020 Ordinance For Discussion Purposes Only**
- **Approval Of Revised Schedule And Next Steps**

4:10 PM Board Action: Kerri Howell/ Steve Harris – Continued the public hearing of the Draft Expenditure Plan. Added Directors Garrett Gatewood and Steve Miller to the Transportation Expenditure Plan Subcommittee and approved the revised schedule regarding the tentative 2020 Measure A Transportation Sales Tax timeline.

AYES: Sue Frost, Garrett Gatewood, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Hume, Patrick Kennedy, Steve Miller, Don Nottoli, Phil Serna, Darren Suen, Susan Peters, Paul Sandhu
NOES: (None)
ABSTAIN: (None)
ABSENT: Larry Carr, Eric Guerra, Jay Schenirer
RECUSAL: (None)
(PER POLITICAL REFORM ACT (§ 18702.5.))

6. Contract With Townsend Calkin Tapio Public Affairs For Public Education And Outreach

4:11 PM Board Action: Steve Hansen/ Jeff Harris – Approved the contract as recommended.

AYES: Sue Frost, Garrett Gatewood, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Kennedy, Steve Miller, Don Nottoli, Phil Serna, Darren Suen, Susan Peters, Paul Sandhu
NOES: (None)
ABSTAIN: Patrick Hume
ABSENT: Larry Carr, Eric Guerra, Jay Schenirer
RECUSAL: (None)
(PER POLITICAL REFORM ACT (§ 18702.5.))

PARLIAMENTARY ITEMS

7. Selection Of Chair And Vice -Chair For Calendar Year 2020

4:12 PM Board Action: Steve Hansen/ Jeff Harris – Elected Director Darren Suen as Chairperson.

AYES: Sue Frost, Garrett Gatewood, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Hume, Patrick Kennedy, Steve Miller, Don Nottoli, Phil Serna, Darren Suen, Susan Peters, Paul Sandhu
NOES: (None)
ABSTAIN: (None)
ABSENT: Larry Carr, Eric Guerra, Jay Schenirer
RECUSAL: (None)
(PER POLITICAL REFORM ACT (§ 18702.5.))

4:12 PM Board Action: Darren Suen/ Phil Serna – Elected Director Don Nottoli as Vice-Chairperson.

AYES: Sue Frost, Garrett Gatewood, Steve Hansen, Jeff Harris, Kerri Howell, Patrick Hume, Patrick Kennedy, Steve Miller, Don Nottoli, Phil Serna, Darren Suen, Susan Peters, Paul Sandhu
NOES: (None)
ABSTAIN: (None)
ABSENT: Larry Carr, Eric Guerra, Jay Schenirer
RECUSAL: (None)
(PER POLITICAL REFORM ACT (§ 18702.5.))

8. Comments Of Authority Members

4:12 PM Board Action: No comments were made.

Adjourned at 4:12 p.m.

Respectfully Submitted,

Renae McClain-White

Renae McClain-White, Deputy Clerk

FEBRUARY 5th, 2020 **AGENDA ITEM # 3**

PROPOSED DRAFT MEASURE A ORDINANCE AND TRANSPORTATION EXPENDITURE PLAN

Action Requested: Receive and File

Key Staff: Will Kempton, Executive Director

Recommendation

Receive an oral presentation from representatives of the Sacramento Area Council of Governments (SACOG) and the Sacramento Metropolitan Air Quality Management District regarding Air Quality Conformity and GHG Emission Reduction with the Draft 2020 Measure A expenditure Plan.

Take additional public testimony on the Draft Measure A 2020 Ordinance and the Draft Measure A Transportation Expenditure Plan.

Discussion

A. At the authority's regular meeting of December 12, 2019, Board Member Steve Hansen (City of Sacramento) requested that SACOG and the Air District work collaboratively to review the proposed Draft 2020 Measure A Expenditure Plan to determine any conformity and GHG Emission Reduction issues relative to the requirements of the federal Clean Air Act and the inclusion of listed projects in the Metropolitan Transportation Plan (MTP) Sustainable Communities Strategy (SCS).

SACOG and the Air District have completed a preliminary analysis of the proposed Expenditure Plan and will present the results of that analysis to the Authority. This information will be taken into consideration as the final Draft 2020 Measure A Expenditure Plan is prepared for presentation to the Authority for tentative adoption in March.

B. Following the regular December 12, 2019 meeting of the Sacramento Transportation Authority at which TCT Consultants presented a discussion draft of the Measure A Transportation Expenditure Plan, then Chair Susan Peters requested that two special meetings of the Authority be scheduled during the month of February to provide additional opportunity for public input and comment on the draft plan. Today is the first of those special meetings. The second meeting is scheduled for Wednesday, February 19, 2020, following the regular February meeting on February 13, 2020.

Continued on back side →

At the regular January 9, 2020 meeting, the draft Measure A 2020 Ordinance was presented for discussion purposes only. Work continues in the development of the draft Measure A Transportation Expenditure Plan with concomitant changes to the draft Ordinance, and these proposed changes will be presented at the regular February meeting on February 13, 2020. Pending presentation of those proposed changes, the Authority desires to hear additional input from the public regarding the discussion drafts of the proposed Transportation Expenditure Plan and the Measure A 2020 Ordinance.

Attachment.

January 30, 2020

To: Sacramento Transportation Authority Board of Directors
From: James Corless, Executive Director, SACOG
Alberto Ayala, Executive Director and Air Pollution Control Officer, SMAQMD

The attached analysis is being provided to respond to the STA board's request from your December 2019 board meeting. In it, we examine five of the larger, most impactful capital expansion projects that are being considered for funding in the STA's draft transportation expenditure plan (TEP). We have taken the time to work closely with STA's Executive Director and to brief each of the project sponsors for these five projects in order to solicit staff feedback and input on the analysis.

A summary of our key findings are as follows:

- Our analysis of specific transportation projects provides data for forecasted impacts on traffic congestion, vehicle miles traveled (VMT), air quality and greenhouse gas emissions (GHG) to the best of our ability in the time we had to perform the analysis. These are important performance measures already used by state and federal agencies to judge the effectiveness of transportation investments, and they will be applied to transportation projects and spending with increasing frequency in the years ahead.

- As outlined in the attachment, the impacts of the proposed projects on traffic congestion, VMT, pollution and GHG emissions vary widely. Impacts of different individual project segments of the same larger project or corridor also vary widely. Much of this data has been pulled from the recently adopted 2020 Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS). The variation among different segments of the same projects explains why some of those segments are included in the 2020 MTP/SCS for full construction, others are included for planning or pre-construction, and others are only included for further scoping or analysis.

- Our analysis of transportation projects demonstrates the critical importance of current and future growth and development patterns surrounding the projects. It is insufficient to examine any larger transportation project in a vacuum, absent an understanding of land use and growth patterns. Transportation projects are not inherently effective or ineffective simply based on what mode they represent (e.g. roadways, transit, bikes etc.). Rather, public transit projects and highway projects are highly dependent on supportive growth patterns in order to maximize their effectiveness. The current and future land use assumptions in this analysis are derived from the 2020 MTP/SCS, are

consistent with local general plans, support the region's Blueprint plan and have been carefully vetted with local jurisdictions and planning staff.

- It is critical that projects in the final adopted TEP align with the projects in the MTP/SCS. This 20-year plan has gone through rigorous analysis and meets stringent state greenhouse gas reduction and federal air quality conformity targets. If we fail to meet these targets, the region could be cut off from critical state and federal transportation funds that we are relying on – and that future Measure A project funds are intended to leverage – in order to fully fund critical transportation projects. Indeed, had the adopted 2020 MTP/SCS not met the state's ambitious GHG reduction target, the region would have been ineligible or uncompetitive for several critical state transportation grant programs under Senate Bill 1 this year.

- While the available time for this analysis did not allow for a more robust project-level air quality assessment, SACOG and SMAQMD can confidently advance some general considerations for STA to ensure the TEP is consistent with the region's air quality attainment and GHG reduction commitments. First, projects that are included in the 2020 MTP/SCS have already undergone the full air quality and transportation conformity analysis and would not compromise the region's ability to attain the federal clean air standards or the state GHG goals. Second, of the projects outside of the most recent MTP/SCS, those that reduce VMT, eliminate vehicle trips, convert trips to sustainable modes, accelerate adoption of zero emission battery electric or fuel cell electric vehicles, or promote regional growth in low-VMT areas will stay consistent with air quality attainment and GHG targets.

As a part of future MTP/SCS cycles, SACOG and SMAQMD fully commit to an ongoing partnership with the STA and its member jurisdictions to continue this work and ensure that candidate projects for changes in TEP are fully analyzed for congestion and emissions impacts.

Congestion and VMT/GHG Emissions Analysis of Transportation Projects in the Discussion Draft Measure A Transportation Expenditure Plan

At the request of the STA board, Sacramento Area Council of Governments and Sacramento Metropolitan Air Quality Management District staff have analyzed a subset of proposed transportation capacity projects in the draft Measure A transportation expenditure plan (TEP).

(1) Scope of the analysis

SACOG and SMAQMD staff were asked to analyze a subset of projects in the TEP for their potential effects on traffic congestion and vehicle miles traveled (VMT)/greenhouse gas (GHG) emissions, including air quality impacts. We were also asked to identify whether the projects were in the recently adopted Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS). The subset of projects included in our analysis from the draft Transportation Expenditure Plan (TEP) was developed in close consultation with the STA executive director. The subset of projects includes the larger capital projects as listed in the TEP proposed congestion relief program that are likely to have regional impacts.[1] Table 1 lists the name and description of each project, including whether it is planned for construction in the MTP/SCS. Attachment A includes a map of the location of each these projects.

Data and analysis from the current MTP/SCS were used for this analysis because:

- the MTP/SCS represents the most recent and comprehensive estimate of population, jobs, housing, development, and transportation revenue assumptions;
- the MTP/SCS is required by state and federal law to achieve reductions in automobile-generated air pollution, which is achieved by reductions in VMT and vehicle trips; and
- the MTP/SCS is required by state law to achieve, if there is a feasible way to do so, an aggressive target of per capita GHG emissions reductions from passenger vehicles by reductions in VMT.[2]

[1] Interchange projects are not part of this analysis because they cannot be modeled for congestion effects in a regional travel demand model.

[2] SB 375 requires MPOs to prepare a SCS that demonstrates how the region will meet its GHG per capita emissions reduction targets through integrated land use, housing and transportation planning. Specifically, the SCS must identify a transportation network that is integrated with the forecasted development pattern for the plan area, and will, if feasible, reduce per capita GHG emissions from passenger vehicles below 2005 per capita emissions. CARB set the SACOG region's target at 19 percent per capita (CARB 2018a). The SACOG 2035 target was reset conditionally to 19 percent based on a pilot test proposed by SACOG staff of an enhanced SCS that recognizes some of the differences between the Sacramento region and the other three large MPOs. If SACOG is not able to secure the funding and commitments to implement the proposed pilot project, CARB staff would evaluate the SCS performance against an 18 percent target.

Table 1. Project & Segment Description

Corridor	#	Segment Name	Roadway Facilities Future Changes ***(Projects included in MTP/SCS in bold/Italics)***	Transit Service Future Changes ***(Projects included in MTP/SCS in bold/Italics)***
Regional Roadway Project Corridors				
Capital City Freeway	1	US50 to Arden	***By 2030:*** ***Add managed Lanes + aux. lanes; potential add general purpose lanes at Arden***	***By 2040:*** ***Increased commuter bus service***
	2	Arden to I-80	Under study by Caltrans: Add managed Lanes + aux lanes	***By 2040:*** ***Increased commuter bus service***
Capital Southeast Connector (Grant Line & White Rock)	1	SR99 to Bradshaw	***By 2025:*** ***Widen to 4 lanes to Bradshaw***	None on route Expanded local service nearby
	2	Bradshaw to Douglas	***By 2040: Ops. improvements--no lane widening*** CSECJPA: 4 lanes proposed	None on route Local service nearby in RC, Folsom
	3	Douglas to US50	***By 2025,2035:*** ***Widen to 4 lanes east of Douglas***	None on route Expanded commuter service on US 50
Capital Southeast Connector (Kammerer Road)	1	SR99 to Bruceville	***By 2025:*** ***Widen to 4 lanes Bruceville>Lent Ranch***	None on route
	2	Bruceville to I-5	***By 2030:*** ***Extend Kammerer to I-5***	None on route
I-5 Managed Lanes	1	US50 to American River	***By 2030:*** ***Add managed lanes + aux. lanes***	***By 2030:*** ***Increased comm. bus on managed lanes***
	2	River to I-80	***By 2030:*** ***Add managed lanes + aux. lanes***	***By 2030:*** ***Increased comm. bus on managed lanes***
	3	I-80 to SMF	***By 2030:*** ***Add managed lanes + aux. lanes***	***By 2030:*** ***Increased comm. & airport buses***
Transit Expansion Corridors				
Green Line Extension	1	SVS to Township 9	***Parallel roadways by 2030:*** ***5th, Bercut, other Railyards roadways***	***By 2030:*** ***Green Line extended, interlined w/ Gold Line***
	2	Township 9 to NTC	***By 2035:*** ***New Lower American River crossing***	***By 2030:*** ***Green Line to NTC***
	3	NTC to SMF	***By 2030:*** ***Meister OC & extension***	Under study by RT: Green Line extended to SMF
Blue Line Extension	1	CRC to Sheldon		***By 2025: Enhanced bus to CRC*** Under study by RT, Elk Grove: Blue Line extension
	2	Sheldon to Civic Center	By 2025: Bruceville--6 lanes to Big Horn	***By 2025: Enhanced bus to CRC*** Under study by RT, Elk Grove: Blue Line extension

Source: SACOG, January 2020.

(2) Importance of future growth patterns to determine project effectiveness

One of the more critical components of any transportation project-level analysis is how important growth and development patterns are to determine the effectiveness of the transportation project. Whether a project will be successful in achieving desired outcomes (such as congestion relief, air quality improvements, and/or VMT and GHG reductions) must be considered in context generally, and specifically in light of the surrounding development pattern the project serves, including existing and future jobs, housing, retail, and more. Expanding SacRT's Green Line light rail line, for example, would serve both existing and planned land uses along the project corridor, and the success and effectiveness of the project is highly dependent upon more intensive development near future stations. While some parts of the proposed Green Line serve rapidly developing areas that are likely to generate transit ridership, the northernmost segment of the Green Line extending from Natomas Town Center to the airport does not show the types of future growth patterns that would support project cost-effectiveness. Similarly, roadway expansion projects such as the Capital Southeast Connector are also highly dependent on growth and development in the project corridor. As a result, some segments of the Connector project have demonstrated benefits because they serve near-term development projects (e.g., White Rock Road in Folsom and its connection to Folsom Ranch). However, other segments of the project that are further from job centers and higher-density development don't show utility in terms of congestion relief; nor do they support regional air quality, VMT, or GHG objectives.

(3) Different segments of projects have different impacts

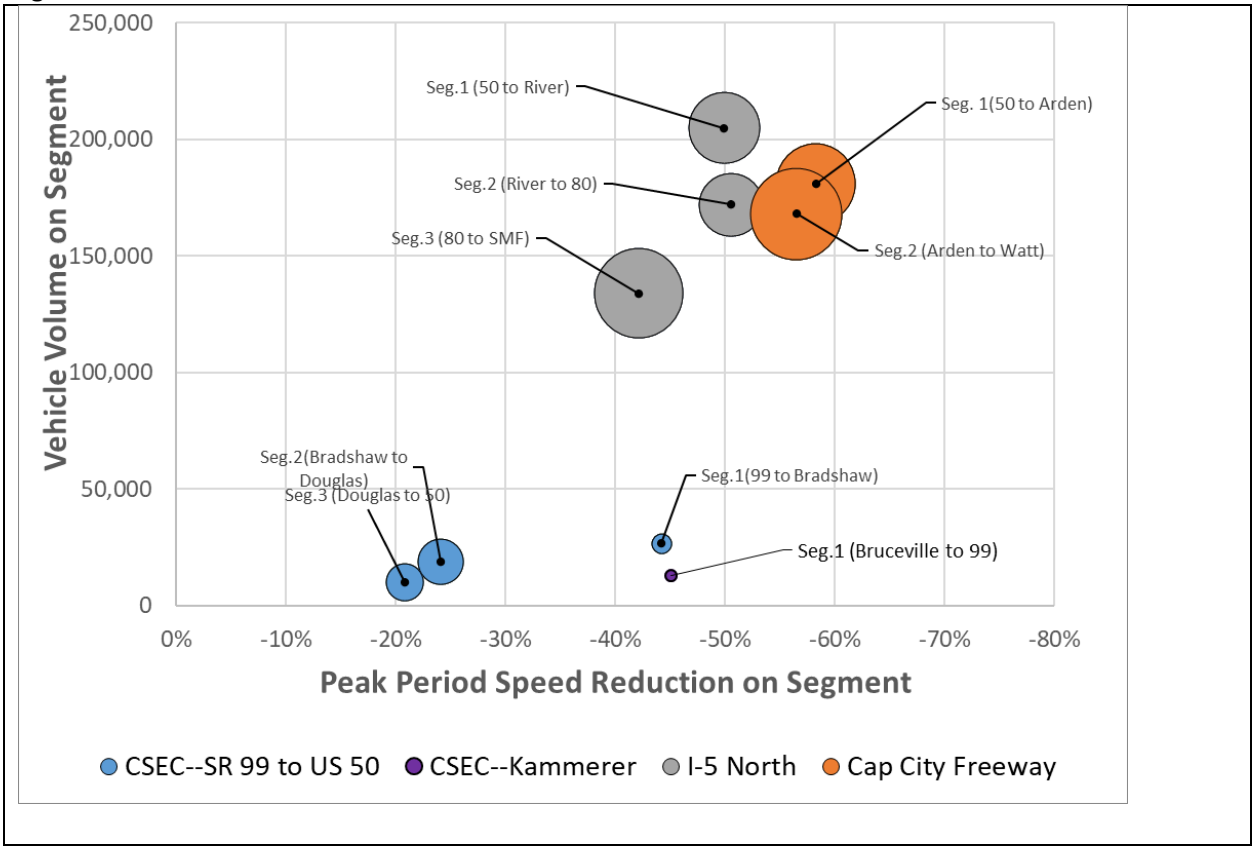
While it is tempting to think of the projects in this analysis as singular projects with one consistent set of characteristics (e.g., the "Green Line to the Airport" or the "Capital Southeast Connector"), in reality the projects in this analysis are made up of individual segments that have different benefits and impacts. The analysis herein includes detailed information for the individual segments of each project and demonstrates the wide variation in benefits and impacts among the project segments (see Attachment 1). This variation also explains why some of the individual segments are included in the most recent MTP/SCS for construction, while others are included only for planning and preconstruction purposes, and others are not included in the MTP/SCS at all.

(4) Project impacts on traffic congestion

Congestion impacts on individual travelers are greatest where travel speed is extremely degraded (e.g., stop-and-go conditions with very slow speeds and long or unpredictable travel times). From the standpoint of the whole transportation system, congestion impacts more individual travelers on roadways where volumes are high, and many travelers are affected. Figure 1 illustrates the relationship between existing conditions of speed degradation and the number of vehicles affected on each of the roadway segments analyzed. Roadway segments toward the top right of the graph have the worst speed degradation, affecting the greatest number of travelers. The size of the circles indicates the amount of VMT, or travel, occurring on the roadway, and therefore affected by delay. Table 2 lists the congestion metrics for each roadway segment under current conditions and in 2040, as modeled in the MTP/SCS. Table 2 shows that roadway segments where projects are planned for construction in the MTP/SCS, and where there is heavy congestion today, will result in a significant reduction in

heavy congestion by 2040. This data shows that segment 1 of the Capital City freeway yields the most significant benefit in terms of congestion relief.

Figure 1. Existing Conditions Peak Period Speed Reduction and Vehicle Volume, with total VMT for each Project Segment



Source: SACOG, January 2020. Based on National Performance Management Research Data Set speed data (from INRIX®).
Key: "CSEC" = Capital Southeast Connector
Notes:
/1/ "Peak Period Speed Reduction" is the percentage reduction in travel speed during the most congested times, compared to the "free flow" travel speeds (times when roadway is virtually unaffected by traffic). Speed reduction factors both the average peak period speed (AM and PM peak periods) and the worst hour speed for each segment.
/2/ "Vehicle Volume on Segment" are the highest vehicle volume, based on the most recent available count data.
/3/ Project segment points are sized according to the total VMT on the segment. For longer segments, dot size may be bigger for a lower volume segment.
/4/ Kammerer portion of CSEC is based on a very short segment at the SR 99 interchange—a worst case segment on this roadway.

Table 2. Metrics Related to Congestion Relief Potential

Corridor	#	Segment Name	2018 Observed Speeds (mph) Average During Peak Periods	2018 Observed Speeds (mph) Free flow speed	% of VMT in Heavy Congestion Current	% of VMT in Heavy Congestion 2040 Future ***(w/MTP/SCS Project)***
Regional Highway Project Corridors						
Capital City Freeway	1	US50 to Arden	34	63	36%	***2%***
	2	Arden to I-80	34	63	15%	16%
Capital Southeast Connector (Grant Line & White Rock)	1	SR99 to Bradshaw	29	48	0%	***0%***
	2	Bradshaw to Douglas	46	58	5%	6%
	3	Douglas to US50	47	57	7%	***+0%***
Capital Southeast Connector (Kammerer Road)	1	SR99 to Bruceville	23	41	0%	--
	2	Bruceville to I-5	NA	NA	0%	--
I-5 Managed Lanes	1	US50 to American River	42	63	21%	***17%***
	2	River to I-80	42	64	15%	***15%***
	3	I-80 to SMF	46	64	5%	***2%***

Source: SACOG, January 2020.

Notes:

/1/ "Average During Peak Periods" is the percentage reduction in travel speed during the most congested times, compared to the "Free Flow" travel speeds (times when roadway is virtually unaffected by traffic). Speed calculations based on National Performance Management Research Data Set (NPMRDS) speed data (from INRIX®).

/2/ "% of VMT in Heavy Congestion" is the percentage of vehicle miles traveled on each segment that occurs on segments where the peak period volume-to-capacity ratio is greater than 1.0. All percentages based on output from the SACSIM regional travel demand model.

/3/ Kammerer portion of CSEC is based on a very short segment at the SR 99 interchange—speed data for the majority of Segment 1 and all of Segment 2 were not provided in the NPMRDS dataset.

(5) Project impacts on VMT/GHG emissions

Overall impacts from transportation projects on GHG emissions and VMT are critical measures used in much of the State of California's climate and transportation policy.[3] There are multiple ways to analyze project VMT/GHG emissions, each with strengths and weaknesses (see Attachment 1 for description of other methods).

The analysis here evaluates potential project-level impacts by looking at land use and travel patterns of residents in the areas around the individual projects. Extensive research has shown that roadway capacity projects without tolling or other user charge, as a category, increase VMT per capita. The potential to offset these increases depends on the ability of the projects to support low VMT growth. Table 3 shows that a transportation investment that benefits VMT/GHG emissions will be part of an area where growth will generate lower VMT/GHG per capita in the future than today. Lower VMT/GHG per capita indicates that the transportation investment is serving households that take shorter and/or fewer car trips. This lower VMT/GHG per capita is attributable to the presence of some, or all, of the following land use-transportation factors:

- compact development pattern;
- close proximity, or mix, of residential, employment, and commercial uses;
- pedestrian-scale blocks and streets and
- access to transit.

The more a community is designed with these land use-transportation attributes, the lower its VMT/GHG per capita tends to be.

If the TEP includes only projects that are listed in the MTP/SCS for construction, the TEP will support VMT/GHG emissions reduction goals because the MTP/SCS was designed to achieve such goals.[4] But this is not a predetermined outcome. It requires coordinated land use and transportation decisions and actions, by both the public and private sectors.

Consider that the region will add 620,000 new people by 2040, most of them in Sacramento County, which will increase overall VMT as new residents commute to jobs, drop children off at school, head to the grocery store, or make any other number of daily trips. Despite this growth, the region can achieve its VMT/GHG reductions goals through reduced *per capita* VMT, but only *if* the region grows and builds the transportation system as planned in the recently adopted MTP/SCS. When VMT growth outpaces population growth, congestion tends to increase, air quality gets poorer, and our transportation system becomes less reliable for all roadway users. The transportation investments in the MTP/SCS are designed and timed to avoid this trend over next 20 years.

In contrast, construction of road capacity projects not included in the MTP/SCS may induce an increase in the region's VMT/GHG/air pollution emissions, which could jeopardize the ability of the greater Sacramento region to achieve the state's air quality and climate goals, and could make the region ineligible or uncompetitive for key state transportation funding programs.

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[3] The state's GHG emissions reduction strategy for the transportation sector, as defined in CARB's 2017 Climate Change Scoping Plan, is threefold: 1) low carbon fuels, 2) cleaner vehicles, 3) and strategies to promote sustainable communities and improved transportation choices that result in curbing growth in VMT. The state forecasts significant GHG emissions reductions from the low carbon fuels and cleaner vehicles strategies. The state is relying on the SCSs of the 18 metropolitan planning organizations in the state to achieve the GHG emissions reductions from VMT. Under state law (SB 375), SACOG must adopt an MTP/SCS that reduces GHG emissions from passenger VMT. The target reduction in passenger vehicle GHG per capita, compared to 2005 levels, is 19 percent. This reduction is required to come from primarily reduction in travel and VMT, and improvements in traffic operations.

[4] However, MPO plans, at 19 percent, are insufficient to meet the goals of CARB's 2017 Climate Change Scoping Plan. It is likely that more stringent measures will be implemented by the state in the future.

Table 3. Metrics Related to Vehicle Miles Traveled Potential

Corridor	#	**Segment Name**	Weekday Household-Generated VMT per Capita of Residents in Trip Shed*		% Above (+) or Below (-) Regional Current Average VMT per Capita	
			Current	2040 Future ***(w/ MTP/SCS Projects)***	Current	2040 Future ***(w/ MTP/SCS Projects)***
Regional Highway Project Corridors			****"Trip Shed" fixed at 2 miles around roadway project alignment***			
Capital City Freeway	1	US50 to Arden	11	***9***	-41%	***-47%***
	2	Arden to I-80	12	9	-34%	-38%
Capital Southeast Connector (Grant Line & White Rock)	1	SR99 to Bradshaw	18	***17***	3%	***-7%***
	2	Bradshaw to Douglas	21	21	16%	17%
	3	Douglas to US50	23	***20***	26%	***13%***
Capital Southeast Connector (Kammerer Road)	1	SR99 to Bruceville	20	17	9%	***-5%***
	2	Bruceville to I-5	20	18	12%	***-1%***
I-5 Managed Lanes	1	US50 to American River	13	***10***	-30%	***-42%***
	2	River to I-80	14	***11***	-21%	***-36%***
	3	I-80 to SMF	18	***16***	-2%	***-13%***
Transit Expansion Corridors			****"Trip Shed" fixed at 1/2 mile around transit project alignment***			
Green Line Extension	1	SVS to Township 9	9	***8***	-51%	***-57%***
	2	Township 9 to NTC	15	***12***	-15%	***-32%***
	3	NTC to SMF	22	18	22%	2%
Blue Line Extension	1	CRC to Sheldon	15	14	-17%	-23%
	2	Sheldon to Civic Center	16	14	-13%	-22%

Source: SACOG, January 2020.

(6) Air quality and climate regulations link to transportation

Air pollution in our region currently exceeds health-based state and national ambient air quality standards (NAAQS), resulting in a classification of severe nonattainment for ground-level ozone.[5] While the NAAQS for short-term particle pollution (PM2.5) levels have been attained, the region still is under stringent maintenance requirements to stay in attainment because ambient PM2.5 pollution concentrations routinely oscillate very near the standard. The SMAQMD and its partners[6] develop and implement plans and projects to reduce criteria pollutants[7] to meet state and federal standards. The partners also advance sustainable actions to reduce greenhouse gas (GHG) emissions and adapting to climate change.

Since mobile sources (e.g., cars, trucks, buses, equipment) are the most significant contributors of both criteria[8] and GHG emissions, formal federal and state processes have been established to address pollution from this sector. Transportation General Conformity is the federal regulatory process for preventing major federal actions or projects from interfering with air quality planning goals. Conformity provisions ensure that federal funding and approval are given only to those activities and projects that are consistent with or "conform to" the state's air quality implementation plan (SIP). Conformity with the SIP means that major federal actions will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. The Sustainable Communities Act Regional Targets address whether a region's MTP/SCS will meet the GHG emissions budget set by the ARB for light-duty vehicles. A federally approved SIP is a prerequisite for the MTP. These processes take years to complete and rely on careful forecasting, modeling, and planning by multiple partners at the local, state, and federal level. Regions that fail to meet these standards, in addition to the pollution burden on public health, also lose access to state and federal transportation funding.

(7) Impact of projects on conformity and regional targets

To comply with a NAAQS attainment deadline of 2024 for the Sacramento region[9] and demonstrate transportation conformity, the ARB has determined that the region needs to reduce on-road mobile sector emissions of oxides of nitrogen (NO_x) from approximately 30 tons per day[10] today to 21 tons per day by 2024.[11] The latest air quality modeling included in the approved SIP and SACOG's adopted MTP/SCS demonstrate the Sacramento region will achieve these emission reductions. However, construction of road capacity projects that are not included in the MTP/SCS have the potential to increase or induce pollution emissions and would require further SIP compliance analysis by SACOG and the SMAQMD. Attachment 2 discusses the relationship between project outcomes and emissions.

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[5] 1997 and 2008 National Ambient Air Quality Standards for Ozone.

[6] SACOG, Air Resources Board (ARB), Yolo-Solano Air Quality Management District, Placer County Air Pollution Control District, Feather River Air Quality Management District, El Dorado County Air Quality Management District, and US Environmental Protection Agency (EPA) are all involved in local air quality planning.

[7] Criteria air pollutants consist of ozone, particulate matter, lead, carbon monoxide, sulfur oxides, and nitrogen oxides.

[8] Criteria emissions include NO_X, a precursor to ozone.

[9] 2008 National Ambient Air Quality Standard for Ozone.

[10] 2018 Updates to the California State Implementation Plan. California Air Resources Board. October 25, 2018. Table V-1.

[11] Ibid, Table V-4

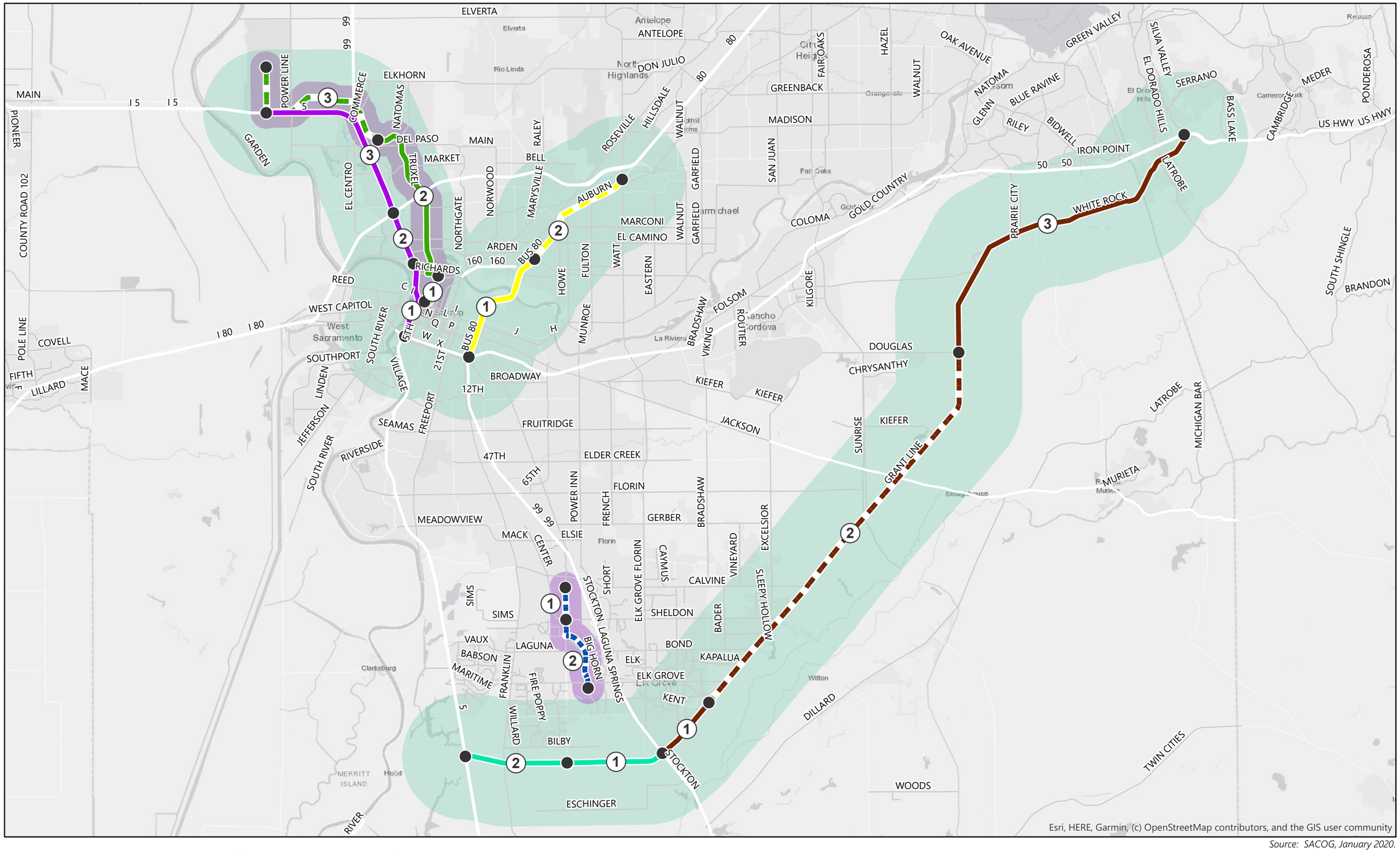
Attachment 1: Technical Background on Transportation Metrics (Vehicle Miles Traveled, Congestion, Transit)

SACOG and the Sacramento Metropolitan Air Quality Management District (SMAQMD) were requested by the STA Boardmembers to provide information and analysis on Measure A expenditure plan projects, focusing on four general topics related to project performance:

- Vehicle miles traveled (VMT)
- Greenhouse gas (GHG) and criteria pollutant emissions
- Congestion
- Transit ridership

Specifically, the STA requested information on the potential of the projects to affect VMT, GHG emissions, criteria pollutant emissions, and congestion in the region. This appendix provides detailed data and background notes on sources and analysis performed in response to the request. This attachment provides:

- Detail map of the project corridors and segments for which metrics were assembled.
- Rollup of descriptive information on the roadway facilities and transit services currently provided and planned in each corridor and segment.
- Rollup of congestion, VMT and transit data metrics assembled in response to the STA request.
- Observations the data metrics on each project segment.
- Technical background information on data sources for metrics on VMT, congestion and transit.



Source: SACOG, January 2020.

Figure 1-A

Project Locations

Project Segment Locations for STA-Requested Metrics

- Capitol Southeast Connector
- Interstate 5
- Kammerer Road
- Blue Line Extension
- Green Line Extension
- Capitol City Freeway
- Segment Not In MTP/SCS
- Half Mile Area Around Project
- Two Mile Area Around Project

Attachment 1

Table 1-A. STA-REQUESTED METRICS ON SELECTED MEASURE A EXPENDITURE PLAN PROJECTS

Corridor Description						Congestion							VMT								Transit			
Corridor	Seg #	Segment Name	Roadway: Current	Roadway: Future Changes *(Project included in 2020 SCS future changes in Bold/Italics)*	Transit Service: Current	Transit Service: Future Changes *(Project included in 2020 SCS future changes in Bold/Italics)*	Traffic Vol. (Max. Segment): Current	Traffic Vol. (Segment Avg.): Current	Traffic Vol. (Segment Avg.): 2040 Future *(SCS Included)*	Observed Speeds (mph): Average During Peak Period	Observed Speeds (mph): Free flow speed	% of VMT in Heavy Congestion: Current	% of VMT in Heavy Congestion: 2040 Future *(SCS Included)*	Population in Trip Shed: Current	Population in Trip Shed: 2040 Future *(SCS Included)*	Jobs in Trip Shed: Current	Jobs in Trip Shed: 2040 Future *(SCS Included)*	Total Density in Trip Shed (residents plus jobs per square mile): Current	Total Density in Trip Shed (residents plus jobs per square mile): 2040 Future *(SCS Included)*	Weekday Household-Generated VMT per Capita of Residents in Trip Shed: Current	Weekday Household-Generated VMT per Capita of Residents in Trip Shed: 2040 Future *(SCS Included)*	% Above (+) or Below(-) Regional Current Average VMT per Capita: Current	% Above (+) or Below(-) Regional Current Average VMT per Capita: 2040 Future *(SCS Included)*	Weekday Passenger Volumes: Current	Weekday Passenger Volumes: 2040 Future Change	Transit Mode Share in Trip Shed: Current	Transit Mode Share in Trip Shed: 2040 Future *(SCS Included)*
Regional Highway Project Corridors														***Trip Shed for Highway Projects = 2 mile area around route***											***2 mi. Trip Shed***	
Capital City Freeway	1	US50 to Arden	6 GP lanes at American River Bridge 6 GP lanes + 2 HOV at US 50	***By 2030:*** ***Add managed Lanes + aux. lanes; potential add GP at Arden***	Roseville, PCT comm. buses on route Blue Line, RT local on parallel routes	***By 2040:*** ***Increased commuter bus service***	180,940	164,300	***189,900***	34	63	36%	***2%***	103,734	***147,684***	156,140	***177,269***	13,025	***16,287***	11	***9***	-41%	***-47%***	Blue Line: 9,000 passenger at River Comm.Buses: 800 At River	***Blue Line: +9,000*** ***Comm. Buses: +2,000***	4.2%	***9.7%***
	2	Arden to I-80	Min. 2 GP Lanes EB at Arden Max. 4 GP Lanes btwn El Camino & Marconi	Under study by Caltrans: Add managed Lanes + aux lanes	Roseville, PCT comm. buses on route Blue Line, RT local on parallel routes	***By 2040:*** ***Increased commuter bus service***	168,080	160,100	178,600	34	63	15%	16%	102,540	119,195	64,883	77,901	7,011	8,253	12	9	-34%	-38%	Blue Line: 7,000 passenger at ADP Comm.Buses: 800 At Arden	***Blue Line: +8,000*** ***Comm. Buses: +2,000***	2.6%	5.1%
Capital Southeast Connector (Grant Line & White Rock)	1	SR99 to Bradshaw	2 lanes Bradshaw > Waterman	***By 2025:*** ***Widen to 4 lanes to Bradshaw***	None on route E-tran local service nearby	None on route Expanded local service nearby	26,600	16,500	***26,600***	29	48	0%	***0%***	18,840	***30,288***	5,354	***12,003***	1,371	***2,396***	18	***17***	+3%	***-7%***			0.6%	***1.0%***
	2	Bradshaw to Douglas	2 lanes Bradshaw > Douglas	***By 2040: Ops. improvements--no lane widenin*** CSECJPA: 4 lanes proposed	None on route	None on route Local service nearby in RC, Folsom	18,800	13,000	17,600	46	58	5%	6%	26,359	46,973	5,096	6,589	555	945	21	21	+16%	+17%			0.1%	0.7%
	3	Douglas to US50	2 lanes Douglas > White Rock; 4 lane WR>Prairie City 2 lanes Prairie City > Winfield; 2-4 Lanes Winfield>US 50	***By 2025,2035:*** ***Widen to 4 lanes east of Douglas***	None on route ED Transit comm.buses on US 50	None on route Expanded commuter service on US 50	10,200	10,800	***19,300***	47	57	7%	***+0%***	21,981	***46,973***	14,214	***23,870***	767	***1,886***	23	***20***	+26%	***+13%***			0.9%	***1.4%***
Capital Southeast Connector (Kammerer Road)	1	SR99 to Bruceville	6 lanes Lent Ranch > SR 99 2 lanes Bruceville to Lent Ranch	***By 2025:*** ***Widen to 4 lanes Bruceville>Lent Ranch***	None on route		12,900	6,800	***8,700***	23	41	0%	--	22,189	***35,244***	4,159	***10,215***	1,409	***2,431***	20	17	+9%	***-5%***			0.6%	1.1%
	2	Bruceville to I-5	Currently Kammerer ends at Bruceville Bilby is nearest parallel connection	***By 2030:*** ***Extend Kammerer to I-5***	None on route		NA	NA	***9,200***	NA	NA	0%	--	23,760	***32,641***	1,055	***2,979***	1,295	***1,858***	20	18	+12%	***-1%***			0.5%	0.9%
I-5 Managed Lanes	1	US50 to American River	8 GP lanes thru downtown Aux. lanes at various locations	***By 2030:*** ***Add Managed Lanes + aux. lanes***	Yolobus, Yuba-Sutter comm. buses RT 11, 86, 88, 15; Jibe shuttles	***By 2030:*** ***Increased comm. bus on managed lanes***	205,000	181,300	***207,300***	42	63	21%	***17%***	67,459	***111,081***	86,134	***105,777***	10,212	***14,419***	13	***10***	-30%	***-42%***	See Green Line	***See Green Line***	3.5%	***7.2%***
	2	River to I-80	8 GP + 2 aux lanes at River Aux. lanes at various locations n. of River	***By 2030:*** ***Add Managed Lanes + aux. lanes***	Yolobus, Yuba-Sutter comm. buses RT 11, 86, 88, 15; Jibe shuttles	***By 2030:*** ***Increased comm. bus on managed lanes***	172,000	203,100	***248,400***	42	64	15%	***15%***	48,941	***85,569***	61,890	***81,698***	8,397	***12,673***	14	***11***	-21%	***-36%***	See Green Line	***See Green Line***	2.5%	***6.5%***
	3	I-80 to SMF	5-8 GP + various aux. lanes, I-80 to SR-99 4 general purpose lanes SR-99 to SMF	***By 2030:*** ***Add Managed Lanes + aux. lanes***	Yolobus 42 Downtown>SMF RT 142, Downtown>SMF	***By 2030:*** ***Increased comm. & airport buses***	134,000	113,700	***140,400***	46	64	5%	***2%***	52,484	***77,613***	19,693	***32,554***	2,912	***4,445***	18	***16***	-2%	***-13%***	See Green Line	***See Green Line***	1.1%	***3.4%***
Transit Expansion Corridors														***Trip Shed for Transit Projects = 1/2 mile area around route***											***1/2 mi. Trip Shed***	
Green Line Extension	1	SVS to Township 9	7th Street = 2 lanes	***Parallel roadways by 2030:*** ***5th, Bercut, other Railyards roadways***	Green Line to T9; Gold Line to SVS Local RT bus (e.g. 11, etc.)	***By 2030:*** ***Green Line extended, interlined w/ Gold***								4,471	***23,984***	41,638	***52,537***	28,868	***47,908***	9	***8***	-51%	***-57%***	Green Line: 300 N. of SVS Comm. Buses: 1,100 at River	***Green Line: +12,000*** ***Comm. Buses: +900***	8.6%	***10.2%***
	2	Township 9 to NTC	No local roadway across River--via I-5, Northgate Truxel Road north of River	***By 2035:*** ***New Lower American River crossing***	Some commuter bus (Jibe) Local RT bus (e.g. 11, etc.)	***By 2030:*** ***Green Line to NTC***								27,303	***43,829***	15,892	***22,850***	7,645	***11,802***	15	***12***	-15%	***-32%***	Green Line: na Comm. Buses: 1,100 at Del Paso	***Green Line: +2,500 at Del Paso*** ***Comm. Buses: +900***	1.8%	***6.2%***
	3	NTC to SMF	Limited local roadway across SR-99: Via I-5 & Elkhorn	***By 2030:*** ***Meister OC & extension***	Yolobus 42 Downtown>SMF RT 142, Downtown>SMF	Under study by RT: Green Line extended to SMF								6,076	17,459	3,496	10,369	1,630	4,740	22	18	+22%	+2%	Green Line: na Comm. Buses: 800 at SR-99	***Green Line: na*** ***Comm. Buses: +400; Airport buses +1,200***	0.6%	2.9%
Blue Line Extension	1	CRC to Sheldon	Bruceville: 6 lanes CRB to Calvine Bruceville: 4 to 6 lanes Calvine to Sheldon		Blue Line terminus at CRC e-Tran 110, 114, 116 to CRC	***By 2025: enhanced bus to CRC*** Under study by RT, Elk Grove: Blue Line extension								8,083	12,458	2,320	2,480	6,852	9,840	15	14	-17%	-23%	Blue Line: 1,400 board at CRC Local Buses: 600 Etran at CRC	***Local Buses: +800***	1.6%	3.2%
	2	Sheldon to Civic Center	Bruceville & Bighorn: 4 lanes Sheldon to Civic Center	By 2025: Bruceville--6 lanes to Big Horn	e-Tran 10, 110 routes	***By 2025: enhanced bus to CRC*** Under study by RT, Elk Grove: Blue Line extension								16,849	20,208	6,846	10,983	8,547	11,251	16	14	-13%	-22%	Blue Line: na Local Buses: 400 Etran at Sheldon	***Blue Line: na*** ***Local Buses: +600***	1.4%	2.7%

Source: SACOG, January 2020.

See Attachment 1: Technical Background on Transportation Metrics (Vehicle Miles Traveled, Congestion, Transit) for background on data sources and methods.

Projects and Project Segmentation

Project corridors included in this analysis are shown on Figure 1-A. Because some of the project corridors are long, traffic volumes, congestion levels and surrounding land uses very widely along the corridors. Also, current planned improvements on the project corridors are phased by segments within the corridors. For this reason, each project corridor was split into two or three segments. Metrics are provided for project segments.

Data Summary Table

Table 1-A provides an array of metrics related to congestion, VMT, and transit in each corridor. Notes and observations on the data table are provided below.

Regarding the "Congestion" portion of Table 1-A:

- On the Capital City Freeway Segment 1, the project (new managed lanes in both directions between US to and Expo Blvd, plus new auxiliary lanes connecting from E street to Expo), allows for a 14 percent increase in volume served, at lower overall congestion than today (2 percent of VMT in heavy congestion by 2040, compared to 34 percent today).
- On the Capital City Freeway Segment 2, volumes increase from today while congestion increases by one percent (16 percent of VMT in heavy congestion by 2040, compared to 15 percent today). Note that the 2020 MTP/SCS does not include any major improvements on this segment until after 2040.
- On the Capital Southeast Connector Segment 1, the project (widen to four lanes from SR 99 to Bradshaw), allows for a 38 percent increase in volume served, from a 61 percent increase in population and a 124 percent increase in jobs in the trip shed, with no increase in congestion from today.
- On the Capital Southeast Connector Segment 2, with operational and safety improvements but without widening to four lanes, volumes increase from today while congestion increases by one percent, from a 78 percent increase in population and a 29 percent increase in jobs in the trip shed.
- On the Capital Southeast Connector Segment 3, the project (consistent four lanes east of Douglas to US 50), allows for a 93 percent increase in volume served, at lower overall congestion than today, even with significant growth in the Folsom South of 50 area.
- On Kammerer Road Segment 1, the project (widen to four lanes from Bruceville to Lent Ranch Parkway), allows for a 26 percent increase in volume served, from a 59 percent increase in population and a 146 percent increase in jobs in the trip shed, with no increase in congestion.
- On Kammerer Road Segment 2, the project (extend Kammerer to I-5), provides a new road connection where none existed before, accommodating a 37 percent increase in population and 182 percent increase in jobs in the trip shed, with no increase in congestion.
- On the I-5 Managed Lanes Segment 1, the project (managed lanes and auxiliary lanes from US50 to the American River), allows a 13 percent increase in volume served, at a lower overall congestion than today.
- On the I-5 Managed Lanes Segment 2, the project (managed lanes and auxiliary lanes from the American River to I-80), allows a 26 percent increase in volume served, with no increase in congestion.

- On the I-5 Managed Lanes Segment 3, the project (managed lanes and auxiliary lanes from I-80 to SMF), allows a 24 percent increase in volume served, at a lower overall congestion than today.
- The Green Line Extension Segment 1 and Segment 2 (light rail extension from SVS to Township 9, and Township 9 to Natomas Town Center), is in the same trip shed as the I-5 Managed Lanes Segments 1 and 2, and a portion of Segment 3. In total the Green Line Extension, I-5 Managed Lanes, and increased commuter bus service contribute to the increased volumes and lower overall congestion on I-5 by 2040.
- The Green Line Extension Segment 3 (Natomas Town Center to SMF) is part of the same trip shed as I-5 Managed Lanes Segment 3 (I-80 to SMF). On that corridor, without the Green Line Segment 3, the I-5 corridor accommodates increased traffic volumes and lower overall congestion by 2040.
- The Blue Line Extension Segment 1 (CRC to Sheldon) and Segment 2 (Sheldon to Civic Center) are in the same corridor as Bruceville Road.

Regarding the "VMT" portion of Table 1-A, the "trip shed" analysis prepared for this request tallies land use and density within the area around each project segment, and the VMT per capita of residents of those areas. It must be noted that the TEP projects are not solely responsible for the level of VMT per capita, either currently or in the future—many factors related to land use, demographics, and availability of non-vehicle travel options are part of the VMT per capita. To the extent that the TEP projects facilitate growth and development within the trip sheds, the projects are partially responsible for the VMT per capita metrics shown.

- Cap City Freeway Segments: Both segments rank among the highest in density among the ten roadway segments. Density is the best point of comparison among the segments, since the overall size of the trip sheds varies by segment length. Segment 1 is the most dense currently and in future of all ten roadway segments (13,025 residents + jobs per square mile currently, increasing to 16,287 by 2040). Segment 2 ranks fourth in total density.
    - In part due to this, and in part due to the rich array of transit serving it, household VMT per capita is the lowest of all ten segments (41 percent below the 17.9 mile regional average in 2016, and 47 percent below by 2040).
- Capital Southeast Connector (Grant Line and White Rock) segments rank seventh to tenth in total density by 2040 among the ten corridors. The lowest density is Segment 2 (less than one thousand total residents + jobs), with Segment 1 and Segment 3 both more than double.
    - In part due to this, and in part due to the lack of available alternatives to driving, household VMT per capita is among the highest of all ten segments (13 to 17 percent above regional average by 2040 for Segment 2 and Segment 3, respectively).
    - Segment 1 transitions from slightly above regional average VMT per capita (+3%) to significantly below by 2040 (-7%).
- Capital Southeast Connector (Kammerer Road) segments are also among the lowest in total density (Segment 1 at 2,431 in total residents plus jobs per square mile by 2040, Segment 2 at 1,858). The change in density in Segment 1 is largely due to development in the SEPA.
    - Segment 1 household VMT per capita reduces significantly, from 9 percent above regional average to 5 percent below regional average.
- I-5 Managed Lanes project Segments 1 and 2 are among the highest in total density (14,419 and 12,673 total residents plus jobs per square mile by 2040, respectively) among the ten roadway project segments. Trip shed for Segment 3, which includes Greenbriar and Metro Airpark

developments, is currently very low in total density (2,912 currently, increasing to 4,445 by 2040). Transit expansion, including that shown in the Green Line transit corridor, reflects these density, with extension of the Green Line LRT into Segment 2, but not Segment 3.
    - In part due to these factors, Segment 1 and 2 household VMT per capita are 36 to 42 percent below regional average.
    - Segment 3 household VMT per capita is 13 percent below regional average.
- Transit Expansion Corridors—note that while 2-mile areas around roadway projects were uses, project areas around transit segments were set at ½ mile, for reasons discussed in greater detail below.
    - Green Line transit corridor in Segment 1 is extremely dense (currently 28,868 in residents plus jobs per square mile, increasing to 47,908 by 2040). However, the population density is very low (only 4,471 residents in the trip shed currently), and a big part of the density increase relates to new dwellings and residents in the Railyards and River District more generally. Combining this density with expanding transit service and other factors, VMT per capita is 57% below regional average by 2040. Significant changes in Segment 2 on both total density and transit service drive VMT per capita from 15 percent below regional average currently to 32 percent below regional average by 2040. Green Line Segment 3 shows much less total density and transit service in the ½ mile trip shed—for that reason, VMT per capita is relatively high (slightly above regional average by 2040).
    - The Blue Line project segments show significant total density, much lower than Green Line Segment 1, but comparable to Green Line Segment 2. Enhanced local bus included in the 2020 MTP/SCS provides connection to CRC LRT station. VMT per capita for these areas is 22 to 23 percent below regional average by 2040.

Congestion Data Sources and Methods

For purposes of this response, two sources were used for assembling information on the projects:

1) 2018 observed data on speeds and vehicle volumes for each project segment, to illustrate the level of speed reduction (one measure of congestion)—this shows the most subjective experience of congestion on roadways
2) SACOG travel demand model estimates of travel in heavily congested roadways, for both 2016 and 2040 based on the 2020 Metropolitan Transportation Plan/Sustainable Community Strategy (MTP/SCS) travel forecasts—this is a system performance metric, emphasizing heavily congested conditions. The 2020 MTP/SCS was adopted in November 2019. Federal agencies and Caltrans have already completed review of the MTP/SCS. The 2020 MTP/SCS has not been submitted for technical review of the SCS portion of the document.

Not included in this analysis are metrics on reliability of travel speeds and times on the project segments. Reliability is becoming a bigger concern for both roadways and transit. The new federal "Performance Management" (PM) rules define reliability metrics that, based on observed data on travel times and speeds discussed in greater detail below. In part based on these required metrics for federal PM rules, the SACOG Congestion Management Program also include monitoring of reliability as a key

part of the Program. Reliability was not included in this analysis, due to constraints on time to provide the response.

2018 Observed Data—Free Flow and Congested Travel Speeds

The data source is the "National Performance Monitoring Research Data Set" (NPMRDS). NPMRDS speed data are based on actual traces of smartphones and navigational devices in vehicles on each roadway segment, for a subset of major roadways in the region. A well-known and long-term vendor of vehicle trace data used for speed and reliability estimation, INRIX®, is the current contractor to FHWA for purposes of providing the NPMRDS data. The most recent full year of data available through this source (2018) was used for this analysis. The data are provided in 15-minute increments, 24 hours a day, 7 days a week, 365 days a year. Data are aggregated to the Traffic Message Channel (TMC) segments. TMC segments are the standard segments used for exchange of traveler information. So for each of these 15 minute increments at TMC segment level, the speed reported is the average of all vehicles using the roadway segment during that 15 minute period, based on the smartphone and navigational device traces. The NPMRDS data set is made available to SACOG through the Federal Highway Administration (FHWA). The NPMRDS data set is used for implementation of the FHWA "Performance Management" rules on system performance (delay and reliability) for all MPOs and state DOTs in the nation.

For responding to this request, the NPMRDS data were used for several calculations:

- **Free flow speed** for each segment, or the travel speed on the roadway when volumes are very low and the roads are uncongested.
- **Weekday peak period travel speed** for each segment, or the travel speed during the two peak commute periods (6:00-9:00am, 3:00-6:00pm) for all weekdays in 2018.
- **Travel speed during the slowest hour**, which was the one-hour period with the slowest average travel speed out of 24 hours in a typical weekday.

Pros of the NPMRDS data:

- Cost of the data are covered by the FHWA and Caltrans.
- The data are the most rigorous and robust available.
- The data covers both state highways and local street system.
- Same data used for the regions Congestion Management Program, and for implementation of the Federal "performance management" rules on system congestion and reliability.

Cons:

- Even "best observed data" are not perfect, and data not available for some roadways.
- Does not factor in growth that could affect congestion—only current conditions.

MTP/SCS Corridor Comparisons—Congested VMT

In order to assess the impact of growth and change over time in congestion, the travel forecasts for the 2020 MTP/SCS were used. The basic land use forecasts, and the travel demand forecasts prepared using SACSIM19, are discussed above in the VMT section.

The key metrics drawn from the 2020 MTP/SCS forecasts related to congestion are:

- Changes in volumes on roadways by project segment, from 2016 (base year of the MTP/SCS) to 2040 (horizon year of the MTP/SCS).
- Changes in VMT by project segment, also 2016 to 2040.
- Changes in the amount of VMT on heavily congested roadways by project segment.
    - Heavily congested roadways are those with a volume-to-capacity (V/C) ratio of greater than 1.0. Under these conditions, traffic speeds are very slow and unpredictable.
    - This metric is provided as a percentage of the total VMT on a project segment that occurs on roadways with V/C ratios greater than 1.0. The higher that percentage, the greater the amount of heavy congestion.

Pros:

- Provides information on expected changes by project segment, based on the 2020 MTP/SCS growth and transportation project investments.
- Can provide an array of relevant, relatively understandable metrics (traffic volumes, travel speeds, etc.)

Cons:

- Horizon year for the MTP/SCS is 2040—Measure A expenditure plan horizon is 2060.
- For most TEP project segments analyzed, the 2020 MTP/SCS includes improvements consistent with the TEP projects. However, in some project segments, either no improvement was included in the 2020 MTP/SCS, or the improvement is a subset of phase of a likely TEP project. The impact of these omitted or partially represented improvements constrains the ability to fully account for the potential impact of TEP projects.
- Since information is only provided on the TEP project corridors, the potential to reduce congestion on some parallel or other related corridor through improvements on the TEP corridor is not provided. Understanding TEP project impact on parallel or other related corridors would require more detailed analysis, well beyond the time frame allowed for this response.

Some corridor improvements referenced in the Measure A expenditure plan are not included in the MTP/SCS—so forecasts presented for those project segments do not show the benefits of a project.

Vehicle Miles Traveled Data Sources and Methods

For purposes of this response to STA, VMT was used as an indicator for GHG. This approach has been used in other published documents, such as the CAPCOA “Quantifying Greenhouse Gas Mitigation

Measures" guidance document. While there are many sources of GHG emissions, and some of the most significant methods for reducing GHG relate to transitioning the vehicle fleet to lower-carbon emitting power sources and lower-carbon fuels, the MTP/SCS is required by SB 375 to reduce GHG emissions primarily from reduction in travel resulting from more compact land uses, more and better available alternatives to private vehicles, etc. The state's GHG emissions reduction strategy for the transportation sector, as defined in CARB's 2017 Climate Change Scoping Plan, has three major components related to transportation: 1) increasing use of low carbon fuels; 2) increasing use of lower carbon-emitting vehicles, including EVs; 3) and strategies to promote sustainable communities and improved transportation choices that result in curbing growth in VMT. The state is taking the lead in the first two components, and the SB 375 targets were set for MPOs to lead in implementation of the third component. The state forecasts significant GHG emissions reductions from the low carbon fuels and cleaner vehicles strategies. The state is relying on the SCSs of the 18 metropolitan planning organizations in the state to achieve the GHG emissions reductions from VMT.

The SB 375 target reduction in passenger vehicle GHG per capita is 19 percent. This reduction is required to come from primarily from reduction in travel and VMT, and improvements in traffic operations. There is often confusion about how the 2020 MTP/SCS, which forecasts a reduction in household-generated VMT per capita of 8 percent from 2016 to 2040, can also achieve the 19 percent GHG reduction target. The main explanation for this is the base years for each percentage. The 19 percent is calculated from the 2005 per capita rate of GHG—2005 was the near-peak in GHG per capita. The 8 percent is calculated from 2016, which was significantly lower in VMT per capita than 2005.

For purposes of this response, three options were considered for assembling information on the VMT generating potential of the projects:

1) Elasticity analysis approach
2) Benefit-cost analysis or "project / no-project" comparisons
3) Travel shed analysis

For this response, the travel shed analysis was selected. The pro's and con's of each approach and rationale for selecting the travel shed analysis approach is presented below.

Elasticity Approach (not used for this response)

Approach snapshot: All roadways induce travel and VMT, no matter what or where.

The Office of Planning and Research (OPR), in its technical advisory on implementing SB 743, identifies a simple elasticity approach as one viable approach for assessing the VMT impact of a highway capacity project (see http://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf , pp.23-25). The National Center for Sustainable Transportation has also provided an on-line calculator for induced VMT, relying on highway capacity as the only input (https://ncst.ucdavis.edu/research-product/induced-travel-calculator) The approach is based on a body of research showing that in aggregate, building of highway capacity projects increases the VMT per capita rate, even after accounting for all other factors affecting VMT (income, cost of fuel, etc.). OPR concluded that the elasticity of VMT with respect to highway capacity is 1.04 (i.e. that a highway capacity project adding 1 percent to lane mileage in a region would lead to a 1.04 percent increase in the VMT per capita for that region). The major concerns

with this approach as an option for responding to this request are: 1) the approach itself is based on aggregate research on all projects built in a region, and the regional average VMT per capita—nuanced differences in VMT impact of specific projects are not accounted for; and 2) the land use context of projects are not taken into account in the approach, and reducing VMT without accounting for land use is only looking at half the problem.

Pros:

- Endorsed by the OPR.
- UCD website calculator available
- Easy to do—hours/days for a short list of projects

Cons:

- ALL roadway projects generate VMT & GHG, depending on size of project
- No accounting for context of project—only type of facility
- Can only be applied to roadway capacity projects—not transit or active modes
- No equity/disadvantaged community value

Benefit-Cost Analysis / "Project – No Project" Approach (not used for this response)

Approach snapshot: Project's impact based on how bad things would be if the one project WEREN'T built.

Benefit-cost analysis (BCA) has a long history of application for evaluations of alternatives for a specific project or corridor. It is a way of comparing the relative cost and benefit of the reasonable project alternatives to solve the same problems in one corridor. BCA can provide powerful information about the investments (stated as costs) and the return on investments (stated as benefits) to choose among those project alternatives. The comparisons generally focus on a "no build" scenario for the project corridor (i.e. what would happen if we did nothing). A typical array of project alternatives might vary the amount of transit service, relative to highway capacity investment in a project corridor, or varying the type of transit service (e.g. heavy rail, light rail, BRT, and express bus) in a project corridor. Applying BCA for this request would be something different, because the comparisons would be among projects for different corridors, each comparing the single project alternative to a "no build" for that corridor. Especially given that in most cases the exact definition of the project alternatives are not finalized (e.g. the Capital City Freeway or the I-5 North managed lanes projects, where a detailed project development process is under way currently), this approach did not seem appropriate to the request. Additionally, 30 days was given for SACOG to respond to this request, and BCA analysis would required several months, minimum, to complete.

Pros:

- Developed & tested methodology (e.g. other MPOs use it)
- Shared methodology w/ PPA working group (3 years ago)
- Yields many metrics beyond VMT & GHG (health, congestion, etc.)

- Could be applied to transit (for sure) and ATP (maybe)
- Equity/disadvantaged communities analysis is possible—but has not been done and would have to be developed

Cons:

- Project /no project approach is artificial
- VERY difficult and time-consuming to use—weeks/months, minimum, to do a short list of projects

Project Travel Shed Approach (used for responding to this request)

Approach snapshot: Project's impact based on what land uses it serves, or will serve.

This approach assumes that each project is intended to serve the people and jobs in the area around the project (defined as the "project travel shed" or PTS), and we can learn about the potential VMT impacts of a project by looking at the VMT and other travel characteristics of the people, jobs and other activities in that PTS. There are options for how to define a PTS. One option is to set a pre-defined distance around the project, and treat that area as the PTS. Another option is to use big data or a travel demand model to define the PTS, based on the origins and destinations of trips made on the project facility. While it would be better to use big data or a travel demand model to define the PTS, for purposes of this request, a 2-mile area around each roadway project, and ½ mile for each transit project.

- The ½ mile area around transit projects is consistent with a number of transit priority area (TPA) definitions in state statutes (including CEQA and SB 375), and is a good rule-of-thumb distance for determining the majority of potential walk trips to transit.
- The longer, 2-mile area around roadway projects is recognizes that the trip sheds for drive trips are significantly longer than walk sheds for transit trips. For most projects, many trips using the project facility will begin or end outside the 2-mile area. SACOG is testing an approach using big data to define a PTS, but this work will take significantly more than the 30 days provided for this request.

Pros:

- Can provide combined land use + project assessment
- Project effects are context sensitive
- Reasonable amount of time needed to apply the approach (more than elasticity approach, less than BCA)
- Can do for roadway capacity, transit and other project types
- Can yield additional metrics (e.g. disadvantaged population, etc)

Cons:

- This is a new approach to looking at potential VMT impacts of a project—will be new to most people

- Determining what is the "project shed" for a project is not well defined, and for purposes of this responding to this request, a compromise solution was used

Sources for VMT Data & Analysis

Three sources were used:

1) SACOG 2016 base year land use data
2) SACOG 2040 MTP/SCS growth forecasts data
3) SACOG 2016 and 2040 MTP/SCS travel forecasts, using SACSIM19 travel demand model

The SACOG 2016 base year land use data includes parcel-level estimates of housing, jobs, and major attractors like schools, hospitals, etc. SACOG updates these estimates every four years for the purposes of the MTP/SCS updates, and the base year data are provided for detailed review by local agency staff, as well as validating the data against other published data at larger subarea level (e.g. by jurisdiction or by county). The 2016 base year land use data were used for calculating 2016 population and jobs, as well as 2016 population and jobs density for each project segment and PTS.

The SACOG 2040 MTP/SCS growth forecasts include parcel-level estimates includes most of the same housing and jobs data as in the 2016 base year land use data, but forecasted to 2040 based on the adopted 2020 MTP/SCS. For responding to this request, 2040 forecasts were used to estimate future population, jobs and densities for each PTS, as well as information on the mix of housing in each PTS.

The SACSIM19 travel demand model is the model of record for the recently adopted 2020 MTP/SCS, as well as for the air quality conformity analysis for the MTP/SCS. The model is updated and validated every four years, and meets state and federal standards for travel demand models. The SACSIM19 travel demand model was used for estimates of VMT per capita, and for estimates of non-auto mode travel.

Transit

Additional information on the current and future transit ridership expected in each project segment is provided:

- Transit passenger volumes at key locations on each project segment, analogous to the traffic volumes reported under the "Congestion" section—either a count or estimate of the number of passengers in transit vehicles for each segment.
    - Current passenger volumes are based on the most current ridership numbers available from the operators
    - Future change in passenger volumes are based on the 2016 to 2040 change in the 2020 MTP/SCS travel forecasts.
- Transit mode share for residents in the project trip shed
    - Both current and future mode share is based on travel forecasts for the 2020 MTP/SCS. Mode shares are for all trip purposes, not just commute trips.

Attachment 2: Air Quality and Climate Regulations link to Transportation

A1 - Sustainable Modes and Emissions

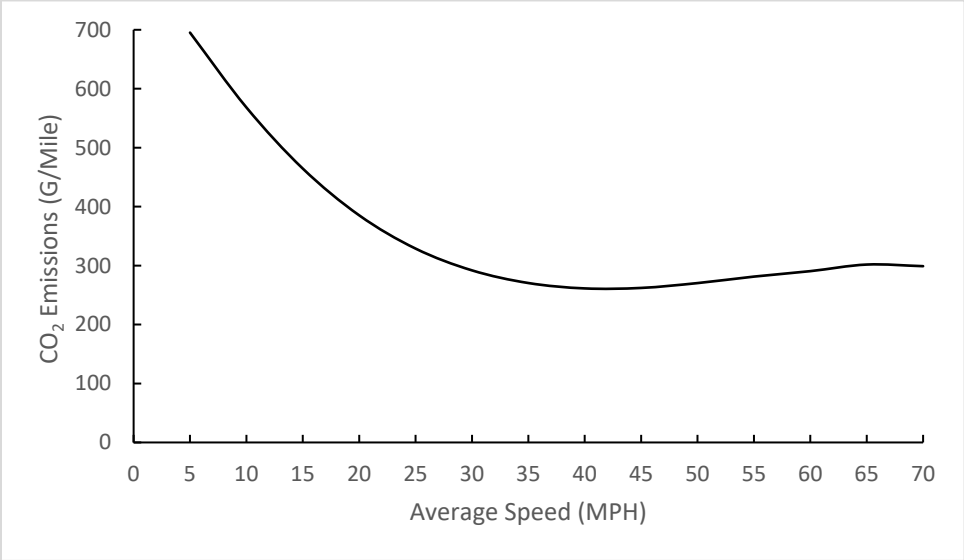
Regulations on light-duty mobile sources have significantly reduced tail-pipe emissions from combustion vehicles. However, the emission control technology in all modern vehicles is most efficient after the vehicle has "warmed up" and thus the most polluting part of a trip is the "cold start." Recognizing that 80 percent of trips are non-commute, and most trips are less than six miles, should the STA board wish to reduce criteria pollutants, projects that eliminate trips (such as walking, biking, and transit) should be given priority.

There is typically a tradeoff between conventional pollution emissions and GHG emissions. In a modern vehicle or truck, the aftertreatment emission control technology that can reduce NO_X and PM emissions does not concurrently reduce GHG emissions; a gallon of gasoline will have roughly the same CO_2 emissions regardless of how it is burned. Reducing VMT and fossil fuel use is the best way to reduce transportation GHG emissions. Recognizing that commute trips, though 20% of trips, represent 45% of VMT, should the STA board wish to reduce greenhouse gas emissions, projects that convert commute trips to sustainable modes (such as walking, biking or transit), accelerate the adoption of zero emissions battery or fuel cell electric vehicles, or promote regional growth in low-VMT areas should be given priority.

A2 - Congestion and Emissions

The proposed TEP projects for congestion mitigation could benefit air quality in the region and reduce driver exposure to combustion emissions. The figure below illustrates the relationship between carbon emissions and vehicle speed. Congestion generally does not mean more GHG emissions, except for the heaviest congestion where vehicle speed notably diminishes. Should the STA board wish to reduce emissions through congestion mitigation, priority should be given to projects in the proposed TEP that reduce roadway segments with the highest volumes of traffic experiencing heavy congestion as indicated by the largest volume / capacity > 1 ratios.

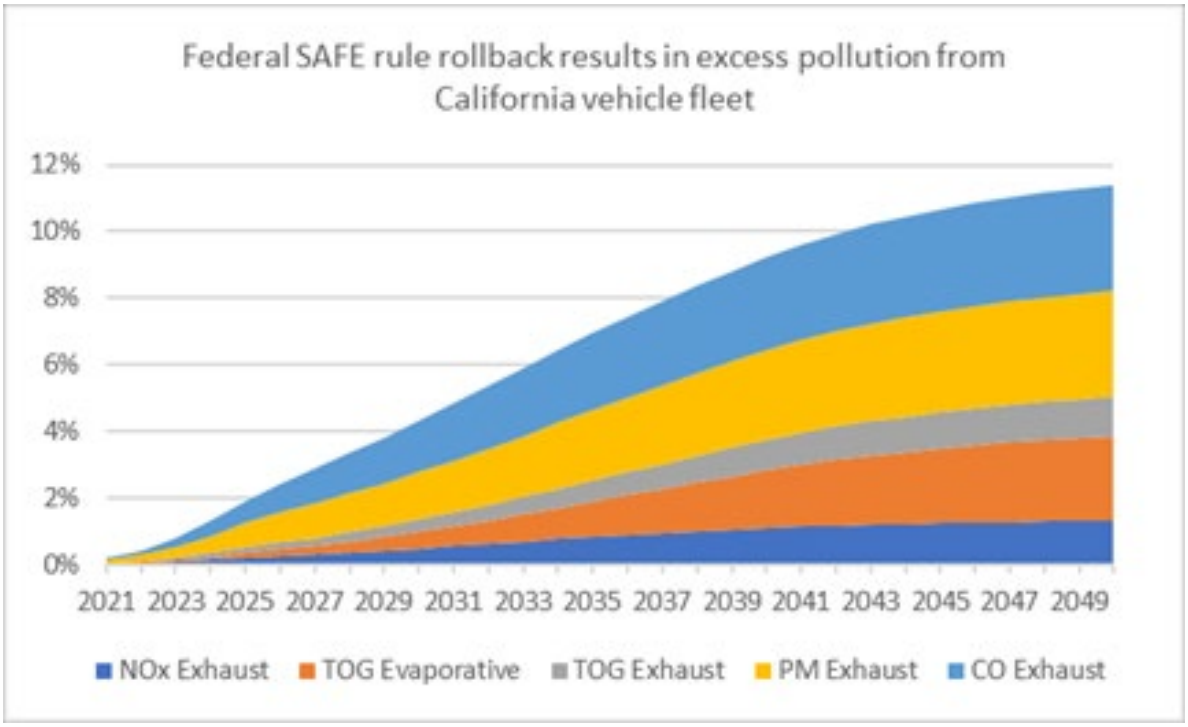
Attachment 2: Air Quality and Climate Regulations link to Transportation Congestion and VMT/GHG Emissions Analysis of Transportation Projects in the Discussion Draft Measure A Transportation Expenditure Plan
1/29/2020



Notes:
EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air District
Region: SACRAMENTO METROPOLITAN AQMD
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

A-3 The SAFE Rule and Emissions

One additional complication for the air quality/conformity assessment of proposed TEP projects is recent federal actions for less stringent vehicle emissions standards. Last September, EPA and the US Department of Transportation issued the SAFE Vehicle Rule[1]. The new rule reduces fuel economy requirements for future vehicles and revokes California's ability to set its own GHG standards, including the Zero Emission Vehicle Mandate. ARB estimates that the SAFE Rule can result in more than a 10% cumulative increase in vehicle emissions in California by mid-century. The actual pollution effect is likely worse because this analysis does not include excess upstream emissions associated with more gasoline combustion cars on the road. While our current transportation conformity budget can likely accommodate conventional pollution increases due to the SAFE rule, any pollution increases are still not desirable given they yield greater public exposure to toxic emissions.



More concerning than the additional criteria emissions is the increase in GHG emissions, as the change would lead to a 50% increase in GHG emissions over previous fuel-economy standards. Future MTP/SCS may need to reduce VMT/capita below the current plan. Any change to the transportation system that would increase VMT and emissions above the adopted MTP/SCS could imperil attaining our GHG regional targets and limit our ability to access state transportation funding.

[1] Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE Vehicle Rule). U.S. EPA and DOT. Sept. 26, 2018. https://www.epa.gov/regulations-emissions-vehicles-and-engines/safer-affordable-fuel-efficient-safe-vehicles-proposed