2022 Project Performance Assessment (PPA v3):

Tool Documentation

Using this Guide

The Project Performance Assessment (PPA) tool links the numerous data sources SACOG tracks and maintains with key policy objectives of the region's long-range transportation plan (now called the Blueprint and formerly called the Metropolitan Transportation Plan/Sustainable Communities Strategy or MTP/SCS). A cornerstone of the tool has been to support data-driven decision making while enhancing transparency in transportation planning and programming. As such, the tool is online and open for anyone to use.

This guide serves as the documentation for the 2022 update of the PPA tool (i.e., PPA v3). The guide first discusses the changes made to the prior version of the tool (part 1), and then provides a description of each of the 2022 PPA indicators by program (part 2). Note that information on running the PPA is included in the tool itself, not in this documentation package.

The documentation also includes three appendices, each with additional information:

- **Appendix 1- Frequently Asked Questions** gives answers to common questions raised by prior users of the tool. Look to this appendix for information such as how to draw more complicated projects in the tool (e.g., projects with limited access points or serving a parallel facility), which project type to use for different categories of investments (e.g., off-street bike paths) or how to add user inputs (e.g., pavement condition, volumes) on a facility with significant variation along its extent.
- The team added **Appendix 2- Guide to PPA Map Data Layers** in response to users who wanted more detail on how the data layers represented in step 1 of the tool (the 'explore' function) relate to the tool's performance indicators output table. Users can reference this appendix table while exploring the tool's visualized data layers as a summary version to the information included in part 2 of the documentation.
- Finally, **Appendix 3- Supplemental Indicator Methodology** gives a more detailed and technical description of several of the more complex data sources and indicators, such as conflating speed data to project lines or calculating project-level accessibility. Users who are interested in the methodological approach for these indicators should refer to this final appendix.

Background

In response to board direction and input as well as federal and state emphasis on performance-based transportation planning and programming, SACOG staff has continued to enhance tools and methods to analyze transportation investments at the project-level.

The Project Performance Assessment (PPA) tool is a major component of SACOG's practice to provide quantitative indicators and other information that help inform regional decision making. The tool draws on multiple data sources to give a consistent and transparent baseline to measure performance for different transportation projects across the region, is online and open for any to use, and has been used as part of the 2018, 2019 and 2021 funding rounds to both streamline the data component for applicants as well as improve transparency in performance-based programming. See the 2018 PPA documentation for a description of the initial version of the tool.

Since its initial rollout in the 2018 funding round SACOG staff conducted a self-assessment of the first iteration of the PPA tool. This review also incorporated valuable comments provided by project sponsors and other tool users. Based on this input SACOG made numerous updates to the PPA in the 2020 version of the tool (PPA v2). See the 2020 PPA documentation for a description of the v2 tool.

SACOG has now released a new 2022 version of the tool building off the feedback and lessons learned from the first two versions of the tool. SACOG staff thanks all those that participated in using the tool for their valuable and constructive feedback.

This documentation describes using the tool within SACOG's core competitive funding programs. Staff hopes stakeholders continue to find value in the tool outside of the regional funding round, and the 2022 tool has additional functionality to create further report templates customizable to different programs and objectives.

Part 1. Major changes to 2022 PPA tool

The largest change in the 2022 PPA is how the project reports are generated. SACOG has navigated the tool to a VertiGIS studio web environment. This new platform helps improve user interface and stability, allows for more functionality around report generation, and sends the completed PPA report via email (instead of having to wait for the tool to finish running in the web browser). In other words, most of the changes to the 2022 PPA tool are in the backend- how the tool runs and on what platform. Most all the indicators remain unchanged from the prior iteration of the tool (though several indicators had slight tweaks to their methodology, as discussed in part 2 below).

The 2022 PPA tool has the same orientation/use as the prior edition. First, users are encouraged to **explore** the tool's data, including transportation, land use and demographic information through a set of layers. The user can control which data is displayed on the map by selecting the layers of interest. Further, as the user changes extent (i.e., zooms in or out), the layers will redisplay based on the new geography. The purpose of this 'explore' step is to help the user get important information about a potential project (including potentially which projects to do further analysis on through the tool's different reports).

Next, users select which report to run, either the **Regional** or **Community Design** programs. These reports correspond to the core programs of SACOG's transportation funding round. The Regional Program allows the user to choose from three possible project type categories: 1) freeway expansion (for Transformative category), 2) arterial or transit expansion (for Transformative category) or 3) complete street/state of good repair (for Maintenance & Modernization category).

Regional Program Project Type Explanation

- **Freeway** project type (first of three project types in Regional Program, used in the Transformative category). Any project primarily on a limited access freeway would use this category. This includes general purpose lanes, auxiliary lanes, HOV/managed lanes, on/off ramps, interchanges, etc. As explained in the description of the indicators below, the indicators in this category look much more at the facility itself, and less at the surrounding land uses.
- **Arterial or transit expansion** project type (second of three project types in Regional Program, used for projects applying in the Transformative program category). This category includes any project that adds roadway capacity (i.e., adding an additional lane to a road, or building a new facility) or any new transit service (both bus and rail), or building a new separated bike/ped trail/path. As these projects add to the regional transportation network, the PPA brings in data both on existing conditions as well as projected change in the project

corridor. Note that a maintenance project request above $5 million needs to apply through the Transformative program category, so would use this second project type definition in the PPA.

- **Complete Street/State of Good Repair** project type (third of three project types in Regional Program, used for projects applying in the Maintenance & Modernization program category), for projects that do not add capacity for any motorized modes. Projects in this second category include road rehabilitation projects, projects adding bike lanes and other active transportation amenities to existing facilities, or other complete streets or operation projects. As the project serves to maintain and enhance existing communities and networks, most of the indicators in this category draw on data for existing conditions. However, some of its indicators do include future data as a reference point for projects proposed for existing corridors that are planned for redevelopment/revitalization.
- Note that transit state of good repair projects, such as bus or light rail vehicle replacements, do not use the PPA tool, as there is not a geographic component to these projects. Transit state of good repair projects instead use the separate Transit Asset Management.
- Sponsors with questions about which project category to use can refer to the PPA FAQ section.

Sponsors using PPA for the Community Design program use a separate report of the tool, that has its own performance outcomes that correspond to the Community Design program.

The new tool platform makes it easier to create custom PPA reports. SACOG aims to add further reports (beyond Regional and Community Design) into the tool in the future that provide indicators specific to other programs (e.g., ATP, Green Means Go, etc).

<u>Changes to Report Interface</u>

The tool's user interface has been updated in PPA v3, though the design should look familiar to former users. Within the report generators (Regional or Community Design), users are asked to draw their project extent (now just a single draw line function), input the project name and jurisdiction, and provide an email. The tool will generate the report asynchronously, and send the report as a pdf file to the specified email. In other words, the user no longer has to wait for the tool to finish running within the tool browser. This is a major change on the back end of how the tool operates, that stems from user feedback of the prior versions of the tool.

For the regional program report, the user has to select project type, which of the 8 outcomes to be evaluated on (or for freeway project, which of the 7 outcomes, given that the equity indicators require post processing outside the tool) and input the Average Daily Travel (ADT), posted speed limit, and Pavement Condition Index (PCI). Note that these inputs are only used in some of the outcomes. For example, PCI is used in the 'maintain state of good repair outcome' but not the others. The report will run with the default values (0) for these three inputs. The appendix gives more detail about each of these three inputs.

2022 Project Performance Assessment: Indicators for Regional Program by Project Type

	Freeways (Transformative)	**Complete Streets/ State of Good Repair (M&M)**	**Arterial/ Transit Expansion (Transformative)**
Performance Outcome	**Indicators by Project type**		
Reduce VMT/capita	-transit trips -avg. vehicle occupancy on project	-jobs + DUs -land use diversity -neighborhood services accessibility	-change in jobs + DUs -change in land use diversity -neighborhood services accessibility
Reduce congested VMT/ capita	- congestion severity and volumes - travel reliability -growth in corridor	- congestion severity -travel volumes -travel time reliability	- congestion severity -travel volumes - travel time reliability -growth in project corridor
Increase multi-modal travel	-transit person-trips on segment	-street connectivity -bike network connection -transit activity -residential mode split	-street connectivity -bike network connection -transit activity -residential mode split
Econ prosperity (jobs)	-job access	-job access	-job access -job growth
Econ prosperity (schools)	-school access	-school access -school enrollment	-school access -school enrollment
Econ prosperity (agriculture)	No indicator	-acres (and change) of ag land near project	-acres (and change) of ag land near project
Improve freight movement	-STAA truck route status -truck mode share	- STAA truck route status -industrial jobs share	- STAA truck route status -industrial jobs share -industrial job growth
Safety	-total collisions -collision rate -% fatal collisions	-total collisions -collision rate -bike/ped collision & rate	-total collisions -collision rate -bike/ped collision & rate
Maintain State of Good Repair	-not applicable to PPA; uses SHOPP program	-PCI -volumes -Complete Street index	-PCI -volumes
Socioeconomic Equity	-Replica post-processing indicators	-EJ population -EJ percent -EJ accessibility	-EJ population -EJ percent -EJ accessibility

2022 Project Performance Assessment: Indicators for Community Design program

Blueprint Principle	Example Indicator
Transportation Choice	Transportation mode split for residents within half mile of corridor, 2016 and 2040
Compact Development	Combined jobs and housing units within half mile of project location, 2016 and 2040
Mixed-Use Development	Land Use Diversity Index within 1 mile of project location, 2016 and 2040
Housing Choice	Housing type mix within 1 mile of project location, 2016 and 2040
Use Existing Assets	Travel time accessibility to neighborhood amenities by transportation mode, 2016 only Infill/greenfield project location
Preserve Natural Resources	Combined acres of forest, agricultural land and park/open space within half mile of project location, 2016 and 2040
Quality Design	No quantitative indicators

Part 2. Description of 2022 PPA Indicators

This section describes the performance outcomes and data indicators in the 2022 PPA tool.

The Regional Program has eight performance outcomes measured in the tool:

- Reduce regional VMT per capita
- Reduce regional congested VMT per capita
- Increase Multimodal Travel/Alternative Travel/Choice of Transportation options
- Provide long-term economic benefit within the region, recognizing the importance of sustaining urban, suburban, and rural economies
- Improve Goods Movement, including Farm-To-Market travel, in and through the region
- Significantly improve safety and security. The 2022 version of the tool has made some changes to how the safety indicator is calculated.
- Demonstrate 'State of Good Repair' benefits that improve the efficiency of the existing transportation system
- Promote Socioeconomic Equity. The 2022 version of the tool has reworked these indicators within this outcome.

The Community Design program has a separate set of performance outcomes based on the blueprint principles. The sponsor can use PPA indicators across any category to demonstrate need or benefit in any of the seven blueprint principles:

- Transportation choice
- Compact development
- Mixed-use development
- Housing choice
- Use existing assets
- Preserve natural resources
- Quality design

After the project sponsor inputs the project information into the online interface (see step by step guide in tool itself), the PPA tool will calculate data indicators for each of the above outcomes, based on project category. For the funding round the project sponsor will select a subset of the performance outcomes to be evaluated on. SACOG will only bring forward the data indicators in the sponsor-selected performance outcomes.

Definitions

Performance Outcome: one of the eight outcomes used in the regional program (or seven in Community Design) to support MTP/SCS implementation
Indicator: specific data to evaluate performance on the given outcome. Each performance outcome has two to three data indicators

How to interpret the indicators

Context, not causality

The PPA uses a variety of data sources to produce data indicators across each of the associated performance outcomes. The tool, however, is not a benefit/cost analysis or other methodological approach that conducts separate simulations to model or estimate the difference between a scenario with the project built to one with the project not constructed.

Instead, the PPA tool aims to strike a balance of three goals: coverage (applicable to a wider variety or projects), user access (a tool that runs in a reasonable amount of time and without specialized or proprietary licensing) and reportability (a transparent tool that produces specific performance indicators on individual transportation projects). As such, it does not run a separate travel demand model for each project (for context, SACOG's travel demand model takes more than twenty hours to run a single time and requires both specialized software and a trained analyst to use. In contrast, the PPA tool runs in a few minutes, and is open to anyone with an internet connection).

In contrast to a benefit/cost analysis, the indicators produced in the PPA are not causal. Many PPA indicators give information about existing conditions without the project built. While each indicator is interpreted differently (see below for each indicator), these existing condition indicators help illustrate if there is a performance need within the outcome. The sponsor still needs to document in the narrative portion of the application how the project's design elements respond to the identified performance need.

Several PPA indicators also include estimates about the project corridor for the year 2040. Importantly, these future year estimates are *not* a project/no project comparison. Rather, they depict the vision for the corridor based on SACOG's MTP/SCS. Sponsors will document in the narrative portion of the application how the project design aligns with and can help realize the MTP/SCS vision. In other words, users and evaluators should not interpret the 2040 indicators as a causal result of the project.

Place type comparisons

The PPA tool provides regional and place/community type averages on each indicator. The place/community type average is an important part of the evaluation framework, where projects are compared relative to size and community type. The 2020 version expanded the number of place/community types to better reflect the diversity of the region. The 2022 version maintains these place/community type categories:

- Agriculture and open space
- Rural residential
- Rural and Small Town Main Street
- Small Town Established Communities
- Developing Communities
- Established Communities
- Arterials and Suburban Corridors
- Urban Core

Regional Program Performance Outcomes

Performance Outcome #1. Regional Reduction in VMT Per Capita

A vehicle mile traveled, or VMT, is one vehicle traveling on a roadway for one mile. Each vehicle traveling on a roadway within the Sacramento region generates one VMT for each mile it travels, regardless of how many people are traveling in the vehicle.

Freeway VMT Indicators

Indicator: Daily Transit Person-Trips
Facility or Buffer: Facility
Data Year: 2016 and 2040
Description: This indicator estimates daily transit trips on the facility, both for current conditions (2016) and future conditions (2040).

Indicator: Average Weekday Vehicle Occupancy
Facility or Buffer: Facility
Data Year: 2016 and 2040
Description: This measure estimates the average number of travelers per passenger vehicle on a typical weekday, using the SACSIM travel model. The indicator reports for current conditions (2016) as well as future conditions in the horizon year of the MTP/SCS (2040) with the project built. Freeway elements such as HOV lanes can increase the number of passengers per vehicle and thus reduce VMT/capita.

Maintenance/Complete Streets VMT Indicators

Indicator: Combined jobs and dwelling units within 0.5mi of project
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: This indicator measures current total combined jobs and dwelling units within 0.5mi of the project, compared to those in a similar place type. Projects with more trip generators (houses and jobs) nearby can support lower VMT/capita given the concentration of activities and destinations. As the projects within the maintenance/ complete streets category focus on serving existing communities, indicators in this outcome focus primarily on current conditions.

Indicator: Land Use Diversity index (0 to 1, with a higher score more reflective of diverse land uses)
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: The land use diversity index measures an area's ratio of households compared to neighborhood activities (K-12 enrollment, park acreage, and employment in the retail, service and food sectors). A score of 1 indicates an 'ideal' ratio of households to amenities that people use on a daily basis like shopping, restaurants, schools, etc. Areas with a mix of land uses increase the likelihood that vehicle trips are shorter per capita and can also be

served by active transportation modes. Note the land use diversity uses a buffer of 1 mile, instead of the shorter 0.5 mile buffer used in other buffer metrics. The supplemental indicator methodology appendix gives a more technical description of this indicator for those interested.

Indicator: Neighborhood Services Accessibility (points of interest)
Facility or Buffer: Facility
Data Year: 2019
Description: The point of interest accessibility indicator estimates the number of neighborhood services a user can access on the facility, by different travel modes. The metric defines these "points of interest" as parks, K-12 schools, higher education facilities, libraries, hospitals, other medical facilities, pharmacies, grocery stores, retail clothing stores and banks. The supplemental indicator methodology appendix gives a more technical explanation of this indicator for those interested.

Road/Transit Expansion VMT Indicators

Indicator: Combined jobs and dwelling units within 0.5mi of project
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: This indicator measures current total combined jobs and dwelling units within 0.5mi of the project, as well as the projected totals in the horizon year of the current MTP/SCS (2040), helping to show if the project is serving an area with forecasted growth in jobs and housing.

Indicator: Land Use Diversity index (0 to 1, with a higher score more reflective of diverse land uses)
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: The land use diversity index measures an area's ratio of households compared to neighborhood activities (K-12 enrollment, park acreage, and employment in the retail, service and food sectors) for both current and forecast conditions. A score of 1 indicates an 'ideal' ratio of households to amenities that people use on a daily basis like shopping, restaurants, schools, etc. Areas with a mix of land uses increase the likelihood that vehicle trips are shorter per capita and can also be served by active transportation modes. The land use diversity uses a buffer of 1 mile, instead of the shorter 0.5 mile buffer used in other metrics. The supplemental indicator methodology appendix gives a more technical explanation of this indicator.

Indicator: Neighborhood Services Accessibility
Facility or Buffer: Facility
Data Year: 2019
Description: The point of interest accessibility estimates the number of neighborhood services a user can access on the facility, by different travel modes. The metric defines these "points of interest" as parks, K-12 schools, higher education facilities, libraries, hospitals,

other medical facilities, pharmacies, grocery stores, retail clothing stores and banks. The supplemental indicator methodology appendix gives a more technical explanation of how the PPA tool calculates project-level accessibility.

Performance Outcome #2. Regional Reduction in Congested VMT Per Capita

Freeway Congestion Indicators

Indicator: Traffic congestion ratio (lower the number, higher the congestion issue)
Facility or Buffer: Facility
Data Year: 2018
Description: This indicator uses observed speed data to compare travel speed on the facility during its slowest four-hour period to its free-flow speed. Often this slowest period overlaps with peak period travel, but not all facilities have their slowest travel during peak period. (The tool will use the slowest four-hour segment regardless of it is in the peak period or not). The tool defines free-flow speed as the 85th percentile speed between the hours of 8pm and 6am, which is meant to reflect conditions where there is no traffic congestion. The lower the ratio of congested speed to free-flow speed, the more severe the congestion during the slowest time of day. For example, if a facility has a free-flow speed of 60mph, and its slowest speed during the day is 50mph, its congestion score would be .83 (50/60). A facility that has a free-flow speed of 60mph and its slowest speed is 30mph would have a congestion score of 0.5, and would have a higher congestion severity in the PPA tool. The supplemental indicator methodology appendix gives more information on how the PPA tool uses observed speed data.

Indicator: Travel time reliability (higher the ratio, the less reliable the facility)
Facility or Buffer: Facility
Data Year: 2018
Description: This indicator uses observed speed data to compare the 80th percentile travel time on the facility to the 50th percentile (or median) travel time. For example, if half of all trips take 10 minutes or fewer on the facility, and 80 percent of all trips take 15 minutes or fewer, the travel time reliability indicator is 1.5 (15/10). The higher the ratio, the less reliable the facility. The percentiles used in this ratio come from MAP-21 performance rules. MAP-21 considers a corridor "unreliable" if its ratio is more than 1.5. The supplemental indicator methodology appendix gives more information on how the PPA tool uses observed speed data.

Maintenance/Complete Streets Congestion Indicators

Indicator: Traffic congestion ratio (lower the number, higher the congestion issue)
Facility or Buffer: Facility
Data Year: 2018
Description: This is the same indicator as that used for freeway projects (see description above), save for arterials it uses the 60th percentile speed (not 85th). The analysis uses 60th percentile to approximate uncongested travel speed while excluding signal delay (i.e., delay

not caused by demand exceeding supply). The lower the congestion ratio, the more severe the speed degradation.

Indicator: Travel time reliability (higher the ratio, the less reliable the facility)
Facility or Buffer: Facility
Data Year: 2018
Description: This is the same indicator as that used for freeway projects (see description above). The higher the reliability ratio, the less reliable the facility given the observed data.

Expansion Congestion Indicators

Indicator: Traffic congestion ratio (lower the number, higher the congestion issue)
Facility or Buffer: Facility
Data Year: 2018
Description: This is the same indicator as that used for freeway projects (see description above), save for arterials it uses the 60th percentile speed (not 85th). The analysis uses 60th percentile to approximate uncongested travel speed while excluding signal delay (i.e., delay not caused by demand exceeding supply). The lower the congestion ratio, the more severe the speed degradation.

Indicator: Travel time reliability (higher the ratio, the less reliable the facility)
Facility or Buffer: Facility
Data Year: 2018
Description: This is the same indicator as that used for freeway projects (see description above). The higher the reliability ratio, the less reliable the facility given the observed data.

Indicator: Growth in jobs and dwelling units
Facility or Buffer: Buffer
Data Year: 2040 compared to 2016
Description: The first two congestion metrics used across project type (above) speak to existing congestion and reliability needs. For projects applying under the expansion category the PPA tool also brings forward data about the projected growth in the corridor, i.e., future contributing factors of congestion based on the growth in the corridor within the MTP/SCS.

Performance Outcome #3. Increase in Multimodal Travel/Alternative Travel/Choice of Transportation Options

Freeway Multi-modal Indicators

Indicator: Daily Transit Person-Trips
Facility or Buffer: Facility
Data Year: 2016 and 2040
Description: This indicator estimates daily transit trips on the facility, both for current conditions (2016) and future conditions (2040). Outcome #1, Reduce VMT per Capita, also uses this same indicator for freeway projects.

Maintenance/Complete Streets Multi-modal indicators

Indicator: Street Connectivity
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the number of 3 and 4-way intersections per acre of the project travel shed in comparison to the community and regional average. The indicator's source is SACOG's all-street centerline file, updated each cycle of the MTP/SCS.

Indicator: Bike path/lane coverage
Facility or Buffer: Buffer
Data Year: 2022
Description: This indicator reports the percent of existing network centerline miles in the project buffer shed that are either off-street bike paths or streets with bike lanes. This quantitative metric, combined with the report's mapping of existing active transportation infrastructure, helps shed light on the bicycle network effect/gap closure potential of the project. The 2022 tool updated the project area bikeway map to improve transparency (i.e., to better display what is existing bike infrastructure and what is the project line).

Indicator: Transit activity
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports weekday transit 'stop activity' per acre of the project buffer. In this definition, a transit stop is not simply a stop location, but also how frequently transit serves the location. For example, an area with five transit stops with frequencies of 30 minutes each has a higher transit activity indicator than a same-sized area with five transit stops with frequencies of an hour. Note that while the indicator measures existing transit activity, it does not give information on how many individuals use this service.

Indicator: Residential mode split
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: The output's chart shows the share of trips made by residents living within

0.5mi of the project location using each of several common modes (bike, walk, drive alone, carpool, and transit). As described earlier , the 2040 mode split is *not* an estimate of the mode shifting effects of the project. Rather it gives a sense of how well a proposed project aligns with the expected future travel modes based on the 2020 MTP's vision for the project area. In other words, users and evaluators should not interpret the 2040 mode share as a causal result of the project.

Expansion Projects Multi-modal Indicators

Indicator: Street Connectivity
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the number of 3 and 4-way intersections per acre of the project travel shed. It also gives a comparison to the community and regional average.

Indicator: Bike path/lane coverage
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the percent of existing network centerline miles in the project buffer shed that are either off-street bike paths or streets with bike lanes. This quantitative metric, combined with the report's mapping of existing active transportation infrastructure, helps shed light on the network effect/gap closure potential of the project.

Indicator: Transit activity
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports weekday transit 'stop activity' per acre of the project buffer. In this definition, a transit stop is not simply a stop location, but also how frequently transit serves the location. For example, an area with five transit stops with frequencies of 30 minutes each has a higher transit activity indicator than a same-sized area with five transit stops with frequencies of an hour. Note that while the indicator measures existing transit activity, it does not give information on how many individuals uses this service.

Indicator: Residential mode split
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: The output's chart shows the share of trips made by residents living within 0.5mi of the project location using each of several common modes (bike, walk, drive alone, carpool, and transit). As described earlier , the 2040 mode split is *not* an estimate of the mode shifting effects of the project. Rather it gives a sense of how well a proposed project aligns with the expected future travel modes based on the 2020 MTP's vision for the project area. In other words, users and evaluators should not interpret the 2040 mode share as a causal result of the project.

Performance Outcome #4. Provide Long-Term Economic Benefit within the Region, Recognizing the Importance of Sustaining Urban, Suburban and Rural Economies

Outcome #4 has three sub-outcomes: job accessibility, school accessibility, and agricultural economy. Project sponsors can select one of these three to speak to how the project supports the themes of the MTP/SCS and Prosperity Strategy.

Job Accessibility Indicators

Freeway

Indicator: Jobs accessible within 30-minute car trip
Facility or Buffer: Facility
Data Year: 2019
Description: This measure calculates the average number of jobs reached in within 30 minutes using the facility. Projects that improve accessibility to more jobs are more supportive of the performance outcome. The supplemental indicator methodology appendix gives more information on how the PPA tool calculates project-level accessibility.

Maintenance/Complete Streets

Indicator: Jobs accessible by mode
Facility or Buffer: Facility
Data Year: 2019
Description: This measure calculates the average number of jobs reached using the facility, by transportation mode. Drive trips use a 15-minute threshold, walk and bike trips use a 30 minute threshold while transit trips use a 45 minute threshold. Like all projects in this category, the tool gives a community type and regional average as point of comparison. The supplemental indicator methodology appendix gives more information on how the PPA tool calculates project-level accessibility across indicators.

Expansion

Indicator: Jobs accessible by mode
Facility or Buffer: Facility
Data Year: 2019
Description: This measure calculates the average number of jobs reached using the facility, by transportation mode. Drive trips use a 15 minute threshold, walk and bike trips use a 30 minute threshold, while transit trips use a 45 minute threshold. The tool also gives a community type and regional average as point of comparison. The supplemental indicator methodology appendix gives more information on how the PPA tool calculates project-level accessibility across indicators.

Indicator: Job growth
Facility or Buffer: Buffer
Data Year: 2040 compared to 2016

Description: This measure reports the estimated job growth in the project corridor by the horizon year of the MTP/SCS (year 2040).

Educational Accessibility Indicators

Freeway

Indicator: Educational facilities accessible within 30 minute car trip
Facility or Buffer: Facility
Data Year: 2019
Description: This measure calculates the average number of educational facilities (k-12 schools plus higher education) reached in within 30 minutes using the facility. Projects that improve accessibility to more locations are more supportive of the performance outcome. The supplemental indicator methodology appendix gives more information on how the PPA tool calculates project-level accessibility across indicators.

Maintenance/Complete Streets

Indicator: K-12 Enrollment
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the number of K-12 enrollments within 0.5 mile buffer of the facility. It reports the absolute number of students, not the individual facilities.

Indicator: Educational facilities accessible by mode
Facility or Buffer: Facility
Data Year: 2019
Description: This measure calculates the average number of educational facilities (k-12 schools plus higher education) reached using the facility, by transportation mode. Drive trips use a 15 minute threshold, walk and bike trips use a 30 minute threshold, while transit trips use a 45 minute threshold. The supplemental indicator methodology appendix gives more information on how the PPA tool calculates project-level accessibility across indicators.

Expansion

Indicator: K-12 Enrollment
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the number of K-12 enrollments within 0.5 mile buffer of the facility. It reports the absolute number of students, not the individual facilities.

Indicator: Educational facilities accessible by mode
Facility or Buffer: Facility
Data Year: 2019
Description: This measure calculates the average number of educational facilities (k-12

schools plus higher education) reached using the facility, by transportation mode. Drive trips use a 15 minute threshold, walk and bike trips use a 30 minute threshold, while transit trips use a 45 minute threshold. The supplemental indicator methodology appendix gives more information on how the PPA tool calculates project-level accessibility across indicators.

Agricultural Economy Indicators

Freeway

Indicator: none
Facility or Buffer: N/A
Data Year: N/A
Description: Freeway projects do not select the 'improve agricultural economy' sub performance outcome

Maintenance/Complete Streets and Expansion projects

Indicator: Acres of Agricultural Use in Project Buffer
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: Both the Maintenance/Complete Streets and Expansion categories use the same indicator in this outcome. The agricultural economy indicator reports the share of acreage within 0.5 miles of the project that is in agriculture uses, both currently (2016) and in 2040. Projects serving areas with high existing agricultural uses that are preserved moving forward are most supportive of the outcome. Projects serving areas converting agricultural land to other uses do not support this outcome.

Performance Outcome #5. Improve Goods Movement, Including Farm-To-Market Travel, In and Through the Region

Freeway Indicators

Indicator: Percent of project that is on federally-recognized STAA truck route
Facility or Buffer: Facility
Data Year: 2018
Description: This measure gives the amount of the facility that falls within the STAA truck route network. All freeways are STAA routes, so most freeway projects will be 100% on the STAA network.

Indicator: Truck volumes
Facility or Buffer: Facility
Data Year: 2016
Description: This data comes from the Caltrans 2016 truck counts point file. Projects with higher truck volumes relative to other regional corridors demonstrate a stronger freight need.

Maintenance/Complete Streets Indicators

Indicator: Percent of project that is on federally-recognized STAA truck route
Facility or Buffer: Facility
Data Year: 2018
Description: This measure gives the amount of the facility that falls within the STAA truck route network. Arterials and other streets will vary in their coverage of the STAA network.

Indicator: Share of jobs in within industrial sectors
Facility or Buffer: Buffer
Data Year: 2016
Description: This measure reports the share of employment within the project buffer that fall within industries heavily reliant on freight. These industries include manufacturing, logistics and agriculture-related activities.

Expansion Indicators

Indicator: Percent of project that is on federally-recognized STAA truck route
Facility or Buffer: Facility
Data Year: 2018
Description: This measure gives the amount of the facility that falls within the STAA truck route network. Arterials and other streets will vary in their coverage of the STAA network.

Indicator: Share of jobs in within industrial sectors
Facility or Buffer: Buffer

Data Year: 2016
Description: This measure reports the share of employment within the project buffer that fall within industries heavily reliant on freight. These industries include manufacturing, logistics and agriculture-related activities.

Indicator: industrial job growth
Facility or Buffer: Buffer
Data Year: 2040 compared to 2016
Description: This measure reports the estimated job growth within the project corridor in freight-dependent industries over the course of the MTP/SCS. The indicator defines freight-dependent indicators the same as the above (manufacturing, logistics, and agricultural sectors)

Performance Outcome #6. Significantly Improve Safety and Security

Freeway Indicators

Indicator: Total collisions
Facility or Buffer: Facility
Data Year: 2015-2019
Description: This data comes from TIMS, and reports the total number of collisions on the facility resulting in an injury or fatality (i.e., the data does not include 'property-damage only' incidents which do not involve an injury).

Indicator: Collision rate (total collisions/ 100 million VMT)
Facility or Buffer: Facility
Data Year: 2015-2019
Description: Following the guidance from the federal performance rules, the PPA also includes a rate-based measure of total collisions on the corridor per 100 million vehicle miles traveled. This data comes from TIMS, also for the years 2014-2018, and reports the total number of collisions on the facility resulting in an injury or fatality (i.e., the data does not include 'property-damage only' incidents which do not involve an injury) per 100 million miles of VMT. SACOG uses the SACSIM travel model for estimates of VMT.

Maintenance/Complete Streets and Expansion Project Indicators

Indicator: Total collisions
Facility or Buffer: Facility
Data Year: 2015-2019
Description: Both maintenance/complete streets and expansion projects use the same indicator as that for freeways, discussed above.

Indicator: Collision rate (total collisions/ 100 million VMT)
Facility or Buffer: Facility
Data Year: 2015-2019
Description: This is the same indicator as used for freeways, discussed above. Projects in the maintenance/complete streets category also include a rate comparison to the community-type and regional average, given the sufficient sample size available.

Update for 2022 tool: For arterial projects, the average collision rate for community type and region now exclude collisions that occurred on freeways.

Indicator: Rate of fatal collisions and of collisions involving a pedestrian of cyclist
Facility or Buffer: Facility
Data Year: 2015-2019
Description: This indicator reports what percentage of all TIMS incidents resulted in a fatality, as well as those involving a pedestrian or bicyclist. It gets at the severity of the facility's overall collision history.

Indicator: Collisions per project centerline mile involving a cyclist or pedestrian

Facility or Buffer: Facility
Data Year: 2015-2019
Description: This indicator reports how many cyclist and pedestrian collisions occurred per centerline mile of project. It seeks to provide a more apples to apples comparison between long projects, which may show more collisions merely because they are longer, and shorter projects. This indicator also presents the community type and regional average rates for collector and arterial streets, to provide some values to compare the project against.

Update for 2022 tool: When computing the regional and community type average collision rate per centerline mile, the updated tool excludes minor residential streets from the centerline mileage calculation. Residential streets make up a large share of total centerline mileage, but have very low collision rates compared to the collector and arterial streets that most Funding Round projects occur on. In turn, the old tool made every project appear to have a very high rate of bike/ped collisions and made it harder to compare to other projects.

Performance Outcome #7. Demonstrate 'State of Good Repair' Benefits That Improve the Efficiency of the Existing Transportation System

Freeway Indicators

Indicator: none
Facility or Buffer: N/A
Data Year: N/A
Description: The PPA tool does not have a state of good repair metric for freeway projects, as there are separate programs for freeway maintenance.

Maintenance/Complete Streets Indicators

Indicator: Pavement Condition Index
Facility or Buffer: Facility
Data Year: Sponsor Provided (most current)
Description: The project sponsor provides the most current Pavement Condition Index (PCI) score for the facility. The FAQ section gives guidance on how a sponsor can give a reflective PCI for a segment with varying pavement conditions.

Indicator: Traffic Volumes
Facility or Buffer: Facility
Data Year: Sponsor Provided (most current)
Description: The project sponsor provides the most current average daily volumes on the facility. The FAQ section gives guidance on how a sponsor can give a reflective ADT for a segment with significantly varying volumes.

Indicator: Complete Street Index (higher the number higher potential for complete street uses)
Facility or Buffer: Buffer
Data Year: 2016
Description: Projects applying in the maintenance/complete streets category also have an indicator on complete street characteristics. The complete streets index is a 0-100 score based on the densities of students, transit service, jobs, and dwelling units within a half mile of the project location and also draws on the project's posted speed limit. A higher index score means higher densities of these input factors, where many different users (bike, walk, transit, drive) are more likely to use the complete streets treatments. As posted speed limit increases beyond 40mph, the index will fall (all else being equal), as higher vehicle speeds are less conducive to the street serving multiple users. The supplemental indicator methodology appendix provides the full technical definition for this indicator. The 2022 tool added the complete street average for each of the community/place types (as a point of comparison).

Expansion Project Indicators

Indicator: Pavement Condition Index
Facility or Buffer: Facility
Data Year: Sponsor Provided (most current)
Description: The project sponsor provides the most current Pavement Condition Index (PCI) score for the facility. The FAQ section gives guidance on how a sponsor can give a reflective PCI for a segment with different pavement conditions throughout its extent.

Indicator: Volumes
Facility or Buffer: Facility
Data Year: Sponsor Provided (most current)
Description: The project sponsor provides the most current average daily volumes on the facility. The FAQ section gives guidance on how a sponsor can give a reflective ADT for a segment with significantly varying volumes.

Promote Socioeconomic Equity

Freeway Indicators

Indicator: optional Replica analysis
Facility or Buffer: Facility travel shed
Data Year: 2019
Description: Freeway projects will have the option to run the Replica tool to estimate how the project serves disadvantaged communities. This Replica functionality is not part of the standard PPA tool, instead requiring a specialized run.

Maintenance/Complete Streets and Expansion Project Indicators

Indicator: environmental justice population
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the total number of residents within a half mile buffer of the project that fall under SACOG's environmental justice definition.

Indicator: environmental justice proportion
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator reports the percentage of residents within a half mile buffer of the project that fall under SACOG's environmental justice definition.

Indicator: Accessibility for disadvantage populations
Facility or Buffer: Buffer
Data Year: 2019
Description: This indicator reports how many different types of activities (jobs, educational facilities and services) members of environmental justice communities can access in a given time threshold using the facility. The measures is weighted based on the population that lives both within a half mile of the project segment and within an environmental justice area. Drive trips use a 15-minute threshold, biking and walk trips use a 30 minute threshold, and transit trips use a 45 minute time threshold. The supplemental indicator methodology appendix gives more detail on how the PPA calculates project-level accessibility across indicators.

Community Design Performance Outcomes

The Community Design program draws on the seven blueprint principles as its performance outcomes. The 2020 PPA tool produces data indicators within each of these outcomes, except for "quality design", which is a more qualitative assessment. Note the updated guidelines for the 2021 Community Design programs notes how sponsors can draw on any PPA indicator to provide demonstration of need or benefit, instead of prescribing what indicators to use by principle.

Transportation Choice

Example Indicator: transportation mode split for residents within half mile of project
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: This indicator estimates the travel characteristics of residents within the project buffer area, split into: walk, bike, drive alone, carpool, transit, and other trips. It reports both for current conditions (2016) as well as what the MTP/SCS envisions for the corridor by 2040. Note that the future year data is not an estimate of the impact of the project. Project sponsors will need to discuss how the proposed project either leverages existing conditions or aligns/helps implement the plan.

Compact Development

Example Indicator: combined jobs and dwelling units within a 0.5mi of project location
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: This is the same indicator used in the Regional Program. The 2016 data estimates current conditions in the project corridor, and the 2040 provides the MTP's projected totals of jobs and dwelling units. Note that the future year data is not an estimate of the impact of the project. Project sponsors will need to discuss how the proposed project either leverages existing conditions or aligns/helps implement the plan.

Mixed-use Development

Example Indicator: land use diversity index within 1 mile of project location
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: This is the same indicator used in the Regional Program. The higher the value on the land use diversity index, the more evidence of mix of uses. The supplemental indicator methodology appendix provides a fuller technical description of the indicator.

Housing choice

Example Indicator: housing product diversity within 1 mile of project location
Facility or Buffer: Buffer

Data Year: 2016 and 2040
Description: This indicator reports the number of housing units within the project corridor in the following categories: high density, medium-high density, medium density, low density, very low or rural residential density, and mixed-use. The density classifications come from SACOG's MTP/SCS. In other words, these are definitions standardized to the full region, not for an individual jurisdiction or community.

Use Existing Assets

Example Indicator: travel time accessibility to neighborhood points of interest
Facility or Buffer: Facility
Data Year: 2019
Description: This indicator reports the number of different types of activities a user can reach in a given amount of time using the facility, by transportation mode. Drive, walk and bike trips use a 30 minute threshold and transit trips use a 45 minute threshold. The indicator uses the same definition of points of interest as the Regional Program. Since the measure is about existing assets, it does not provide a comparison to the predicted 2040 changes; instead, it provides a comparison to existing accessibility for projects in similar communities and the region as a whole. The supplemental indicator methodology appendix gives a fuller description of how the PPA tool calculates project-level accessibility.

Example Indicator: infill/greenfield community
Facility or Buffer: Buffer
Data Year: 2016
Description: This indicator draws on the land uses surrounding the project to give a categorical output. If over 90 percent of the buffer area is in a developing, agricultural, rural residential or other non-urbanized land use, the project is considered greenfield. If 90 percent of more of the buffer area is in an established community or center and corridor, the project is considered infill. If the project is in a mix of uses, the outcome reports the project spans both infill and greenfield areas. The land use designations come from the MTP/SCS.

Preserve Natural Resources

Example Indicator: acres of forest, agricultural land, or park/open space in project shed
Facility or Buffer: Buffer
Data Year: 2016 and 2040
Description: This indicator reports the combined forest, agricultural, park and other open space acreage in the project area, both currently and given the projected growth envisioned in the MTP/SCS. Projects serving areas that decrease the portion of open space through time do not support the preservation performance outcome.

Quality Design

Indicator: There is no data indicator for quality design, as it is a qualitative assessment

Appendices

Appendix 1 Frequently Asked Questions

Choosing your Project Type

The Regional Program asks sponsors running the PPA tool to select one of three project types: freeway, expansion, or complete streets/state of good repair. The following bullets provide an explanation of which type to use, with more detail below.

- Any project applying in the Maintenance & Modernization program category should select the "Complete Streets or State of Good Repair" type in the PPA.
- Any project applying in the Transformative program category (including maintenance projects above $5 million) should select the "Arterial and Transit Expansion" type in the PPA. This PPA category evaluates both maintenance and expansion projects, in that it produces the same metrics as the above category, but also includes indicators on future growth or other change in the corridor given that these are transformative investments.
- The exception to the above two rules is a project on a limited-access highway or freeway. These projects should select the "Freeway" project type in the PPA tool, regardless of if the sponsor is applying in the Maintenance and Modernization or Transformative program category.
- Transit asset management requests (e.g., bus and light rail vehicle replacements) do not use the PPA tool. The application materials will instead ask these sponsors to provide TAM data.

Freeway projects

Choose if your project is on or part of a limited-access, high-speed freeway facility. This includes auxiliary lanes, HOV lanes/managed lanes, on/off ramps, freeway-to-freeway interchanges, etc.

Arterial and transit expansion (select if applying in Transformative program category)

Categorize your project as an arterial or transit expansion project if it is adding new *non-freeway* capacity to the transportation system for any motorized mode or is above $5 million in requested funding. Examples include:

- Physically widening an existing arterial to accommodate increased motorized vehicle throughput (e.g. widening to accommodate new general-purpose lanes, new turn lanes, or new transit lanes). This applies even if the widening project includes adding new bike lanes along with the new motor vehicle capacity.
- Constructing a new arterial.

- Adding new transit service either through a new route or more service on an existing route.

Complete Streets and State of Good Repair (select in applying in Maintenance and Modernization program category)

Choose this if your project is not on a freeway, does not add any capacity for any motorized mode, and is under $5 million in requested funding. Examples include:

- Restriping or reconfiguring an existing arterial to include bus-only lanes *without* physically widening the right-of-way and *without* increasing service frequency. If the project increases transit service frequency, categorize it as "arterial and transit expansion."
- Adding sidewalks or on-street bike lanes to an existing street without adding motor vehicle capacity.
- Rehabilitating an existing non-freeway road without any capacity changes.

Choosing A Project Type for Off-Street Bike Paths

In most cases, SACOG staff recommend users categorize off-street bike path projects as "arterial/transit expansion" projects for the following reasons:

- Most off-street bike path projects are new construction, rather than rehabilitation.
- Complete streets metrics, and particularly the Complete Streets Index, are meant to evaluate the potential of an existing, car-accessible street to become a street that better accommodates and encourages all travel modes. In contrast, a new bike path inherently is for bike and pedestrian use only and is a new facility rather than an existing one.

Drawing Your Project

Importance of Drawing Accurately

The PPA is inherently spatial. Most of its numbers rely on one or more distance-based analyses, so if you draw the line too far from the actual project location, it may give you incorrect numbers. In particular, the tool only counts collisions that are within 75 feet of the project line, so if you draw the line too far from the actual road alignment, you risk under- or overcounting the collisions.

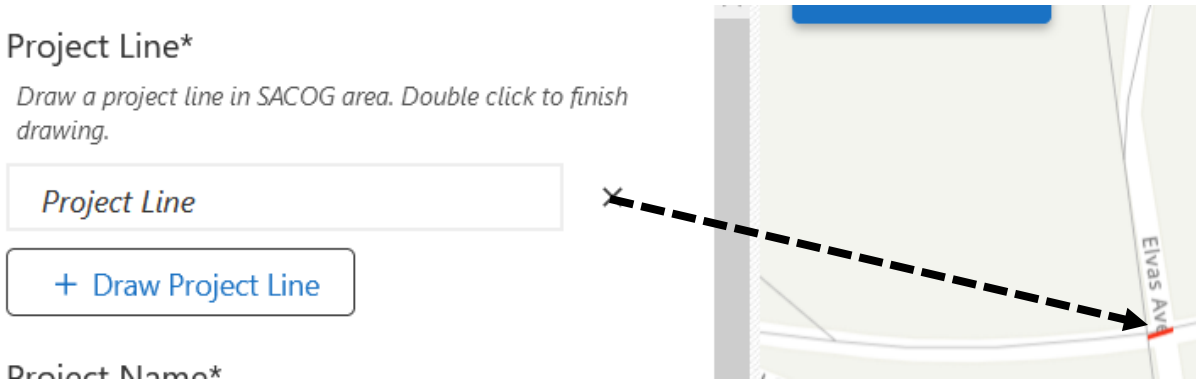
To draw an accurate line, follow these tips:

- Zoom in close to the project location.

- If zooming in makes it so you cannot see the entire project extent in the map frame, draw what you can in the frame, then click and drag the map frame as much as needed, then continue drawing your project line.
- The 2022 updated tool only has one line draw function, which can be used for all project types.

Draw an Intersection Instead of a Line Project

To draw a project line that represents an intersection instead of a segment or corridor, simply zoom in close to the location and draw a very short line that just crosses the intersection *(note visual below shows old line draw tools)*



Draw A Project with Limited Access Points

Limited-access projects are linear projects whose actual affected area may be better represented by the locations near points where people can access the project instead of the entire project, such as:

- An off-street bike path that can only be accessed via entrances that are far apart from each other.
- A commuter bus that has a few stops at either end but has long freeway-running sections with no stops.
- Other limited-stop transit service with stops spaced far apart (e.g., LRT stations).

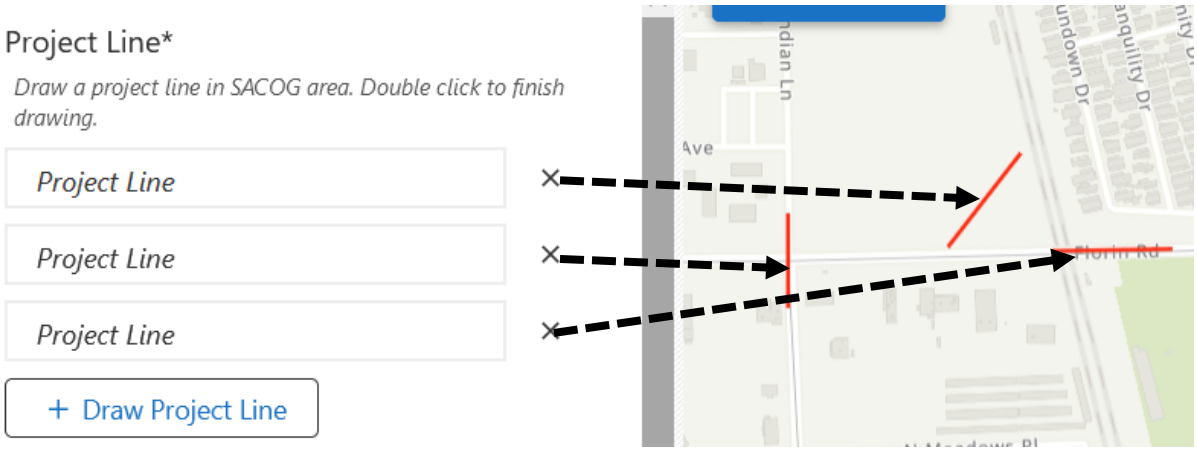
If you believe your project, like the examples above, may be more appropriately represented as separate access points rather than as a single line, then draw in lines that only represent the portions of the project at which there are access points. If your project has multiple access points, draw them as described below in "Analyze Multiple Locations as a Single Project".

Analyze Multiple Locations as a Single Project

Example scenarios

- Multiple intersection locations that you want to analyze as a single project
- A discontinuous bike path project that comprises multiple, disconnected segments that you want to analyze as one project
- You want to code in just the access points of a limited access project.

Example multi-location project



How to represent in the tool

1. Draw the first part of the project as normal.
2. After drawing the first project part, click again "Draw Project Line" button
3. Draw the second part of your project. This will show as a second line both on the map and in the input to the tool's left.
4. Repeat steps 2 and 3 for all other portions of your project.
5. After drawing all pieces of your project, fill out the remaining tool fields and run the tool. The resulting report will have maps and numbers representing your multiple project pieces as one project.

Drawing Projects That Do Not Fit in a Single Screen

Longer projects will require the user to pan the map sideways or up/down. Drawing in a long project that does not fit in a single screen is similar to drawing a multi-part project. Specifically:

1. Start drawing your project as normal.
2. When you get to the edge of the screen (ie., you need to pan sideways to keep drawing your project), double-click the last point on the line you've drawn so far.
3. Pan the map as needed
4. Click the "Draw Project Line" button again and continue your project line from where you left off on your first line.

5. Repeat steps 2-4 as needed until your entire project is drawn.

Drawing Projects to Represent a Parallel Facility

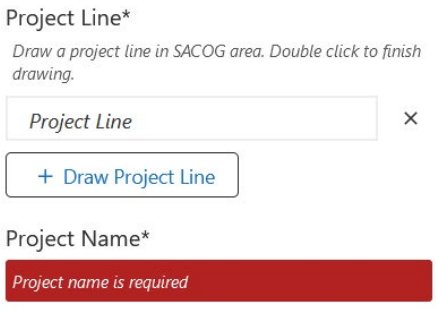
Example situations

- Widening or building a new arterial or freeway facility to relieve congestion on a nearby parallel facility
- Building a new off-street bike or pedestrian path to provide people an alternative to biking or walking on what may be a dangerous or uncomfortable street.

How to represent in the tool

1. Draw your project at its actual location and run the tool as normal.
2. After running the tool for the actual project location, clear your first project line.
3. Draw a new project line on the parallel facility that your project is intended to improve or complement. Update the project name, ADT, speed limit, and PCI to reflect the parallel facility.
4. Rerun the tool.

Example of representing parallel facility



Deciding which outputs to use in your application

To help you and reviewers best evaluate your project's benefits to a parallel facility, we recommend compiling your report outputs in the following manner in your application:

- Include the title page for BOTH runs in your application

- If you selected any of these performance outcomes, include their pages from BOTH runs in your application:
    - Reduce congestion
    - Improve safety
- For all other performance outcomes, only include their pages for your PROJECT location run.

Entering Project Data

Entering Your Project's Average Daily Traffic (ADT)

Average Daily Traffic (ADT) is most important for the following three metrics:

- Collision rate per 100 million VMT.
- Estimating how many people are affected by current maintenance conditions at the project location.
- Giving reviewers an idea of how many people are affected by congested conditions at the project location.

Estimating ADT may be challenging. Use the guidelines below to help you estimate ADT for several well-known difficult situations.

- *ADT varies significantly along the project length*
    - If your project segment is long and, per observed traffic counts, has significant variety in its ADT (e.g., ADT at the start is much higher than ADT in the middle but lower than ADT at the end), use your best judgement to provide a single, reasonably representative average ADT for the entire project based on what share of the project's length has each ADT value.
- *Project covers multiple locations*
    - If your project covers multiple locations that are far apart from each other, such as different intersections or separated segments that are far apart from each other on the same street, we recommend keeping the ADT at the zero default and not incorporating it if your application does *not* cite safety as one of its primary performance outcomes.
    - If, however, you have a multi-location project that has safety as a primary performance outcome, we recommend you run the tool separately for each location of the project to ensure the ADT values are representative of each project location, which in turn will result in more accurate collision rates.
- *If your project is a new road, off-street bike path, or off-street transit project*

    - For new construction projects, you may keep the default ADT value of zero.
- *If your project is supposed to relieve congestion on a parallel facility*
    - If one of your project's goals is to help divert traffic from an existing facility, follow the directions for parallel facility analysis as described above.

Entering Speed Limit

Like ADT, the posted speed limit may vary along your project, especially if you have a long project or your project covers multiple locations. Below are several approaches to reconciling a project that has multiple speed limits within its extent.

- *Leave speed limit as zero if you do not have a complete streets project* - While the speed limit appears on the cover page of the PPA report, it is only used in an evaluative sense to calculate the complete streets index. Therefore if you are not including complete streets or state of good repair in your performance outcomes, then you may leave the speed limit at the default value of zero.
- *Enter a reasonably representative typical speed limit* – if complete streets/state of good repair is one of your project's outcomes, enter the most reasonable speed limit that captures the "average" speed limit for all locations within your project's extent, if the speed limits are reasonably close (e.g., within +/-10mph).
- *Run separate project reports* – if the speed limits within your project's extent vary significantly (more than +/- 10mph), then consider running separate reports to capture the significant variation in your project's locations. Even if you submit different reports with your application your project will still be evaluated as a single project.
- *Entering current vs. future speed limit* - If your project would change the speed limit, then enter the speed limit that would be in effect if the project were completed.

Entering Pavement Condition Index

- *If PCI varies significantly within the project extent* – Similar to handling ADT or speed limits that vary within the project extent, use your best judgement to provide an approximate average PCI for the project. If your project has a few specific locations whose PCI you wish to highlight, please do so in your application narrative.
- *Road maintenance projects without a PCI score* – If your project is a non-surface maintenance project (e.g. bridge structure), leave the PCI as its default zero value and use the narrative section to highlight the other maintenance needs your project will fulfill.

- *Transit projects* - Transit state of good repair projects do not use the PPA, so transit expansion projects using the PPA tool can leave the default zero value in the PCI box. This will not affect any transit outcomes. Transit maintenance projects use the separate Transit Asset Management indicators.

What Does My Complete Street Index Value Mean?

The complete street index (CSI) evaluates a street's potential to benefit from complete streets treatments that allow it to better accommodate a diverse set of road users. A higher score means the street has more potential to benefit from projects that provide complete street treatments. More details on how the score is calculated is described in complete streets index methodology section.

The 2022 edition of the PPA tool has several improvements to help users better gauge what a "good" CSI value is for a project. Specifically:

- The score has been normalized on a 0-100 scale, rather than being a raw number with no maximum value.
- We computed the average arterial CSI value for each of the major community types, enabling more context-sensitive consideration of a project's CSI value. Table 1 below lists the average CSI score for each community type.

Table 1 - Average Complete Street Index (CSI) by Community Type

Community Type	Average CSI
Ag	0.08
Arterials & Suburban Corridors	4.17
Developing	0.49
Established Communities	2.44
Rural & Small Town Main Street	3.28
Rural Residential	0.12
Small-Town Established Communities	1.94
Urban core	41.42
Maximum Possible CSI	*100*

CSI = Complete Street Index (0-100 score)

Viewing Reports without Excel

This issue is no longer relevant in the PPA v3, as the tool now produces a pdf (instead of an excel workbook).

Receiving an Error while running the Tool

SACOG's has done exhaustive testing on the new PPAv3. The testing has found the tool to be very stable across multiple testing environments and users. One possible issue however is if a user runs multiple PPA reports back-to-back-to-back (without allowing the tool to complete any individual run). If this is the case, and the tool does not run, you can simply wait for a few minutes and then rerun your project. If you receive another error, the tool will send the error message direct to SACOG project staf.

Collision Data Seem Wrong

Total number of collisions seems wrong

If you think you may not be capturing all collisions on your project segment, check how accurately you drew your line by zooming in on it in the user interface. The tool only counts collisions whose geocoded location is within 75 feet of your project line, so to ensure you are accurately capturing collisions on your project segment, be sure to draw as accurately as possible. Zooming closer in makes it easier to draw accurately.

Collision rate per 100 Million VMT seems wrong

The collision rate is based on the total number of collisions found for the project and the average daily traffic (ADT) you entered. If the collision rate seems unreasonably high or low, double check to make sure you entered the most reasonable ADT estimate available.

The 2022 tool updated the collision rate methodology to compare projects of the same facility type (freeway to freeway, arterial to arterial, etc).

Project on One-Way Street Has Congestion Data for Two Directions

If you draw your project in a one-way street, e.g., a street that only goes eastbound, normally the report should only show congestion data for the eastbound direction, with an empty "Null" space where the second direction would go on a two-way street. However, due to how the speed data conflation process works, you may get a second direction of congestion data. This normally happens if, for example:

- Your project line is very short and just represents an intersection.

- Your project segment is short and has numerous cross-streets. In these cases you may, for example, have a project on an eastbound one-way street but have congestion numbers for northbound or southbound directions for cross streets.

If your project on a one-way street shows congestion data for two directions, please only consider the congestion numbers for the direction that the one-way street actually goes. E.g., if you have a project on a one-way street but it has congestion data for both eastbound and northbound, only consider the numbers for eastbound for purposes of project evaluation.

We hope to rectify this issue in future versions of the tool.

Appendix 2 Guide to PPA Map Data Layers

Layer Name(s)	Description	Relevant Performance Outcome(s)	Project Supports Outcome Better if it…
VMT per Capita 2016	Vehicle-miles traveled per capita	Reduce VMT	is in a low-VMT area
STAA Truck Routes	State Transportation Assistance Act designated truck routes	Improve Freight Movement	is on or connects freight routes
Environmental Justice (EJ) Areas	Areas with high shares of persons who belong to an ethnic/racial minority, are low income, or have limited English proficiency.	Increase Social Equity	has a higher share of people living near it within an EJ area
Bikeways (2022)	Existing class 2 bike lanes and class 1 bike paths	Promote Multimodal travel	is on or connects existing bike facilities
Collisions	Locations of collisions involving an injury or fatality	Improve Safety	has more collisions per 100 million VMT than community type average
Transit Service Density (Stops per Day)	Heat map of frequency of transit vehicle stops occurring in a typical weekday.	Promote Multimodal travel	has more transit stops per acre than community type average
Community Types	Based on 2020 MTP community types, but with more categories to enable better comparison of projects in similar built environments.	Various	No effect. Used to compare projects that are within similar built environments.
Land Use 2016 (Dwelling Units + Jobs)	Total jobs and dwelling units in 2016	Reduce VMT	has more dwelling units and jobs near it
Job and Dwelling Unit Growth (2016 to 2040)	Increase in combined total of jobs + dwelling units between 2016 and 2040	Reduce VMT, Reduce CVMT	has more growth in jobs and dwelling units nearby

Layer Name(s)	Description	Relevant Performance Outcome(s)	Project Supports Outcome Better if it…
Industrial Jobs 2016	Total jobs in industrial sectors	Improve Freight Movement	has more industrial jobs near it
Land Use Diversity Index, 2016	SACOG land use diversity index	Reduce VMT	is in an area with a higher index value (max value = 1)
Natural Resources, 2016	Forest and agricultural land	Promote Economic Prosperity; Preserve Natural Resources	is in an agricultural or forestland area that does not urbanize within 2020 MTP horizon
Accessibility layers	Count of destinations accessible from each block group within a given travel time for different modes	Economic Prosperity; Reduce VMT; Use Existing Resources	has more jobs, schools, and services accessible through it than its community type average
Average Speed (Slowest 4 Hours of the Day)	Average vehicle speed during the most congested 4 hours of a typical weekday in 2018	Reduce Congestion	is on a road with slower congested vehicle speeds, i.e. responds to an existing congestion need
Average Hours/Day in Congested Conditions	Number of hours on a typical weekday during which the actual travel speed is less than 60 percent of the free-flow speed	Reduce Congestion	is on a road that is congested during more hours of the day, i.e., responds to an existing congestion need
Reliability Ratio	Measures how consistent travel times are during indicated period. Higher number means segment is less reliable.	Reduce Congestion	is on a road with a higher reliability ratio, i.e., improves a road with poor travel time reliability

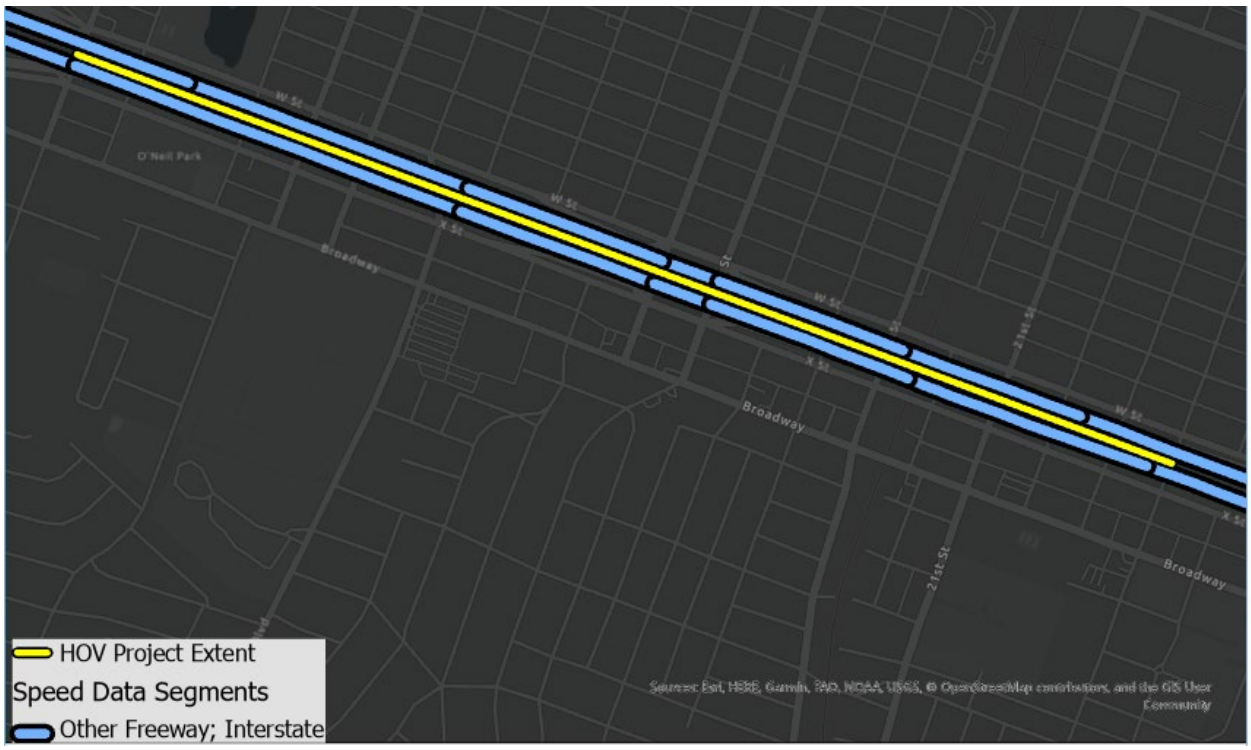
Appendix 3 Supplemental Indicator Methodology

Conflating NPMRDS Speed Data to Project Lines

As Figure 4 shows, the NPMRDS traffic speed data are provided on segments, called TMCs (traffic message channels) whose end points generally will not line up with a project's extents. Some shorter projects will be contained entirely within a TMC, but in most cases a project will span multiple TMCs. To reconcile these geometry differences, the PPA tool does the following:

1. Identify which TMCs overlap the project extent, represented by the blue segments in Figure 4

Figure 1 TMC Lines Vs. Sample Project Line



2. For each direction of the project (e.g. east and west), the tool breaks up the project line into pieces whose extents either match up with the TMCs or are contained within a TMC. If a project line is short and within a single TMC, the project line is not split up. This splitting allows a GIS spatial join to occur, in which each TMC's data gets copied over to the piece of the project line that overlaps it. Figure 5 shows the result of this splitting and spatial join, with the westbound speed being copied over from the blue project line onto the corresponding project piece, and the distance representing the length of that project piece.

Figure 2 Project Line Split to Match TMC Segments with TMC Data Joined to Segments

3. After this splitting and spatial joining process, each project piece has the following data:
    a. Free-flow and congested speeds, from the TMC
    b. Level of travel time reliability (LOTTR) also from the TMC
    c. Length of the project piece, in miles

The next step is to aggregate these values into a single number that represents, for example, the average representative speed for the entire project extent, or its overall level of travel time reliability.

The tool calculates the project's average speeds (both the free-flow and congested speeds) through the following steps, which are summarized in the equation below

1. For each piece, get the inverse of its speed, or "hours per mile", and multiply this hours-per-mile rate by the piece's distance in miles. This returns the travel time, in hours, to traverse the piece.
2. Sum the results from step 1 for all pieces, which will give you the total travel time, in hours, to traverse the entire project segment.
3. Divide the total project length, in miles, by the total travel time, in hours, which returns the average project speed, in miles per hour.

$$S_P = \frac{\sum D_i}{\sum \left(\frac{1}{S_i}\right) * D_i}$$

Where:

- S_P = Average speed, in miles per hour, for entire project extent
- S_i = Speed, in miles per hour, of project piece i
- D_i = Distance, in miles, of project piece i

To calculate the average LOTTR, the tool takes a simpler distance-weighted average:

$$R_P = \frac{\sum R_i * D_i}{\sum D_i}$$

Where:

- R_P = Distance-weighted travel time reliability for entire project extent
- R_i = travel time reliability on project piece i
- D_i = Distance, in miles, of project piece i

Calculating Project-Level Accessibility

Accessibility data come from Sugar Access and are provided in census block geographies, which you can view in the map layers of the tool interface. Given that projects are lines, and most projects span multiple census blocks, the tool must get an "average" level of accessibility for the project line.

To calculate the average accessibility, the tool does the following, for each accessibility metric (e.g. number of schools accessible by walking, number of jobs accessible by biking, etc.):

1. Select all census blocks within 300 feet of the project line, or all census blocks that are within roughly half a physical, street block of the project line.
2. Get the average accessibility to destinations using one of the following methods:
    a. *If **no one** lives in lives in the census blocks within 300 feet of the project line*, the average accessibility for the project is the simple, unweighted average of the accessibility for the selected census blocks.
    b. *If **one or more households** lives in any of the census blocks within 300 feet of the project line,* the project's accessibility score is the population-weighted average accessibility of the census blocks, calculated using the formula below:

$$A_{dm} = \frac{\sum A_{idm} * P_i}{\sum P_i}$$

Where:

- A_{dm} = Population-weighted accessibility to destination type "d" using mode "m"
- A_{idm} = Accessibility to destination type "d" from census block "i" using mode "m"
- P_i = Population of census block "i"

The population-weighted accessibility gives a sense of how accessible something is for an average person living in a census block within 300 feet of the project line, e.g., if a PPA report says accessibility to schools in a 30-minute bicycle ride is 7.5, it means the average person living near the project line can access 7.5 schools within a 30-minute bicycle ride.

Accessibility for People Environmental Justice Areas

Within census blocks near the project line, designated Environmental Justice (EJ) areas may be concentrated within one part of the project, and therefore the average accessibility for the entire project may be different than the accessibility for the parts of the project that are within EJ areas. To account for this, the tool has a separate indicator, under the Social Equity performance outcome, for EJ-population weighted accessibility.

The formula to calculate EJ-population-weighted accessibility is essentially the same as the formula above used for all-project accessibility, except instead of population P_i representing the whole population, it only includes populations within EJ areas.

Complete Streets Index Methodology

The complete streets index (CSI) aims to evaluate a street's potential for being a "complete street" that provides a comfortable environment and effective means of mobility for users of all modes. The CSI formula, provided below, is based on the following assumptions:

The following factors *increase* the CSI:

- A higher density of school students, since students are more likely to walk to school, younger children are more vulnerable to safety risks posed by auto-oriented streets, and schools tend to generate large amounts of foot traffic on school days.
- More transit service, which results in more pedestrians since most transit trips include a walking trip to access the stop.
- Higher density of jobs and/or housing, which means a higher number of origins and destinations nearby and thus a higher potential for investments in bike and pedestrian infrastructure to shift short driving trips to being made by biking or walking
- Slower posted speed limits, since slower speeds reduce the incidence of fatal collisions and create a more comfortable biking and walking environment.

In contrast, once a project's posted speed limit rises above 40mph, higher speeds will *decrease* a project's CSI. The policy assumption behind this is that high-speed roads are inherently less compatible with having non-auto modes nearby or sharing the same space due to a less comfortable walking/biking environment and higher risk of fatal collisions at high speeds.

$$CSI = (D_S + D_T + D_J + D_D) * (1 - (S_P - S_T) * P)$$

Where:

- CSI = Complete Street Index
- D_S = students per acre (at school location, not home location)
- D_T = transit vehicle stops per acre per day
- D_J = jobs per acre
- D_D = dwelling units per acre
- S_P = Posted speed limit
- S_T = Threshold speed at which the speed penalty factor begins affecting the index value. For PPA2 this is 40mph.
- P = Speed penalty factor, set to 0.04 for PPA2

Update for 2022 tool: The CSI is now a 0-100 score, normalized to the segment of street with the highest CSI in the region. I.e., the "most complete" street in the region gets a score of 100, while projects' scores are relative to 100.

The equation below shows how a project's final, normalized CSI is computed:

$$C_P = \frac{CSI_P}{CSI_R} * 100$$

Where:

- C_P = normalized (0-100) complete street score for the project
- CSI_P = raw, non-normalized CSI value for project
- CSI_R = raw, non-normalized CSI value for highest-scoring street in the region

SACOG Land Use Diversity Index

The land use diversity index measures an area's ratio of households compared to neighborhood amenities including K-12 enrollment, park acreage, and employment in the retail, service and food sectors, which are presented in the "land use factor" column of Table 1. A score of 1 indicates an 'ideal' ratio of households to amenities that people use on a daily basis like shopping, restaurants, schools, etc. Areas with a mix of land uses increase the likelihood that vehicle trips are shorter per capita and can also be served by active transportation modes. The land use diversity uses a buffer of 1 mile, instead of the shorter 0.5 mile buffer used in other buffer metrics.

The "ideal" ratio of households to amenities is based on the ratio of households to amenities for the entire SACOG region, shown in the "regional ratio" column of Table 1. The assumption is that if the ratio of households to amenities within a one-mile buffer of a project matched that of the region as a whole, then those households would live within an easily walkable or bikeable distance to those amenities and therefore drive less to access them, or at least drive a shorter distance. Conversely, it also means that those amenities' users are more likely to access the amenities by either walking, biking, or driving a shorter distance.

The "weight" column captures which, in professional judgement, are the land use factors that have the most potential to reduce trip lengths if people live near them. For example, people will tend to go to the schools and retail stores closest to their homes, so if they have schools and retail within an easily bikeable or walkable distance from their homes, they are likely to patronize those facilities and thus be more likely to walk, bike, or at least have a shorter driving distance. Conversely, jobs are given a relatively low weight because people have far less choice over where they work than where they shop and are not as likely to choose a job just because it's the closest to their homes.

Table 2 – Land Use Diversity Index input factors

Land Use Factor	Regional ratio (hh/factor)	Weight
K-12 School Enrollment	0.39	0.2
Total Jobs	1.09	0.05
Retail Jobs	0.15	0.4
Service Jobs	0.13	0.1
Food/Restaurant Jobs	0.10	0.2

Acres of Parks	0.27	0.05

The steps to calculate the land use diversity index for a project are the following:

1. From parcel-level data within one mile of the project line, get the total number of households and total numbers for each of the land use factors listed in Table 1
2. For each land use factor, calculate the ratio of households to that factor (e.g. households per job, households per k-12 student, etc.)
3. For each of these ratios:
    a. If the ratio value is less than the regional factor, divide the ratio value by the regional factor. If the ratio value is greater than or equal to the regional factor value, divide the regional factor value by the ratio.
    b. Example: if regionally there are 0.39 households per student but the project has 0.24 households per student, divide 0.24/0.39; if the project had 0.56 households per student, divide 0.39/0.56
    c. The resulting number for each factor is called the "balance ratio", i.e., how well the project's ratio compares to the ideal, regional ratio.
4. Multiply each of the balance ratios by the weights specified in Table 1. The result from each multiplication is the "weighted balance ratio".
5. Sum up the weighted balance ratios. This is the land use diversity index value.

An important aspect of the land use diversity index is that it works both ways, i.e., a project that has mostly homes around it and few nearby amenities will score as low as a project that has many jobs and/or services around it but few households. In both of these scenarios, the land use mix implies that there are not many households living near destinations the people use on a regular basis, and therefore the people or facilities occupying the land will generate more and longer driving trips due to greater travel distances.