

ITEM 14

MEETING DATE: January 28, 2022

TITLE: Review of Connector Project Benefit-Cost Analysis prepared by Economic Planning Systems, Inc.

PREPARED BY: Derek Minnema

RECOMMENDATION

Review this draft report and provide input as desired.

BACKGROUND

A Benefit-Cost Analysis (“BCA”) is a standard process for identifying, quantifying, and comparing expected benefits and costs of a potential infrastructure project.

The 34-mile Connector project BCA was prepared by Economic & Planning Systems, Inc. (“EPS”), a full-service economic consulting firm with more than 30 years of experience in the fields of land use economics, municipal finance, and real estate market analysis, among others.

This BCA was completed to the standards as set forth by the US Department of Transportation (“USDOT”) as described in the 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs (BCA Guidance).

EXECUTIVE SUMMARY

EPS has shared with staff that the 34-mile Connector project demonstrates some of the most significant benefits of a transportation project that they have worked on.

The BCA finds a benefit-to-cost ratio of at least **2.81:1** at an annual discount factor of 7 percent, as recommended by OMB Circular A-94. Depending on the discount factor applied to the future stream of benefits and costs, this ratio could significantly increase; for example, **this ratio rises to 3.94:1** at a discount rate of 3 percent.

The 34-mile project reduces greenhouse gases, pollutant emissions, vehicle miles traveled, and regional congestion.

Development of the 34-mile project will dramatically improve roadway conditions and safety, reducing vehicle crashes and improving access and response times for emergency response services.

Additionally, the multi-modal project will create access to bicycle facilities that may induce new previously sedentary users to exercise. The BCA estimates the monetized value of improved journey quality benefits. As defined by the California Department of Transportation, journey quality benefits are the perceived benefit due to an enhanced quality of the trip for pedestrians and cyclists that arise from a greater feeling of safety, comfort, aesthetics, and other types of improvements.

Completing the project will support the economic vitality of Sacramento and El Dorado Counties and the surrounding region.

The project results in an overall positive benefit, as defined in the BCA Guidance. The project supports each of the five long-term outcomes typically addressed by benefit-cost analyses, as required for many USDOT grant applications: economic competitiveness, state of good repair, safety, quality of life, and environmental sustainability.

REVIEW OF PROJECT BENEFITS

Total project benefits calculate to **\$1,685,849,375**. Using the mandated 7 percent discount factor to determine Net Present Value, the benefit is \$590,642,380.

- Travel Time Savings - Existing Users

The new roadway will facilitate improved traffic flow and more direct traffic routes, reducing Vehicle Hours Traveled (VHT) and travel time estimates. Existing users are defined in this BCA as users who would continue to use the existing roadway absent any improvements.

- Travel Time Savings - New Users (*Discounted 50%*)

Reductions for new users are estimated by isolating only the growth in average daily trips related to users who would not be willing to use the existing roadway under current conditions, i.e. the difference in Average Daily Trips (ADT) from the No Build Scenario to the Build Scenario. According to the BCA Guidance, the time savings for new users is equal to one-half of the value for existing users.

Note: Travel Time Savings is 250 travel days per year (excluding weekends and holidays).

- Reduced Freight Truck Miles Traveled

Under current conditions, existing quarries in the market area are not operating at peak efficiency because of transportation constraints and therefore cannot meet demand for aggregate in the market area. To meet existing demand, aggregate is being transported to the market area from quarries located in the Cities of Woodland and Marysville in Yolo and Yuba Counties, respectively. These facilities are considered to be the next best alternative for delivery of aggregate to the market area. The project will allow for additional movement of aggregate from local quarries throughout the region.

- Avoided Rehabilitation Costs

The existing roadway was constructed more than 60 years ago and is well beyond its useful life. The roadway has failing pavement with a current pavement condition index of below 60, based on the County of Sacramento Pavement Condition Report, completed in 2019. Under current conditions, it is anticipated an ongoing investment of \$39 per square yard would be required to maintain the current roadway condition. Because of budgetary constraints, Sacramento County is unable to perform the required maintenance, and the condition of the roadway continues to deteriorate.

- Safety Benefits

The existing geometrics of roadway through the Project area are primarily a 2-lane, undivided, unlit, rural roadway on rolling terrain, with a non-engineered alignment following natural contours. The corridor has minimal to no shoulders, steep roadside ditches, and non-standard clear recovery zones caused by the proximity of obstructions such as trees, utility poles, and steep side slopes. The result of these conditions is an alignment consisting of short vertical curves, creating unsafe driving conditions because of limited decision and stopping sight distances and inadequate design speeds.

An estimate of the reduction in fatalities, injury, and property damage incidents along the project from the No Build Scenario to the Build Scenario is determined using the California Life-Cycle Benefit/Cost Analysis Model.

- Cyclist and Pedestrian Benefits

The project will create access to bicycle facilities that may induce new users that were previously sedentary to exercise. It is well documented that increased physical activity has many health benefits, while inactivity results in higher medical and related costs.

- Reduced Vehicle Emissions: Auto

As the project results in a diversion of traffic from congested roadways elsewhere in the Sacramento Region, the project is anticipated to result in a net decrease in most harmful vehicle emissions. Calculation of the change in emissions in metric tons from the No Build Scenario to the Build Scenario is estimated using the California Life-Cycle Benefit/Cost Analysis Model.

- Reduced Vehicle Emissions: Cyclists

In addition to the decrease in emissions resulting from improved travel speeds and diversion from congested highways, the project includes a protected bike path, allowing for commuters to cycle to work in lieu of taking an automobile. The increase in commuter cyclists will result in a decrease in emissions as estimated by the California Active Transportation Benefit/Cost Analysis Model.

SUMMARY

The benefit-cost ratio achieved in the analysis is significantly greater than one, even in the absence of potential additional calculations listed above, which are anticipated to increase the total net benefits of the Project.

In many ways, the BCA Guidance results in a conservative analysis of benefits. Where appropriate, EPS included a discussion of potential ranges of benefits for specific benefit categories beyond the USDOT-approved calculations.

ATTACHMENTS

- a. Draft Benefit-Cost Analysis, dated January 10, 2022



TECHNICAL MEMORANDUM

To: Capital Southeast Connector Joint Powers Authority
From: David Zehnder and Sean Fisher
Subject: Capital Southeast Connector Benefit-Cost Analysis;
EPS #212076
Date: January 10, 2022

This memorandum provides the Benefit-Cost Analysis (BCA) of the Capital Southeast Connector Project (Project or Connector), an innovative, smart corridor, 34-mile expressway. This BCA has been completed at the request of the Capital Southeast Connector Joint Powers Authority (JPA).

This analysis was prepared by Economic & Planning Systems, Inc. (EPS), a full-service economic consulting firm, with more than 30 years of experience in the fields of land use economics, municipal finance, and real estate market analysis, among others. This analysis was informed by information provided by the JPA, Mark Thomas & Company (Mark Thomas), and Kimley Horn.

This BCA has been completed to the standards as set forth by the US Department of Transportation (USDOT) as described in the 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs (BCA Guidance). In many ways, the BCA Guidance results in a conservative analysis of benefits. Where appropriate, EPS has included in this BCA a discussion of potential ranges of benefits for specific benefit categories beyond the USDOT-approved calculations.

Introduction and Executive Summary

The Project is a 34-mile expressway, connecting Interstate 5 with Highway 50, resulting in reduced regional congestion and vehicle miles traveled (VMT) and enhanced goods movement, and the Connector supports the regionally significant rural economy. The Project will convert the existing 2-lane rural road into a modern 4-lane expressway. The existing roadway requires significant improvement and has several noted safety concerns. Development of the Project will improve roadway conditions and safety, reducing

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vehicle crashes and improving access and response times for emergency response services.

Project development will improve roadway capacity and freight throughput, enhance traffic operations and safety, improve climate change adaptability and resilience, enhance transportation equity, and benefit the regional and national economy.

No Project—Baseline Conditions

Under the No Project (also referred to as the No Build) alternative, the Project will not develop, including no further development of other roadway segments of the Connector beyond those already completed. It is assumed the existing roadway will remain under current conditions and no other alternative roadways are developed or other roadway improvements or replacement projects occur.

Proposed Project

The Project will widen 34 miles of roadway from a narrow, 2-lane, rural or suburban road into a divided 4-lane expressway. The Project includes the construction of 4 continuous lanes from Interstate 5 and State Route 99 in Elk Grove to the new Silva Valley interchange at Highway 50 in El Dorado Hills, expanded at-grade intersections at all major access points, and a continuous path for pedestrians, bicyclists, and equestrians. Because of the condition of the existing roadway, development of the Project will greatly improve roadway capacity, allowing for improved freight movement through the region and additional economic development in the surrounding areas.

The existing roadway was constructed more than 60 years ago and is well beyond its useful life. The majority of the roadway was designed to service rural agricultural land use and not serve as a regional freight route. The Project will provide necessary improvements to the roadway, allowing for increased commercial and passenger vehicle and freight traffic and safer operating conditions. In addition to regional freight and economic benefits, the Project will enhance the quality of life of the region by providing access to a safe commuter and recreational bike path and a multimodal transit station.

Under the Project (also referred to as the Build) alternative, the entire Connector will develop.

Findings

Project Effect on Long-Term Outcomes

The Project is considered necessary to eliminate existing geometric deficiencies, enhance vehicle safety, provide cycle and multimodal transit access, and create additional roadway capacity, improving freight operations and throughput along the corridor. Completion of the Project will support the economic vitality of Sacramento and El Dorado Counties (Counties) and the surrounding region. The Project results in an overall positive benefit, as defined in the BCA Guidance. The Project supports each of the 5 long-term outcomes typically addressed by benefit-cost analyses, as required for many USDOT

grant applications: economic competitiveness, state of good repair, safety, quality of life, and environmental sustainability. One of the purposes for completion of this BCA is to provide a study that can be adapted for individual segments as the JPA seeks future grant funding for the development of individual segments of the Project.

The BCA attempts to quantify as many of the economic benefits and costs associated with the Project as is feasible, given available data, information resources, and time. The BCA finds a benefit-to-cost ratio of at least 2.81:1 at a discount factor of 7 percent, as recommended by OMB Circular A-94. Depending on the discount factor applied to the future stream of benefits and costs, this ratio could significantly increase, for example, this ratio rises to 3.94:1 at a discount rate of 3 percent.

As is described further in the section below, it is likely the analysis is conservative in its approach, and further monetization of benefits and costs would reveal a higher benefit-to-cost ratio.

Sensitivity of Assumptions

The findings of the BCA are dependent on key assumptions that drive the model. Changing these assumptions will affect the estimates of total costs and total benefits. The model uses assumptions that are as rigorous and specific to local conditions as possible. Sensitivity analyses could be performed by changing many of the assumptions used in the model; however, the model was built using the most conservative of assumptions, and it is assumed the BCA provides an estimate of the minimum benefit-cost ratio that could be achieved.

Benefit-Cost Analysis

Development of the Project is anticipated to be completed in segments, with construction from 2026 through 2033. Costs and benefits are estimated for 20 years of Project operations, beginning in 2026 and ending in 2047. The proposed Project analysis results are presented in **Table 1** by benefit and cost category. Benefits and costs are shown undiscounted and discounted using both 7 percent and 3 percent year-end discount factors.

The BCA is intentionally limited and inherently conservative because of these factors:

- Benefits resulting from Reduced Freight Truck Miles Traveled are included based on the increased freight movement made possible with development of the Project. Reduction in VMT is estimated based on the distance traveled to reach the edge of the market area served by the quarry, located just outside the Project area, by trucks originating from the next best quarry alternatives, located in the nearby counties of Yolo and Yuba. The actual distance saved could be much greater depending on where trucks travel in the market area. To be conservative, this analysis further reduces the vehicle miles saved by a factor of 50 percent to account for aggregate needs located near the market area boundaries. As the majority of demand for the aggregate shipments is located near the Project area and further east, this adjustment most

likely results in a vehicle mile reduction below what will be experienced, resulting in a conservative benefit estimate. In addition, quarry benefits estimated in this BCA reflect the increased activity of existing quarries only. It is anticipated that development of the Project will facilitate additional quarries to develop. As the Build alternative does not reflect additional development beyond the Project, additional quarries are not assumed to develop.

- The BCA includes only avoided maintenance costs related to a one-time repair/replacement of the existing roadway. It is assumed that following this repair, additional maintenance would be required approximately every 7 years. As this maintenance is not being performed on the current roadway, no additional avoided rehabilitation costs are included.
- In addition to the roadway improvements, the Project is envisioned to contain a multimodal transit center, improving access to alternative transportation methods for nearby communities, including underserved communities. As benefits related to the multimodal transit center rely in part on future residential development surrounding the Project not reflected in the Build scenario, no transit center benefits are estimated in the analysis.
- Similar to the freight benefits estimated in this BCA, there is the existing Keifer Landfill, located adjacent to the Project. Access to Keifer Landfill is constrained by roadway access and available freight routes. Development of the Project will improve access to the landfill, allowing for increased waste transportation options. Estimated benefits of increased landfill activity could be estimated based on decreased VMT by waste management vehicles, similar to the estimate of increased freight activity included in this BCA. As specific data pertaining to waste management truck traffic patterns and the alternative landfill options are not available at this time, no landfill benefits are estimated.
- All non-fatal crash incidents eliminated through development of the Project resulting in personal injury are assumed to be moderate in nature, the lowest level of injury-causing incident included in the BCA Guidance. In reality, a portion of these incidents would be classified as severe, but as there is no available information as to the categorization of incidents reduced, this analysis conservatively assumes monetized benefits equivalent to moderate incidents only.
- The existing roadway facility is prone to flooding on bad weather days and as such traffic is frequently diverted to other roadways or is required to move at significantly lower speeds. The Project will greatly reduce flooding issues along the segment, potentially resulting in additional time-saving benefits. As detailed data related to required traffic diversions are not available at this time, and to avoid double counting of any reduced speed-related benefits that may be included in travel time savings benefits captured elsewhere in the BCA, no flood resiliency benefits are included in this analysis beyond any captured by the time travel savings benefits estimated for existing users.

- The grassland surrounding the Project is subject to frequent grass fires. In recent years, several significant fires have occurred in the area immediately adjacent to the Project, and more frequent fires are expected because of climate change. Completion of the Project will result in faster evacuation times and easier access for emergency response vehicles. These may result in significant benefits pertaining to avoided personal and property damage. Because of uncertainty inherent to fire data, no fire resiliency benefits are estimated in this analysis.

The benefit-cost ratio achieved in the analysis is significantly greater than one, even in the absence of potential additional calculations listed above, which are anticipated to increase the total net benefits of the Project. It should be noted that many data restrictions could be resolved with additional time to conduct market research needed to support the previously discussed items.

The sections below discuss the methodology used to estimate benefits and costs associated with the Project. All costs and benefits are reported in 2021 dollars in this analysis unless otherwise stated.

Key Assumptions

The demand forecast used to calculate individual benefit categories varies based on the affected population and is detailed in the discussion of proposed Project benefits below. Listed below is a brief summary of key assumptions used to calculate multiple Project benefits:

- **Average Daily Trips.** Average Daily Trips (ADT) estimates are the demand factor used to estimate changes to VMT, vehicle hours traveled (VHT), and associated benefits. ADT estimates are based on information included in the Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, dated October 13, 2021. The TDM update reflected ADT values across all segments, with a 2016 baseline through 2040. This analysis assumes linear growth in ADT through the Project development period. Daily trips are the average estimated daily trips of all roadway segments.
- **VMT.** Safety and emissions benefits are estimated using the estimated reductions in VMT resulting from Project development. These data were estimated by applying the ADT estimates for each year of the analysis to the full segment length of 34 miles. VMT estimates for the No Build Scenario are assumed to relate to existing users, and new user VMT is the estimated growth from the No Build Scenario to the Build Scenario.
- **VHT.** Travel Time Savings benefits are estimated based on the reductions in VHT. These data were calculated by applying the estimated VMT for new and existing users to average travel speeds for the existing roadway under the No Build Scenario and the Project under the Build Scenario. Average travel speed was estimated based on data provided by Kimley Horn in the October 2021 TDM update.

The sections to follow offer a detailed accounting of the methodological approach to calculating the different benefits generated by the proposed Project as compared to a No Project alternative.

Proposed Project Benefits

Summarized in **Table 1**, this BCA evaluates a variety of benefits generated by the proposed Project. Each category of Project benefit is described below, with benefits reported reflecting the incremental benefit received over the No Build baseline alternative. All numbers reported are in 2021 dollars unless otherwise specified.

Travel Time Savings

If the Project is developed, the new roadway will facilitate improved traffic flow and more direct traffic routes, resulting in reduced VHT and travel time estimates, despite increased daily trips and higher VMT. The Travel Time Savings benefit was estimated using the following data:

- VHT reduction data for existing and new users.
- Average vehicle occupancy factors and hourly travel time values from the BCA Guidance.
- US gross domestic product (GDP) price deflators, as provided by the Bureau of Economic Analysis, current as of July 2021.

Existing Users

Existing users are defined in this BCA as users who would continue to use the existing roadway absent any improvements. VMT and VHT estimates for existing users are based on the ADT estimates assuming a No Build Scenario as reported in the TDM.

Travel Time Savings are estimated beginning with the first year of operations, 2026, through the end of the BCA analysis, 2047, representing 20 years following buildout of the Project. The estimated VHT reduction resulting from the following scenarios are used in calculating the Travel Time Savings:

- **No Build.** Conditions assuming the Project is not built.
- **Build.** Conditions assuming the Project is built, and the trip length estimates remain the same as for the No Build Scenario. Only the roadway improvements and associated average speed estimates change from the No Build Scenario.

This approach focuses on the VHT reduction benefitting existing and future roadway users impacted by development of the Project based on ADT estimates provided in the TDM as described in the previous section. Estimated percentages of passenger and commercial vehicles under the Build and No Build Scenarios were provided in the TDM. These percentages were applied to the VHT estimates for both existing and new users to estimate appropriate Travel Time Savings benefits for each user type.

Daily VHT estimates for passenger and commercial vehicles are used to calculate the reduction in daily VHT for the Build Scenario as compared to the No Build Scenario for each type of vehicle. The VHT reduction is based on a current average speed of 37 miles per hour and a Project speed following Project construction of 51 miles per hour applied to the total daily VMT. The annual travel time in person-hours saved is calculated for passenger vehicles and for commercial vehicles as follows:

- Daily VHT reduction for years 2026 through 2047.
- Annual VHT reduction = Daily VHT reduction * 250 travel days per year (excluding weekends and holidays).
- Annual person VHT reduction = Annual VHT reduction * Average vehicle occupancy.

For each type of vehicle, the BCA Guidance provides a time savings value per person-hour that is applied to the annual person-hours saved to estimate the average annual Travel Time Savings values.

The total value of time saved to existing users is estimated at \$1.2 billion in undiscounted 2021 dollars and \$428.3 million when discounted using a 7 percent discount factor.

New Users

Daily VHT reductions for new users are estimated using the same methodology as described in the above section but isolating only the growth in ADT related to users who would not be willing to use the existing roadway under current conditions, defined as the difference in ADT from the No Build Scenario to the Build Scenario. Similar to existing users, the annual travel time in person-hours saved is calculated for passenger vehicles and commercial vehicles as follows:

- Daily VHT reduction for years 2026 through 2045.
- Annual VHT reduction = Daily VHT reduction * 250 travel days per year (excluding weekends and holidays).
- Annual person VHT reduction = Annual VHT reduction * Average vehicle occupancy.

For each type of vehicle, the BCA Guidance provides a time savings value per person-hour that is applied to the annual person-hours saved to estimate the average annual Travel Time Savings values. According to the BCA Guidance, the time savings per value figure for new users is equal to one-half of the value for existing users.

The total value of time saved to new users is estimated at \$204.3 million in undiscounted 2021 dollars and \$83.1 million when discounted using a 7 percent discount factor.

Table 2 through **Table 5** detail the Travel Time Savings and annual VHT reduction calculations for existing and new users.

Value of Time Saving Sensitivity

While the BCA is based on the value of time saved assumptions as dictated by the BCA Guidance, more region-specific assumptions are estimated by the California Department of Transportation. These assumptions are slightly higher than those included in the BCA Guidance and result in an increased Travel Time Savings benefit to new and existing users of \$1.46 billion in undiscounted 2021 dollars, an increase of \$77 million, and \$540.1 million when discounted using a 7 percent discount factor.

Vehicle Operations Cost Savings of Freight Traffic

The Project will allow for additional movement of aggregate from local quarries throughout the region. Based on estimates included in the East Sacramento Region Aggregate Mining Truck Management Plan Final Technical Report (Freight Report), prepared by DKS Associates Transportation Solutions, dated December 2011, existing quarry facilities located near the Project are producing below optimal efficiency and are not meeting aggregate demands within the regional market area. The market area, as defined in the Freight Report, includes Sacramento County and a portion of El Dorado County terminating east of Pollock Pines.

Under current conditions, the existing quarry in the market area is not operating at peak efficiency because of transportation constraints and cannot meet demand for aggregate in the market area. To meet existing aggregate demand, aggregate is being transported to the market area from quarries located in the Cities of Woodland and Marysville in Yolo and Yuba Counties, respectively. Approximately one-half of all demand not met by the existing quarry in the market area is being provided from each outside quarry. These facilities are considered to be the next best alternative for delivery of aggregate to the market area.

The existing roadway was not designed for freight activity and is not in a state of good repair. As such, development of the Project will result in increased roadway capacity for existing facilities, allowing for additional production, meeting demand needs in the market area. Trucks providing aggregate would experience a significant reduction in trip lengths as they will originate from the facility located in the area as opposed to those outside.

Based on information included in the Freight Report, development of the Project would allow for at least 419,000 tons of aggregate to travel through the Project. For estimation of benefits, the BCA considers the trucks containing this aggregate to be new users, and any associated benefits are discounted by 50 percent as dictated by the BCA Guidance, resulting in a conservative estimate of benefits.

To arrive at an estimate of the growth in annual trips, the BCA applies a factor of 5.8 tons of aggregate per truck to the anticipated annual output, based on information provided in the Freight Report. Trip length reduction has been estimated based on the average distances traveled by trucks from existing facilities in Yolo and Yuba Counties to enter the market area served by the Project. On average, a truck coming from a facility outside of the market area travels approximately 21 miles to access the market area. Although the majority of demand for aggregate is located within the area immediately surrounding the

Project, an additional adjustment of 50 percent was applied to the average miles traveled to enter the market area to account for any demand needed near the market area boundary to arrive at the number of miles saved per trip.

Using methodologies included in the BCA Guidance, the benefit of travel time reduction is estimated based on a vehicle cost savings factor for commercial vehicles applied to the total annual vehicle mile reduction.

Table 6 details the calculation of freight vehicle mile reduction and the associated cost savings calculations.

The total vehicle operations cost saving is estimated at \$7.9 million in undiscounted 2021 dollars and \$3.0 million when discounted using a 7 percent discount factor.

Avoided Rehabilitation Costs

The existing roadway was constructed more than 60 years ago and is well beyond its useful life. The roadway has failing pavement with a current pavement condition index of below 60, based on the County of Sacramento Pavement Condition Report, completed in 2019. Under current conditions, it is anticipated an ongoing investment of \$39 per square yard would be required to maintain the current roadway condition. Because of budgetary constraints, Sacramento County is unable to perform the required maintenance, and the condition of the roadway continues to deteriorate. As a result, it was estimated at the time of completion of the Pavement Condition Report, that in 5 to 10 years, Sacramento County would be required to perform deferred maintenance/replacement of the existing roadway at an increased one-time cost of \$54 per square yard.

At this point, the roadway would require additional maintenance to maintain a state of good repair, but the actual performance of any additional maintenance is uncertain at this time. To remain conservative, the BCA assumes the one-time cost will be incurred only when Sacramento County has no further ability to defer maintenance, and no further maintenance to the existing road is assumed following the initial remediation. Estimates of the benefits related to avoided rehabilitation costs are computed in **Table 7**.

At the end of the analysis period, the estimated avoided rehabilitation cost-benefit is \$25.9 million in undiscounted 2021 dollars and \$15.0 million when applying a 7 percent discount factor.

Residual Value of Improvements

Because the Project improvements are expected to have a useful life beyond the analysis timeframe, the residual value of the improvements is included as a Project benefit, computed in **Table 8**. The value of the Project improvements is apportioned over the identified useful life using a straight-line depreciation approach. The residual value of the improvements is calculated by subtracting accumulated depreciation at the end of the analysis period from the original Project cost.

At the end of the analysis period, the estimated residual value of the improvements is \$189.0 million in undiscounted 2021 dollars and \$32.5 million when applying a 7 percent discount factor.

Improved Safety Benefit

The existing geometrics of roadway through the Project area are primarily a 2-lane, undivided, unlit, rural roadway on rolling terrain, with a non-engineered alignment following natural contours. The corridor has minimal to no shoulders, steep roadside ditches, and non-standard clear recovery zones caused by the proximity of obstructions such as trees, utility poles, and steep side slopes. The result of these conditions is an alignment consisting of short vertical curves, creating unsafe driving conditions because of limited decision and stopping sight distances and inadequate design speeds.

An estimate of the reduction in fatalities, injury, and property damage incidents along the Project from the No Build Scenario to the Build Scenario is determined using the California Life-Cycle Benefit/Cost Analysis Model, as provided by the California Department of Transportation (CAL-B/C Sketch) Version 7.2 Corridor.

Using the methodology as defined in the BCA Guidance, the annual incident reduction was multiplied by the monetized unit value for a MAIS-level fatal (Not Survivable) incident for fatalities, MAIS-level 2 (Moderate) for incidents resulting in injury, and property damage-only events benefit for property damage incidents.

The total safety benefit is estimated at \$43.5 million in undiscounted 2021 dollars and \$17.0 million when discounted using a 7 percent discount factor. **Table 9** details the safety benefit calculations.

Cyclist Benefits

The Project will create access to bicycle facilities that may induce new users that were previously sedentary to exercise. It is well documented that increased physical activity has many health benefits, while inactivity results in higher medical and related costs. The East Carolina University College of Health and Human Performance developed an inactivity calculator to estimate the cost of inactivity. Physical inactivity contributes to injuries and illnesses and leads to higher medical and lost productivity costs. A document entitled "How the Physical Inactivity Cost Calculator Was Developed" was prepared by Active Living Leadership at San Diego State University to document how the inactivity calculator estimates costs. The steps in this document were followed to estimate the inactivity costs per person that will be avoided if the Project is built.

This cost per person serves as the benefit value to apply to the annual number of people to receive the benefit. In this analysis, persons receiving this benefit are defined as new cyclists who have new access to safe, reliable bike paths included in the Project, which will allow for access to existing regional bike paths where there are little to no safe connecting routes, therefore inducing these new users to exercise.

As shown in **Table 11**, the health savings costs consist of medical and lost productivity costs. The medical cost savings per person are increased annually by the difference in the

average medical Consumer Price Index for all Urban Consumers (CPI-U) from 2000 to 2021 and the average general CPI-U for the same time period. This annual increase is estimated in **Table 11** and acknowledges that medical costs typically outstrip the rate of inflation.

In addition to the avoided physical inactivity benefits to cyclists, the BCA estimates the monetized value of improved journey quality benefits. Journey quality benefits, as defined by the California Department of Transportation, are the perceived benefit due to an enhanced quality of the trip for pedestrians and cyclists that arise from a greater feeling of safety, comfort, aesthetics, and other types of improvements. Quality of journey benefits are estimated using the California Department of Transportation California Active Transportation Benefit/Cost Analysis Model Version 7.2.

Estimates of the number of both recreational and commuter cyclists anticipated to use the new facilities are calculated based on the California Department of Transportation California Active Transportation Benefit/Cost Analysis Model Version 7.2.

The annual health and quality benefits for the new groups of people described above are estimated by multiplying the number of new people receiving health benefits each year by the calculated benefit value per person and then discounting by 50 percent, pursuant to the BCA Guidance and to conservatively estimate new cyclists. The benefit value per cyclist is based on the avoided medical and lost productivity costs per person adjusted for inflation in the Inactivity Cost Calculator document discussed above, as well as the estimated journey quality monetized benefit.

Table 10 provides the calculation of the annual cyclist benefits, as described above.

The total avoided physical inactivity cost and journey quality benefits are estimated at \$20.6 million in undiscounted 2021 dollars and \$5.9 million when discounted using a 7 percent discount factor.

Reduction in Vehicle Emissions

As the Project results in a diversion of traffic from congested roadways elsewhere in the Sacramento Region, the Project is anticipated to result in a net decrease in most harmful vehicle emissions. Calculation of the change in emissions in metric tons from the No Build Scenario to the Build Scenario is estimated using the California Life-Cycle Benefit/Cost Analysis Model (CAL-B/C Sketch) Version 7.2 Corridor, as provided by the California Department of Transportation. Annual benefit per unit applied to the estimated annual change in metric tons of emissions is based on monetized benefit factors included in the BCA Guidance. To the extent that any emissions are anticipated to increase because of development of the Project, a negative benefit is estimated. The benefit related to the growth of annual emissions is computed in **Table 12**.

In addition to the decrease in emissions resulting from improved travel speeds and diversion from congested highways, the Project includes a protected bike path, allowing for commuters to cycle to work in lieu of taking an automobile. The increase in commuter

cyclists will result in a decrease in emissions as estimated by the California Active Transportation Benefit/Cost Analysis Model Version 7.2 and shown in **Table 13**.

The total value of the benefit related to vehicle emissions is estimated at \$16.0 million in undiscounted 2021 dollars and \$5.9 million when discounted using a 7 percent discount factor for automobile users. The total value of the benefit related to reduced emissions is estimated at \$75,000 in undiscounted 2021 dollars and \$24,000 when discounted using a 7 percent discount factor for cyclists.

Proposed Project Costs

Project costs consist of the one-time construction costs of the Project and the ongoing operations and maintenance costs incurred to maintain the new roadway. As with the benefits of the Project, only costs that are particular to this Project (such that this Project demonstrates independent utility) are included in the BCA. **Table 14** summarizes the total construction costs for the Project, which are estimated to total approximately \$315 million in 2021 dollars.

Table 15 summarizes the anticipated operation and maintenance costs throughout the analysis period, based on the per-mile annual road maintenance cost factor calculated by the Counties. It is anticipated that the Project will require slurry seal maintenance every 7 years and a full overlay in Year 21. As this analysis encompasses the first 20 years of Project operations, slurry seal repair is assumed to happen twice during the BCA time period, and no overlay repair and maintenance is assumed.

The total estimated Project cost is \$343.7 million in undiscounted 2021 dollars and \$188.7 million when applying a 7 percent discount factor.

BCA Conclusions

Construction of the Project will generate benefits totaling \$1.69 billion in undiscounted 2021 dollars and \$590.6 million using a 7 percent discount factor. Total Project costs, inclusive of operations and maintenance, amount to approximately \$343.7 million in undiscounted 2021 dollars, and \$188.7 million using a 7 percent discount factor.

After applying the 7 percent discount factor to both Project benefits and costs, the Project generates a BCA ratio of 2.81:1. When applying the 3 percent discount factor, this ratio increases to 3.94:1. Because of the conservative nature of the benefits calculated in this analysis, it is anticipated that this ratio reflects the lower bounds of the achievable benefit-to-cost ratio and monetization of additional benefits would result in improved outcomes over this baseline.

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Table 1
Southeast Connector
Benefit Cost Analysis
Summary of VMT Related Benefits and Costs

Year	Project Year	PROJECT BENEFITS										PROJECT COSTS						
		Travel Time Savings - Existing Users	Travel Time Savings - New Users	Reduced Freight Truck Miles Traveled	Avoided Rehabilitation Costs	Residual Value of Improvements	Safety Benefits	Cyclist and Pedestrian Benefits	Reduced Vehicle Emissions: Auto	Reduced Vehicle Emissions: Cyclists	Total Project Benefits	Construction	Operations and Maintenance	Total Project Costs	Discounted at 7% Benefits	Discounted at 7% Costs	Discounted at 3% Benefits	Discounted at 3% Costs
Table Reference:		Table 2	Table 3	Table 6	Table 7	Table 8	Table 9	Table 10	Table 12	Table 13		Table 14	Table 15					
2021	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
2022	1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
2023	2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
2024	3	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
2025	4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
2026	5	\$41,380,539	\$7,973,263	\$358,102	\$0	\$0	\$2,133,723	\$48,650	\$327,348	\$513	\$52,222,137	\$24,000,000	\$0	\$24,000,000	\$37,233,662	\$17,111,668	\$45,047,274	\$20,702,611
2027	6	\$42,677,034	\$8,586,591	\$358,102	\$0	\$0	\$2,127,975	\$96,059	\$389,210	\$1,019	\$54,235,988	\$75,500,000	\$0	\$75,500,000	\$36,139,729	\$50,308,838	\$45,421,786	\$63,230,061
2028	7	\$43,973,529	\$9,199,918	\$358,102	\$0	\$0	\$2,111,469	\$183,879	\$462,032	\$1,524	\$56,290,453	\$31,500,000	\$0	\$31,500,000	\$35,054,865	\$19,616,617	\$45,769,290	\$25,612,383
2029	8	\$45,270,024	\$9,813,246	\$358,102	\$25,850,880	\$0	\$2,094,963	\$271,700	\$537,895	\$2,030	\$84,198,839	\$51,500,000	\$0	\$51,500,000	\$49,004,491	\$29,973,469	\$66,467,341	\$40,654,576
2030	9	\$46,566,520	\$10,426,574	\$358,102	\$0	\$0	\$2,078,457	\$359,520	\$616,798	\$2,535	\$60,408,506	\$69,500,000	\$0	\$69,500,000	\$32,858,225	\$37,803,395	\$46,298,090	\$53,265,963
2031	10	\$47,863,015	\$11,039,902	\$358,102	\$0	\$0	\$2,061,951	\$447,340	\$698,742	\$3,041	\$62,472,093	\$15,000,000	\$0	\$15,000,000	\$31,757,644	\$7,625,239	\$46,485,104	\$11,161,409
2032	11	\$49,159,510	\$11,653,230	\$358,102	\$0	\$0	\$2,045,445	\$535,161	\$783,727	\$1,998	\$64,537,173	\$24,000,000	\$0	\$24,000,000	\$30,661,146	\$11,402,227	\$46,623,027	\$17,338,111
2033	12	\$50,456,006	\$12,266,558	\$358,102	\$0	\$0	\$2,028,939	\$622,981	\$871,753	\$2,283	\$66,606,621	\$24,000,000	\$0	\$24,000,000	\$29,574,136	\$10,656,287	\$46,716,544	\$16,833,117
2034	13	\$51,752,501	\$12,879,886	\$358,102	\$0	\$0	\$2,012,434	\$710,801	\$503,987	\$2,568	\$68,220,278	\$0	\$0	\$0	\$28,308,990	\$0	\$46,454,690	\$0
2035	14	\$53,048,996	\$13,493,214	\$358,102	\$0	\$0	\$1,995,928	\$798,622	\$549,764	\$2,853	\$70,247,478	\$0	\$0	\$0	\$27,243,183	\$0	\$46,441,858	\$0
2036	15	\$54,345,491	\$14,106,542	\$358,102	\$0	\$0	\$1,979,422	\$886,442	\$596,653	\$3,138	\$72,275,789	\$0	\$0	\$0	\$26,196,072	\$0	\$46,391,079	\$0
2037	16	\$55,641,987	\$14,719,869	\$358,102	\$0	\$0	\$1,962,916	\$974,262	\$644,653	\$3,423	\$74,305,212	\$0	\$0	\$0	\$25,169,746	\$0	\$46,304,552	\$0
2038	17	\$56,938,482	\$15,333,197	\$358,102	\$0	\$0	\$1,946,410	\$1,062,083	\$693,765	\$3,708	\$76,335,747	\$0	\$0	\$0	\$24,165,942	\$0	\$46,184,382	\$0
2039	18	\$58,234,977	\$15,946,525	\$358,102	\$0	\$0	\$1,929,904	\$1,149,903	\$743,989	\$3,993	\$78,367,393	\$0	\$14,361,600	\$14,361,600	\$23,186,084	\$4,249,079	\$46,032,584	\$8,435,926
2040	19	\$55,641,987	\$2,456,819	\$358,102	\$0	\$0	\$1,913,398	\$1,237,724	\$795,324	\$4,277	\$62,407,631	\$0	\$0	\$0	\$17,256,230	\$0	\$35,590,200	\$0
2041	20	\$56,938,482	\$3,070,147	\$358,102	\$0	\$0	\$1,896,893	\$1,325,544	\$847,771	\$4,562	\$64,441,501	\$0	\$0	\$0	\$16,652,908	\$0	\$35,679,697	\$0
2042	21	\$58,234,977	\$3,683,475	\$358,102	\$0	\$0	\$1,880,387	\$1,413,364	\$901,330	\$4,847	\$66,476,482	\$0	\$0	\$0	\$16,054,940	\$0	\$35,734,385	\$0
2043	22	\$59,531,472	\$4,296,803	\$358,102	\$0	\$0	\$1,863,881	\$1,501,185	\$956,000	\$5,132	\$68,512,575	\$0	\$0	\$0	\$15,464,190	\$0	\$35,756,199	\$0
2044	23	\$60,827,968	\$4,910,131	\$358,102	\$0	\$0	\$1,847,375	\$1,589,005	\$949,304	\$5,417	\$70,487,302	\$0	\$0	\$0	\$14,869,077	\$0	\$35,715,334	\$0
2045	24	\$62,124,463	\$5,523,459	\$358,102	\$0	\$0	\$1,830,869	\$1,676,825	\$1,003,375	\$5,422	\$72,522,516	\$0	\$0	\$0	\$14,297,569	\$0	\$35,676,272	\$0
2046	25	\$63,420,958	\$6,136,787	\$358,102	\$0	\$0	\$1,814,363	\$1,811,195	\$1,058,533	\$5,439	\$74,605,377	\$0	\$14,361,600	\$14,361,600	\$0	\$0	\$35,631,944	\$6,859,180
2047	26	\$64,717,454	\$6,750,115	\$358,102	\$0	\$189,000,000	\$1,924,764	\$1,857,745	\$1,058,659	\$5,444	\$265,672,283	\$0	\$0	\$0	\$0	\$0	\$123,190,837	\$0
Total		\$1,178,746,371	\$204,266,252	\$7,878,234	\$25,850,880	\$189,000,000	\$43,481,866	\$20,559,991	\$15,990,613	\$75,167	\$1,685,849,375	\$315,000,000	\$28,723,200	\$343,723,200	\$531,148,831	\$188,746,820	\$1,039,612,469	\$264,093,336
Discounted Total (7% discount rate)		\$428,450,208	\$83,112,032	\$3,021,864	\$15,045,448	\$32,544,948	\$17,014,002	\$5,941,936	\$5,488,213	\$23,729	\$590,642,380	\$184,497,741	\$4,249,079	\$188,746,820				
Discounted Total (3% discount rate)		\$490,532,643	\$95,154,966	\$3,459,732	\$17,225,533	\$37,260,711	\$19,479,331	\$6,802,922	\$6,283,455	\$27,167	\$676,226,461	\$269,269,954	\$13,186,532	\$282,456,486				
Benefit to Cost Ratio																	2.81	3.94

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Source: EPS

Table 2
Southeast Connector
Benefit Cost Analysis
Annual Travel Time Savings - Existing Users

Year	Passenger Vehicles				Commercial Vehicles			
	Daily Vehicle Hour Reduction [1]	Annual Vehicle Hour Reduction	Total Annual Person Hours Saved	Monetized Value	Daily Vehicle Hour Reduction [1]	Annual Vehicle Hour Reduction	Total Annual Person Hours Saved	Monetized Value
Travel Days per Year [2]		250				250		
Vehicle Occupancy [3]			1.67				1.00	
Hourly Value per Person Hour [4]				\$ 18.13				\$ 31.20
2021	0	0	0	\$ 0	0	0	0	\$ 0
2022	0	0	0	\$ 0	0	0	0	\$ 0
2023	0	0	0	\$ 0	0	0	0	\$ 0
2024	0	0	0	\$ 0	0	0	0	\$ 0
2025	0	0	0	\$ 0	0	0	0	\$ 0
2026	5,075	1,268,670	2,118,679	\$ 38,411,682	381	95,169	95,169	\$ 2,968,857
2027	5,234	1,308,419	2,185,059	\$ 39,615,160	393	98,150	98,150	\$ 3,061,874
2028	5,393	1,348,168	2,251,440	\$ 40,818,637	405	101,132	101,132	\$ 3,154,892
2029	5,552	1,387,916	2,317,820	\$ 42,022,115	416	104,114	104,114	\$ 3,247,909
2030	5,711	1,427,665	2,384,201	\$ 43,225,593	428	107,095	107,095	\$ 3,340,926
2031	5,870	1,467,414	2,450,581	\$ 44,429,071	440	110,077	110,077	\$ 3,433,944
2032	6,029	1,507,163	2,516,961	\$ 45,632,549	452	113,059	113,059	\$ 3,526,961
2033	6,188	1,546,911	2,583,342	\$ 46,836,027	464	116,041	116,041	\$ 3,619,978
2034	6,347	1,586,660	2,649,722	\$ 48,039,505	476	119,022	119,022	\$ 3,712,996
2035	6,506	1,626,409	2,716,103	\$ 49,242,983	488	122,004	122,004	\$ 3,806,013
2036	6,665	1,666,158	2,782,483	\$ 50,446,461	500	124,986	124,986	\$ 3,899,031
2037	6,824	1,705,906	2,848,864	\$ 51,649,939	512	127,968	127,968	\$ 3,992,048
2038	6,983	1,745,655	2,915,244	\$ 52,853,417	524	130,949	130,949	\$ 4,085,065
2039	7,142	1,785,404	2,981,624	\$ 54,056,895	536	133,931	133,931	\$ 4,178,083
2040	6,824	1,705,906	2,848,864	\$ 51,649,939	512	127,968	127,968	\$ 3,992,048
2041	6,983	1,745,655	2,915,244	\$ 52,853,417	524	130,949	130,949	\$ 4,085,065
2042	7,142	1,785,404	2,981,624	\$ 54,056,895	536	133,931	133,931	\$ 4,178,083
2043	7,301	1,825,153	3,048,005	\$ 55,260,372	548	136,913	136,913	\$ 4,271,100
2044	7,460	1,864,901	3,114,385	\$ 56,463,850	560	139,894	139,894	\$ 4,364,117
2045	7,619	1,904,650	3,180,766	\$ 57,667,328	572	142,876	142,876	\$ 4,457,135
2046	7,778	1,944,399	3,247,146	\$ 58,870,806	583	145,858	145,858	\$ 4,550,152
2047	7,937	1,984,148	3,313,526	\$ 60,074,284	595	148,840	148,840	\$ 4,643,170

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Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; EPS.

[1] Refer to Table 5 for details.

[2] Excludes weekends and 10 holidays per year.

[3] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021).

[4] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021) and escalated to 2021 dollars using the Q4 GDP price deflator for 2019 and 2021 as provided by the Bureau of Economic Analysis.

Table 3
Southeast Connector
Benefit Cost Analysis
Annual Travel Time Savings - New Users

Year	Passenger Vehicles				Commercial Vehicles			
	Daily Vehicle Hour Reduction [1]	Annual Vehicle Hour Reduction	Total Annual Person Hours Saved	Monetized Value	Daily Vehicle Hour Reduction [1]	Annual Vehicle Hour Reduction	Total Annual Person Hours Saved	Monetized Value
Travel Days per Year [2]		250				250		
Vehicle Occupancy [3]			1.67				1.00	
Hourly Value per Person Hour [4]				\$ 18.13				\$ 31.20
Adjustment for New Users [3]				50%				50%
2021	0	0	0	\$ 0	0	0	0	\$ 0
2022	0	0	0	\$ 0	0	0	0	\$ 0
2023	0	0	0	\$ 0	0	0	0	\$ 0
2024	0	0	0	\$ 0	0	0	0	\$ 0
2025	0	0	0	\$ 0	0	0	0	\$ 0
2026	1,956	488,898	816,460	\$ 7,401,219	147	36,674	36,674	\$ 572,044
2027	2,106	526,506	879,265	\$ 7,970,543	158	39,496	39,496	\$ 616,047
2028	2,256	564,114	942,070	\$ 8,539,868	169	42,317	42,317	\$ 660,050
2029	2,407	601,721	1,004,874	\$ 9,109,193	181	45,138	45,138	\$ 704,054
2030	2,557	639,329	1,067,679	\$ 9,678,517	192	47,959	47,959	\$ 748,057
2031	2,708	676,936	1,130,484	\$ 10,247,842	203	50,780	50,780	\$ 792,060
2032	2,858	714,544	1,193,288	\$ 10,817,166	214	53,601	53,601	\$ 836,064
2033	3,009	752,151	1,256,093	\$ 11,386,491	226	56,422	56,422	\$ 880,067
2034	3,159	789,759	1,318,897	\$ 11,955,815	237	59,243	59,243	\$ 924,071
2035	3,309	827,367	1,381,702	\$ 12,525,140	248	62,064	62,064	\$ 968,074
2036	3,460	864,974	1,444,507	\$ 13,094,464	260	64,886	64,886	\$ 1,012,077
2037	3,610	902,582	1,507,311	\$ 13,663,789	271	67,707	67,707	\$ 1,056,081
2038	3,761	940,189	1,570,116	\$ 14,233,113	282	70,528	70,528	\$ 1,100,084
2039	3,911	977,797	1,632,921	\$ 14,802,438	293	73,349	73,349	\$ 1,144,087
2040	603	150,645	251,578	\$ 2,280,554	45	11,301	11,301	\$ 176,265
2041	753	188,253	314,382	\$ 2,849,879	56	14,122	14,122	\$ 220,268
2042	903	225,861	377,187	\$ 3,419,203	68	16,943	16,943	\$ 264,272
2043	1,054	263,468	439,992	\$ 3,988,528	79	19,764	19,764	\$ 308,275
2044	1,204	301,076	502,796	\$ 4,557,853	90	22,585	22,585	\$ 352,279
2045	1,355	338,683	565,601	\$ 5,127,177	102	25,406	25,406	\$ 396,282
2046	1,505	376,291	628,406	\$ 5,696,502	113	28,227	28,227	\$ 440,285
2047	1,656	413,898	691,210	\$ 6,265,826	124	31,048	31,048	\$ 484,289

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Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; EPS.

- [1] Refer to Table 5 for details.
- [2] Excludes weekends and 10 holidays per year.
- [3] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021).
- [4] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021) and escalated to 2021 dollars using the Q4 GDP price deflator for 2019 and 2021 as provided by the Bureau of Economic Analysis.

Table 4
Southeast Connector
Benefit Cost Analysis
Daily VMT Estimates

Year	Average Daily Trips [1]			Daily Vehicle Miles Traveled (VMT)		
	No Build	Build	Growth	No Build	Build	Growth
Segment Length:				34 miles	34 miles	
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
2024	0	0	0	0	0	0
2025	0	0	0	0	0	0
2026	21,627	29,961	8,334	735,304	1,018,663	283,359
2027	22,304	31,279	8,975	758,342	1,063,497	305,156
2028	22,982	32,598	9,616	781,380	1,108,332	326,953
2029	23,659	33,917	10,257	804,417	1,153,167	348,749
2030	24,337	35,235	10,898	827,455	1,198,001	370,546
2031	25,015	36,554	11,540	850,493	1,242,836	392,343
2032	25,692	37,873	12,181	873,531	1,287,671	414,140
2033	26,370	39,191	12,822	896,569	1,332,505	435,937
2034	27,047	40,510	13,463	919,607	1,377,340	457,734
2035	27,725	41,829	14,104	942,644	1,422,175	479,530
2036	28,402	43,147	14,745	965,682	1,467,009	501,327
2037	29,080	44,466	15,386	988,720	1,511,844	523,124
2038	29,758	45,785	16,027	1,011,758	1,556,679	544,921
2039	30,435	47,103	16,668	1,034,796	1,601,513	566,718
2040	29,080	31,648	2,568	988,720	1,076,032	87,312
2041	29,758	32,967	3,209	1,011,758	1,120,867	109,109
2042	30,435	34,285	3,850	1,034,796	1,165,701	130,906
2043	31,113	35,604	4,491	1,057,834	1,210,536	152,703
2044	31,790	36,923	5,132	1,080,871	1,255,371	174,499
2045	32,468	38,241	5,773	1,103,909	1,300,205	196,296
2046	33,146	39,560	6,414	1,126,947	1,345,040	218,093
2047	33,823	40,879	7,056	1,149,985	1,389,875	239,890

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Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; EPS.

[1] Based on information included in the Travel Demand Model (TDM) Update Summary, completed by Kimley Horn dated October 13, 2021. The TDM update reflected average daily trip values across all segments with a 2016 baseline through 2040. This analysis assumes a linear growth in average daily trips through the Project development period. Daily trips are the average estimated daily trips of all roadway segments.

Table 5
Southeast Connector
Benefit Cost Analysis
Daily VHT Reduction by User Type

Year	Existing Users						New Users					
	Daily Vehicle Miles Traveled (VMT)	Daily Vehicle Hours (VHT)		Increase/(Decrease) in VHT			Daily Vehicle Miles Traveled (VMT)	Daily Vehicle Hours (VHT)		Increase/(Decrease) in VHT		
		No Build	Build	Passenger Vehicles	Commercial Vehicles	Total		No Build	Build	Passenger Vehicles	Commercial Vehicles	Total
Average User Speed [1]:		37 mph	51 mph					37 mph	51 mph			
Percent of All Users [2]:				93.0%	7.0%					93.0%	7.0%	
2021	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0
2026	735,304	19,873	14,418	(5,075)	(381)	(5,455)	283,359	7,658	5,556	(1,956)	(147)	(2,102)
2027	758,342	20,496	14,869	(5,234)	(393)	(5,626)	305,156	8,247	5,983	(2,106)	(158)	(2,264)
2028	781,380	21,118	15,321	(5,393)	(405)	(5,797)	326,953	8,837	6,411	(2,256)	(169)	(2,426)
2029	804,417	21,741	15,773	(5,552)	(416)	(5,968)	348,749	9,426	6,838	(2,407)	(181)	(2,587)
2030	827,455	22,364	16,225	(5,711)	(428)	(6,139)	370,546	10,015	7,266	(2,557)	(192)	(2,749)
2031	850,493	22,986	16,676	(5,870)	(440)	(6,310)	392,343	10,604	7,693	(2,708)	(203)	(2,911)
2032	873,531	23,609	17,128	(6,029)	(452)	(6,481)	414,140	11,193	8,120	(2,858)	(214)	(3,073)
2033	896,569	24,232	17,580	(6,188)	(464)	(6,652)	435,937	11,782	8,548	(3,009)	(226)	(3,234)
2034	919,607	24,854	18,032	(6,347)	(476)	(6,823)	457,734	12,371	8,975	(3,159)	(237)	(3,396)
2035	942,644	25,477	18,483	(6,506)	(488)	(6,994)	479,530	12,960	9,403	(3,309)	(248)	(3,558)
2036	965,682	26,100	18,935	(6,665)	(500)	(7,165)	501,327	13,549	9,830	(3,460)	(260)	(3,719)
2037	988,720	26,722	19,387	(6,824)	(512)	(7,335)	523,124	14,138	10,257	(3,610)	(271)	(3,881)
2038	1,011,758	27,345	19,838	(6,983)	(524)	(7,506)	544,921	14,728	10,685	(3,761)	(282)	(4,043)
2039	1,034,796	27,967	20,290	(7,142)	(536)	(7,677)	566,718	15,317	11,112	(3,911)	(293)	(4,205)
2040	988,720	26,722	19,387	(6,824)	(512)	(7,335)	87,312	2,360	1,712	(603)	(45)	(648)
2041	1,011,758	27,345	19,838	(6,983)	(524)	(7,506)	109,109	2,949	2,139	(753)	(56)	(809)
2042	1,034,796	27,967	20,290	(7,142)	(536)	(7,677)	130,906	3,538	2,567	(903)	(68)	(971)
2043	1,057,834	28,590	20,742	(7,301)	(548)	(7,848)	152,703	4,127	2,994	(1,054)	(79)	(1,133)
2044	1,080,871	29,213	21,194	(7,460)	(560)	(8,019)	174,499	4,716	3,422	(1,204)	(90)	(1,295)
2045	1,103,909	29,835	21,645	(7,619)	(572)	(8,190)	196,296	5,305	3,849	(1,355)	(102)	(1,456)
2046	1,126,947	30,458	22,097	(7,778)	(583)	(8,361)	218,093	5,894	4,276	(1,505)	(113)	(1,618)
2047	1,149,985	31,081	22,549	(7,937)	(595)	(8,532)	239,890	6,484	4,704	(1,656)	(124)	(1,780)

ann vht

Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; EPS.

[1] Average user speed change based on information included in the Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021.

[2] Based on information included in the Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021.

Table 6
Southeast Connector
Benefit Cost Analysis
Annual Automobile Operations and Maintenance Cost Savings From Increased Quarry Capacity

Year	Additional Annual Roadway Capacity (Tons of Aggregate) [1]	Annual Truck Trips	Annual VMT Reduction	Annual Cost Savings	Total Cost Savings
Tons of Aggregate per Trip [1]		5.8			
Vehicle Mile Reduction per Trip [2]			10.5		
Operations and Maint. Cost per Mile [3]				\$ 0.94	
Adjustment for New Users [4]				50%	
2021	0	0	0	\$0	\$0
2022	0	0	0	\$0	\$0
2023	0	0	0	\$0	\$0
2024	0	0	0	\$0	\$0
2025	0	0	0	\$0	\$0
2026	419,000	72,241	760,341	\$358,102	\$358,102
2027	419,000	72,241	760,341	\$358,102	\$358,102
2028	419,000	72,241	760,341	\$358,102	\$358,102
2029	419,000	72,241	760,341	\$358,102	\$358,102
2030	419,000	72,241	760,341	\$358,102	\$358,102
2031	419,000	72,241	760,341	\$358,102	\$358,102
2032	419,000	72,241	760,341	\$358,102	\$358,102
2033	419,000	72,241	760,341	\$358,102	\$358,102
2034	419,000	72,241	760,341	\$358,102	\$358,102
2035	419,000	72,241	760,341	\$358,102	\$358,102
2036	419,000	72,241	760,341	\$358,102	\$358,102
2037	419,000	72,241	760,341	\$358,102	\$358,102
2038	419,000	72,241	760,341	\$358,102	\$358,102
2039	419,000	72,241	760,341	\$358,102	\$358,102
2040	419,000	72,241	760,341	\$358,102	\$358,102
2041	419,000	72,241	760,341	\$358,102	\$358,102
2042	419,000	72,241	760,341	\$358,102	\$358,102
2043	419,000	72,241	760,341	\$358,102	\$358,102
2044	419,000	72,241	760,341	\$358,102	\$358,102
2045	419,000	72,241	760,341	\$358,102	\$358,102
2046	419,000	72,241	760,341	\$358,102	\$358,102
2047	419,000	72,241	760,341	\$358,102	\$358,102
Total	9,218,000	1,589,310	16,727,491	\$7,878,234	\$ 7,878,234

auto

Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Mark Thomas & Company; EPS.

- [1] Based on estimates included in the East Sacramento Region Aggregate Mining Truck Management Plan Final Technical Report, prepared by DKS Associates Transportation Solutions.
- [2] Any regional existing demand for aggregate beyond that which can be met by current quarries located adjacent to the project is currently being met by facilities located within Yuba and Yolo Counties, outside of the market area served by quarries within the project. Development of the Project will result in increased roadway capacity for the existing facility, allowing for additional production and shorter trip lengths for truck traffic. Trip length reduction has been estimated based on average distances traveled by freight trucks from existing facilities to enter the market area served by the project.
- [3] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021) and escalated to 2021 dollars using the Q4 GDP price deflator for 2019 and 2021 as provided by the Bureau of Economic Analysis.
- [4] Per the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021), benefits associated with new roadway users require an adjustment factor of 50%. Although not all roadway freight users will be new users, to maintain a conservative analysis, the BCA assumes a 50% adjustment factor would apply to all users.

Table 7
Southeast Connector
Benefit Cost Analysis
Avoided Rehabilitation Costs

Item	Assumption	Avoided Rehabilitation Cost
Existing Roadway Repair/Replacement Cost [1]		
State of Repair of Current Road in Year of Improvement [1]	Poor	
Cost of Road Repair/Replacement (Per Sq. Yard)	\$54	
Segment Length (Miles)	34.0	
Number of Lanes (12 ft lanes)	2	
Total Sq. Yards	478,720	
Year of Improvement	2029	
Cost of Roadway Repair and Replacement		\$25,850,880

avoid

Source: Mark Thomas; Sacramento County Pavement Condition Report, January 2019; EPS.

[1] Based on the Pavement Condition Report, completed by Sacramento County in 2019, existing roadway facilities are in poor/fair condition and are continuing to deteriorate. Based on existing funding gaps experienced by the County, it is not anticipated that roadway repairs will be made prior to roadway replacement is required in 5-10 years from completion of the Pavement Condition Report. To remain conservative, this analysis assumes that existing facilities would be replaced in year 10. No additional avoided roadway rehabilitation costs are assumed following initial repair as the roadway will be considered in good repair and additional improvements are uncertain at this time. It is anticipated that additional maintenance will be required beyond those shown herein.

Table 8
Southeast Connector
Benefit Cost Analysis
Residual Value of Project in 2047

Item	Formula	Project Costs (2021\$)
Assumptions		
Installation Date	a	2027
End of Analysis Period	b	2047
Useful Service Life (Years)	c	50
Remaining Useful Life at End of Analysis Period (Years)	$d = c - (b - a)$	30
Project Cost (2021\$)	e	\$315,000,000
Annual Depreciation	$f = e / c$	\$6,300,000
Accumulated Depreciation in 2045	$g = f * (b - a)$	\$126,000,000
Residual Value in 2047	$h = e - g$	\$189,000,000

resid

Source: Capital Southeast Connector JPA; Mark Thomas; Sacramento County; EPS.

Table 9
Southeast Connector
Benefit Cost Analysis
Annual Reduced Incident Safety Savings

Year	Annual Fatalities				Annual Injuries				Annual Property Damage Only Events				Total Monetized Benefit
	Events per Year			Monetized Benefit	Events per Year			Monetized Benefit	Events per Year			Monetized Benefit	
	No Build	Build	Annual Reduction		No Build	Build	Annual Reduction		No Build	Build	Annual Reduction		
Monetized Benefit [3]				\$ 11,040,065				\$ 518,883				\$ 4,558	
2021	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	\$ 0
2022	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	\$ 0
2023	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	\$ 0
2024	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	\$ 0
2025	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	0.00	0.00	0.00	\$ 0	\$ 0
2026	0.27	0.21	0.06	\$ 711,775	11.62	8.95	2.67	\$ 1,386,848	32.46	24.76	7.70	\$ 35,100	\$ 2,133,723
2027	0.28	0.21	0.06	\$ 706,296	11.62	8.95	2.67	\$ 1,386,848	33.24	25.59	7.64	\$ 34,830	\$ 2,127,975
2028	0.28	0.22	0.06	\$ 700,818	11.90	9.25	2.65	\$ 1,376,091	34.02	26.43	7.58	\$ 34,559	\$ 2,111,469
2029	0.29	0.23	0.06	\$ 695,340	12.17	9.54	2.63	\$ 1,365,334	34.79	27.27	7.52	\$ 34,289	\$ 2,094,963
2030	0.30	0.24	0.06	\$ 689,861	12.44	9.83	2.61	\$ 1,354,577	35.57	28.11	7.46	\$ 34,019	\$ 2,078,457
2031	0.30	0.24	0.06	\$ 684,383	12.71	10.12	2.59	\$ 1,343,820	36.35	28.95	7.40	\$ 33,749	\$ 2,061,951
2032	0.31	0.25	0.06	\$ 678,904	12.99	10.42	2.57	\$ 1,333,062	37.13	29.79	7.35	\$ 33,479	\$ 2,045,445
2033	0.32	0.26	0.06	\$ 673,426	13.26	10.71	2.55	\$ 1,322,305	37.91	30.63	7.29	\$ 33,209	\$ 2,028,939
2034	0.32	0.26	0.06	\$ 667,947	13.53	11.00	2.53	\$ 1,311,548	38.69	31.46	7.23	\$ 32,938	\$ 2,012,434
2035	0.33	0.27	0.06	\$ 662,469	13.80	11.30	2.51	\$ 1,300,791	39.47	32.30	7.17	\$ 32,668	\$ 1,995,928
2036	0.34	0.28	0.06	\$ 656,990	14.08	11.59	2.49	\$ 1,290,033	40.25	33.14	7.11	\$ 32,398	\$ 1,979,422
2037	0.34	0.28	0.06	\$ 651,512	14.35	11.88	2.47	\$ 1,279,276	41.03	33.98	7.05	\$ 32,128	\$ 1,962,916
2038	0.35	0.29	0.06	\$ 646,033	14.62	12.18	2.44	\$ 1,268,519	41.81	34.82	6.99	\$ 31,858	\$ 1,946,410
2039	0.36	0.30	0.06	\$ 640,555	14.90	12.47	2.42	\$ 1,257,762	42.59	35.66	6.93	\$ 31,588	\$ 1,929,904
2040	0.36	0.31	0.06	\$ 635,076	15.17	12.76	2.40	\$ 1,247,004	43.37	36.49	6.87	\$ 31,318	\$ 1,913,398
2041	0.37	0.31	0.06	\$ 629,598	15.44	13.06	2.38	\$ 1,236,247	44.15	37.33	6.81	\$ 31,047	\$ 1,896,893
2042	0.38	0.32	0.06	\$ 624,120	15.71	13.35	2.36	\$ 1,225,490	44.92	38.17	6.75	\$ 30,777	\$ 1,880,387
2043	0.38	0.33	0.06	\$ 618,641	15.99	13.64	2.34	\$ 1,214,733	45.70	39.01	6.69	\$ 30,507	\$ 1,863,881
2044	0.39	0.33	0.06	\$ 613,163	16.26	13.94	2.32	\$ 1,203,976	46.48	39.85	6.63	\$ 30,237	\$ 1,847,375
2045	0.40	0.34	0.06	\$ 607,684	16.53	14.23	2.30	\$ 1,193,218	47.26	40.69	6.57	\$ 29,967	\$ 1,830,869
2046	0.40	0.35	0.05	\$ 602,206	16.80	14.52	2.28	\$ 1,182,461	48.04	41.53	6.52	\$ 29,697	\$ 1,814,363
2047	0.41	0.35	0.06	\$ 712,606	16.80	14.52	2.28	\$ 1,182,461	48.04	41.53	6.52	\$ 29,697	\$ 1,924,764
Total				\$ 14,509,403				\$ 28,262,405				\$ 710,058	\$ 43,481,866

safety

Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; EPS

- [1] Events per year estimates calculated using the California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C) Version 7.2 Corridor published by California Department of Transportation.
- [2] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021) and escalated to 2021 dollars using the Q4 GDP price deflator for 2019 and 2021 as provided by the Bureau of Economic Analysis.

Table 10
Southeast Connector
Benefit Cost Analysis
Annual Avoided Physical Inactivity Benefits - Bike Users

Year	New Cyclists [1]	Avoided Physical Inactivity Benefit	Journey Quality Benefits [2]	Total Monetized Benefit
Avoided Physical Inactivity Benefit per User [3]		\$ 1,752		
Adjustment for New Users [4]		50%		
2021	0	\$0	\$0	\$0
2022	0	\$0	\$0	\$0
2023	0	\$0	\$0	\$0
2024	0	\$0	\$0	\$0
2025	0	\$0	\$0	\$0
2026	53	\$46,549	\$2,100	\$48,650
2027	106	\$93,099	\$2,960	\$96,059
2028	159	\$139,648	\$44,231	\$183,879
2029	213	\$186,198	\$85,502	\$271,700
2030	266	\$232,747	\$126,773	\$359,520
2031	319	\$279,296	\$168,044	\$447,340
2032	372	\$325,846	\$209,315	\$535,161
2033	425	\$372,395	\$250,586	\$622,981
2034	478	\$418,945	\$291,857	\$710,801
2035	531	\$465,494	\$333,128	\$798,622
2036	585	\$512,043	\$374,399	\$886,442
2037	638	\$558,593	\$415,670	\$974,262
2038	691	\$605,142	\$456,941	\$1,062,083
2039	744	\$651,692	\$498,212	\$1,149,903
2040	797	\$698,241	\$539,483	\$1,237,724
2041	850	\$744,790	\$580,754	\$1,325,544
2042	903	\$791,340	\$622,024	\$1,413,364
2043	956	\$837,889	\$663,295	\$1,501,185
2044	1,010	\$884,439	\$704,566	\$1,589,005
2045	1,063	\$930,988	\$745,837	\$1,676,825
2046	1,169	\$1,024,087	\$787,108	\$1,811,195
2047	1,222	\$1,070,636	\$787,109	\$1,857,745

bike

Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, U.S. Bureau of Labor Statistics; Physical Inactivity Cost Calculator - How the Physical Inactivity Cost Calculator was Developed (Active Living Leadership, SDSU); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; California Department of Transportation California Active Transportation Benefit/Cost Analysis Model Version 7.2.EPS.

[1] Development of the Southeast Connector will provide significant opportunities for both bike commuters and recreational cyclists. This analysis reflects the monetized health benefits related to avoided physical inactivity for all users. Cyclist count estimates are based on data provided in the Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021.

[2] Quality of Journey benefits are the monetized value of benefit due to an enhanced quality of the trip for pedestrians and cyclists that arise from a greater feeling of safety, comfort, aesthetics, and other types of improvements. Quality of Journey Benefits are estimated using the California Department of Transportation California Active Transportation Benefit/Cost Analysis Model Version 7.2.

[3] Refer to Table 11 for details.

[4] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021).

Table 11
Southeast Connector
Benefit Cost Analysis
Estimated Physical Inactivity Cost per Capita

Item	California Physical Inactivity Cost [1]		
	Base Year	Cost Increase Factor [2]	2021 Dollars
Per Capita Inactivity Costs			
Medical Costs (2004 \$)			
Cost per Claim	\$ 3,257		
Claims per Capita	0.084106		
Cost per Capita	\$ 274	1.75	\$ 479
Lost Productivity Costs (2001 \$)			
Lost Productivity per Worker	\$ 2,933		
Percent Physically Inactive	50%		
Cost per Employee	\$ 1,466		
Employees per Capita	43%		
Cost per Capita	\$ 632	2.01	\$ 1,273
Total Inactivity Cost per Capita	\$ 906		\$ 1,752

inactivity

Source: U.S. Bureau of Labor Statistics, Physical Inactivity Cost Calculator - How the Physical Inactivity Cost Calculator was Developed (Active Living Leadership, SDSU), and EPS.

[1] Base year costs from Physical Inactivity Cost Calculator - How the Physical Inactivity Cost Calculator was Developed. 2021 costs inflated by the change in the CPI for medical care.

[2] CPI Factors - Medical Care in San Francisco-Oakland-San Jose

April 2004	293.500
April 2021	555.675
Average Annual Percentage Increase	4.07%
Cost Increase Factor	1.748
April 2001	254.100
April 2021	555.675
Average Annual Percentage Increase	4.20%
Cost Increase Factor	2.014

Table 12
Southeast Connector
Benefit Cost Analysis
Estimated Change in Emissions Because of Vehicle Travel Time Reductions

Year	Emissions Reductions [1]								Total Monetized Value of All Reductions
	Carbon Dioxide (CO ₂)		Nitrogen Oxides (NO _x)		Particulate Matter (PM _{2.5})		Sulfur Dioxide (SO ₂)		
	Annual Reduction	Monetized Value	Annual Reduction	Monetized Value	Annual Reduction	Monetized Value	Annual Reduction	Monetized Value	
Unit of Measure	Metric Ton		Metric Ton		Metric Ton		Metric Ton		
Annual Benefit per Unit Reduction [2]:		\$52.00		\$15,900		\$742,300		\$41,300	
2021	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2022	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2023	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2024	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2025	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2026	6,455	\$335,663	(0.66)	(\$10,415)	(0.00)	(\$782)	0.07	\$2,882	\$327,348
2027	7,645	\$397,525	(0.66)	(\$10,415)	(0.00)	(\$782)	0.07	\$2,882	\$389,210
2028	8,834	\$459,387	(0.33)	(\$5,274)	0.01	\$4,583	0.08	\$3,337	\$462,032
2029	10,041	\$522,139	0.06	\$1,004	0.01	\$10,955	0.09	\$3,798	\$537,895
2030	11,265	\$585,780	0.53	\$8,418	0.02	\$18,335	0.10	\$4,266	\$616,798
2031	12,506	\$650,311	1.07	\$16,968	0.04	\$26,722	0.11	\$4,741	\$698,742
2032	13,764	\$715,732	1.68	\$26,655	0.05	\$36,117	0.13	\$5,223	\$783,727
2033	15,039	\$782,042	2.36	\$37,479	0.06	\$46,520	0.14	\$5,711	\$871,753
2034	10,854	\$564,383	(7.94)	(\$126,285)	0.08	\$60,208	0.14	\$5,680	\$503,987
2035	11,748	\$610,909	(8.45)	(\$134,327)	0.09	\$67,056	0.15	\$6,126	\$549,764
2036	12,657	\$658,179	(8.95)	(\$142,344)	0.10	\$74,239	0.16	\$6,578	\$596,653
2037	13,581	\$706,195	(9.45)	(\$150,333)	0.11	\$81,755	0.17	\$7,036	\$644,653
2038	14,518	\$754,956	(9.96)	(\$158,295)	0.12	\$89,605	0.18	\$7,499	\$693,765
2039	15,470	\$804,463	(10.45)	(\$166,231)	0.13	\$97,790	0.19	\$7,967	\$743,989
2040	16,437	\$854,715	(10.95)	(\$174,140)	0.14	\$106,308	0.20	\$8,441	\$795,324
2041	17,418	\$905,712	(11.45)	(\$182,022)	0.16	\$115,161	0.22	\$8,920	\$847,771
2042	18,413	\$957,454	(11.94)	(\$189,877)	0.17	\$124,347	0.23	\$9,405	\$901,330
2043	19,422	\$1,009,942	(12.43)	(\$197,705)	0.18	\$133,868	0.24	\$9,896	\$956,000
2044	19,655	\$1,022,039	(14.68)	(\$233,333)	0.21	\$152,391	0.20	\$8,208	\$949,304
2045	20,659	\$1,074,282	(15.26)	(\$242,566)	0.22	\$163,037	0.21	\$8,622	\$1,003,375
2046	21,678	\$1,127,264	(15.84)	(\$251,798)	0.23	\$174,025	0.22	\$9,041	\$1,058,533
2047	21,679	\$1,127,316	(15.84)	(\$251,798)	0.23	\$174,100	0.22	\$9,041	\$1,058,659
Total	298,059	\$15,499,073	(143.70)	(\$2,284,836)	2.13	\$1,581,459	3.30	\$136,258	14,931,954

emissions

Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; California Department of Transportation California Life-Cycle Benefit/Cost Analysis Model for 2021 INFRA Applications; EPS.

[1] Emissions calculations estimated using the California Life-Cycle Benefit/Cost Analysis Model for Corridors as provided by the California Department of Transportation (CAL-B/C Sketch) Version 7.2. Negative Annual Emissions reductions equate to an increase in annual emissions and a negative benefit to the project. Emissions benefits include emissions reductions related to diversion of traffic from congested roadways throughout the Sacramento Region.

[2] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021) and escalated to 2021 dollars using the Q4 GDP price deflator for 2019 and 2021 as provided by the Bureau of Economic Analysis.

Table 13
 Southeast Connector
 Benefit Cost Analysis
 Estimated Change in Emissions Because of Commuter Cyclists

Year	Emissions Reductions [1]								Total Monetized Value of All Reductions
	Carbon Dioxide (CO ₂)		Nitrogen Oxides (NO _x)		Particulate Matter (PM _{2.5})		Sulfur Dioxide (SO ₂)		
	Annual Reduction	Monetized Value	Annual Reduction	Monetized Value	Annual Reduction	Monetized Value	Annual Reduction	Monetized Value	
Unit of Measure	Metric Ton		Metric Ton		Metric Ton		Metric Ton		
Annual Benefit per Unit Reduction [2]:		\$52.00		\$15,900		\$742,300		\$41,300	
2021	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2022	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2023	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2024	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2025	0	\$0	0.00	\$0	0.00	\$0	0.00	\$0	\$0
2026	8	\$421	0.00	\$49	0.00	\$40	0.00	\$3	\$513
2027	16	\$836	0.01	\$98	0.00	\$79	0.00	\$7	\$1,019
2028	24	\$1,250	0.01	\$146	0.00	\$117	0.00	\$10	\$1,524
2029	32	\$1,665	0.01	\$195	0.00	\$156	0.00	\$13	\$2,030
2030	40	\$2,080	0.02	\$243	0.00	\$195	0.00	\$17	\$2,535
2031	48	\$2,494	0.02	\$292	0.00	\$234	0.00	\$20	\$3,041
2032	34	\$1,776	0.01	\$81	0.00	\$128	0.00	\$14	\$1,998
2033	39	\$2,029	0.01	\$93	0.00	\$146	0.00	\$16	\$2,283
2034	44	\$2,282	0.01	\$104	0.00	\$164	0.00	\$18	\$2,568
2035	49	\$2,535	0.01	\$116	0.00	\$182	0.00	\$20	\$2,853
2036	54	\$2,788	0.01	\$127	0.00	\$200	0.00	\$22	\$3,138
2037	58	\$3,041	0.01	\$139	0.00	\$219	0.00	\$24	\$3,423
2038	63	\$3,294	0.01	\$150	0.00	\$237	0.00	\$26	\$3,708
2039	68	\$3,548	0.01	\$162	0.00	\$255	0.00	\$28	\$3,993
2040	73	\$3,801	0.01	\$173	0.00	\$273	0.00	\$30	\$4,277
2041	78	\$4,054	0.01	\$185	0.00	\$291	0.00	\$32	\$4,562
2042	83	\$4,307	0.01	\$196	0.00	\$309	0.00	\$34	\$4,847
2043	88	\$4,560	0.01	\$208	0.00	\$328	0.00	\$36	\$5,132
2044	93	\$4,813	0.01	\$220	0.00	\$346	0.00	\$38	\$5,417
2045	93	\$4,813	0.01	\$220	0.00	\$350	0.00	\$40	\$5,422
2046	93	\$4,813	0.01	\$220	0.00	\$365	0.00	\$41	\$5,439
2047	93	\$4,813	0.01	\$220	0.00	\$369	0.00	\$43	\$5,444
Total	1,269	\$66,012	0.23	\$3,636	0.01	\$4,983	0.01	\$536	69,723

emissions bike

Source: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021); Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" (March 2021); Capital Southeast Connector, Travel Demand Model (TDM) Update Summary, completed by Kimley Horn, Dated October 13, 2021; California Department of Transportation California Life-Cycle Benefit/Cost Analysis Model for 2021 INFRA Applications; EPS.

[1] Emissions calculations estimated using the California Department of Transportation California Active Transportation Benefit/Cost Analysis Model Version 7.2. Negative Annual Emissions reductions equate to an increase in annual emissions and a negative benefit to the project.

[2] Obtained from the Benefit-Cost Analysis Guidance for Discretionary Grant Programs (US Department of Transportation, February 2021) and escalated to 2021 dollars using the Q4 GDP price deflator for 2019 and 2021 as provided by the Bureau of Economic Analysis.

Table 14
Southeast Connector
Benefit Cost Analysis
Project Cost Estimates

Year	Construction Cost by Segment										Total
	Segment A1	Segment B3	Segment C	Segment D1	Segment D2A	Segment D2B	Segment D3B	Segment E1	Segment E2		
2021	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2022	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2023	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2024	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2025	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2026	\$18,000,000	\$0	\$0	\$0	\$6,000,000	\$0	\$0	\$0	\$0	\$0	\$24,000,000
2027	\$37,000,000	\$0	\$0	\$0	\$13,000,000	\$0	\$22,500,000	\$3,000,000	\$0	\$0	\$75,500,000
2028	\$0	\$0	\$0	\$0	\$6,000,000	\$0	\$22,500,000	\$3,000,000	\$0	\$0	\$31,500,000
2029	\$0	\$0	\$16,500,000	\$0	\$0	\$35,000,000	\$0	\$0	\$0	\$0	\$51,500,000
2030	\$0	\$14,000,000	\$16,500,000	\$0	\$0	\$35,000,000	\$0	\$0	\$4,000,000	\$0	\$69,500,000
2031	\$0	\$11,000,000	\$0	\$0	\$0	\$0	\$0	\$0	\$4,000,000	\$0	\$15,000,000
2032	\$0	\$0	\$0	\$24,000,000	\$0	\$0	\$0	\$0	\$0	\$0	\$24,000,000
2033	\$0	\$0	\$0	\$24,000,000	\$0	\$0	\$0	\$0	\$0	\$0	\$24,000,000
2034	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2037	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2038	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2039	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2040	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2041	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2042	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2043	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2044	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2045	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2046	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2047	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$55,000,000	\$25,000,000	\$33,000,000	\$48,000,000	\$25,000,000	\$70,000,000	\$45,000,000	\$6,000,000	\$8,000,000	\$315,000,000	

const cost

Source: Capital Southeast Connector; EPS.

[1] Construction costs excludes approximately \$235 million in constructions costs already incurred related to segments already constructed or currently being developed.

Table 15
Southeast Connector
Benefit Cost Analysis
Estimated Annual Maintenance Costs

Item	Assumption	Estimated Annual Maintenance Expenditures
Total Roadway Miles	34 Miles	
Slurry Seal (Years 7 and 14) [1]	\$14,361,600	
Overlay Replacement Cost [2]	\$0	
Estimated Annual Maintenance Costs		\$2,051,657

an maint

Source: Mark Thomas & Company; Sacramento County; EPS.

[1] Assumes slurry seal performed once every 7 years at a cost of \$5/square yard.

[2] The proposed roadway is designed to not require overlay maintenance and repair for the first 20 year of roadway operations. As such, estimated overlay costs are not anticipated to occur until the end of the period captured within this analysis.

Table 16
Southeast Connector
Benefit Cost Analysis
Cost and Benefit Discount Factors

Year	Project Year	Year-End Discount Factors			
		7%		3%	
		Value	Factor	Value	Factor
2021	0	1.00	1.00	1.00	1.00
2022	1	1.07	0.93	1.03	0.97
2023	2	1.14	0.87	1.06	0.94
2024	3	1.23	0.82	1.09	0.92
2025	4	1.31	0.76	1.13	0.89
2026	5	1.40	0.71	1.16	0.86
2027	6	1.50	0.67	1.19	0.84
2028	7	1.61	0.62	1.23	0.81
2029	8	1.72	0.58	1.27	0.79
2030	9	1.84	0.54	1.30	0.77
2031	10	1.97	0.51	1.34	0.74
2032	11	2.10	0.48	1.38	0.72
2033	12	2.25	0.44	1.43	0.70
2034	13	2.41	0.41	1.47	0.68
2035	14	2.58	0.39	1.51	0.66
2036	15	2.76	0.36	1.56	0.64
2037	16	2.95	0.34	1.60	0.62
2038	17	3.16	0.32	1.65	0.61
2039	18	3.38	0.30	1.70	0.59
2040	19	3.62	0.28	1.75	0.57
2041	20	3.87	0.26	1.81	0.55
2042	21	4.14	0.24	1.86	0.54
2043	22	4.43	0.23	1.92	0.52
2044	23	4.74	0.21	1.97	0.51
2045	24	5.07	0.20	2.03	0.49
2046	25	5.43	0.18	2.09	0.48
2047	26	5.81	0.17	2.16	0.46

factors

Source: Discount Factors - OMB Circular A-94 Revised October 29, 1992.