

California High-Speed Rail Authority

2021 Economic Impact Analysis - Technical Supporting Document

Economic Impact Methodology Documentation

February 2022



CALIFORNIA
High-Speed Rail Authority

This document has been prepared by **KPMG LLP** and **WSP USA** for the California High-Speed Rail Authority (Authority) and for application to the California High-Speed Rail Project. The economic impacts and methodologies presented in this technical memorandum is based on assumptions and analyses conducted by the Authority and its consultants. This document builds off previous iterations of this document from 2016-17 to 2019-20.



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Acronyms & Terms

<u>Acronym/Term</u>	<u>Usage and Meaning</u>
Analysis	Fiscal Year 2020-2021 Economic Impact Analysis
ARRA	American Recovery and Reinvestment Act
Authority	California High-Speed Rail Authority
Caltrain Electrification	Peninsula Corridor Electrification Project
CMGC	Construction Manager / General contractor
CP	Construction Package
DB	Design-Build
E&E	Environment and Engineering
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
FTE	Full Time Equivalent
FY	Fiscal Year
Historical Analysis	July 2006 – June 2017 Economic Impact Analysis
PA	Program Administration
PCM	Project and Construction Management
PM	Program Management
PMT	Program Management Team
Program	California High-Speed Rail Program
RA	Resource Agency
RC	Regional Consultant
RDP	Rail Delivery Partner
ROW	Right of Way
SBE	Small Business Enterprise
Study Team	Authority Team consisting of the Business and Economic Branch
TPA	Third Party Agreements

1 Executive Summary

As the California High-Speed Rail Authority (Authority) continues to deliver the nation's first high-speed train project, the benefits of the Program's substantial investment continue to ripple through the California economy. The economic engine that is the Authority supports thousands of jobs across all functions, from planning and environmental clearance to engineering and construction. This sustained employment, along with substantial investments in construction and other activities across the state, generates substantial economic benefits around California including in many Disadvantaged Communities (DACs) and across the country.

The discrete economic impacts associated with the Authority's investments were first documented in *High-Speed Rail: Investing in California's Economy*, which was published in September 2017. That report detailed the benefits that resulted from the historical investment in high-speed rail from July 2006 through June 2016 (Historical Analysis). Updated reports for 2016-17, 2017-18, and 2018-19, were published in subsequent years. The latest updated version published in January 2021 documented the economic impacts associated with spending that occurred in 2019-20.^{1,2}

This report, the 2021 Economic Impact Analysis Technical Supporting Document, provides an updated snapshot of the economic impacts resulting from Authority spending that took place over 2020-21, which corresponds to July 2020 through June 2021. The magnitude of these economic impacts are estimated using the IMPLAN input-output model. Project costs are aggregated and assigned to appropriate industry sectors to calculate the associated economic impacts at the statewide level. Then, utilizing contract-level historical invoice cost data from the past three (3) fiscal years, geographic spending profiles allocating share of spend by zip code and professional service contract are created and applied to the full contract spend amounts in FY 2020-2021. This approach relies on previous detailed invoice reviews that comprise the total contract spending.

During 2020-21, the Authority expended approximately \$1.25 billion in funds, comprising activity primarily related to construction, planning and engineering, and the Authority's operations. As shown in **Table ES-1**, these expenditures supported approximately 10,100 job-years within the State of California; approximately \$840 million in labor income; and over \$2.2 billion in total economic output. Combined with the results from the previous analyses described earlier, the Authority's expenditures have, since 2006, supported approximately 70,500 job-years, nearly \$5.2 billion in labor income, and about \$13.7 billion in total economic output across the state.²

¹ http://www.buildhsr.com/hsrinvestment/pdf/California_Economy_2017.pdf

² These terms are defined in Section 4.1 of this report.



Table ES1. California Economic Impacts, 2020-21 & Program Total

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	4,700	\$460 M	\$1,140 M
Indirect Effects	2,300	\$180 M	\$510 M
Induced Effects	3,100	\$190 M	\$580 M
2020-21 Total	10,100	\$840 M	\$2,230 M
Program Total³ (July 2006 – June 2021)	64,400 - 70,500	\$4,800 M - \$5,200 M	\$12,700 - \$13,700 M

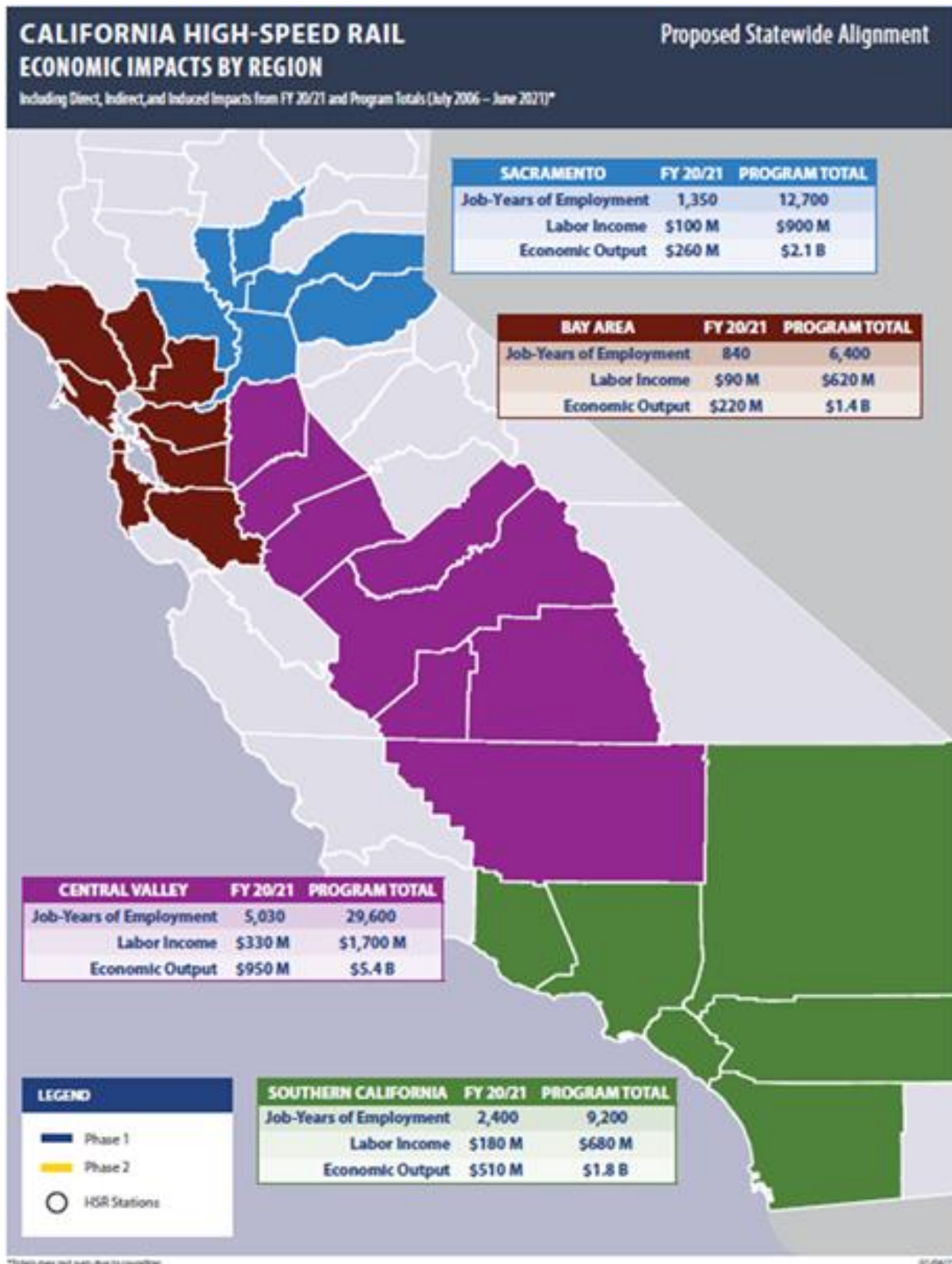
These economic impacts have been felt across the state, with the most sizable effects taking place in the Central Valley, where substantial construction activities are ongoing. These construction activities have supported over 5,000 job-years in the Central Valley region in 2020-21 alone.

Furthermore, the economic impacts of Authority expenditures have been felt beyond the State of California. Approximately \$15.6 million (1%) of the Authority's expenditures went to contractors outside the state, with approximately 82% of that out-of-state spending retained within the United States.

³ Totals may not sum due to rounding.



Figure ES-1. Economic Impacts by Region, 2020-21

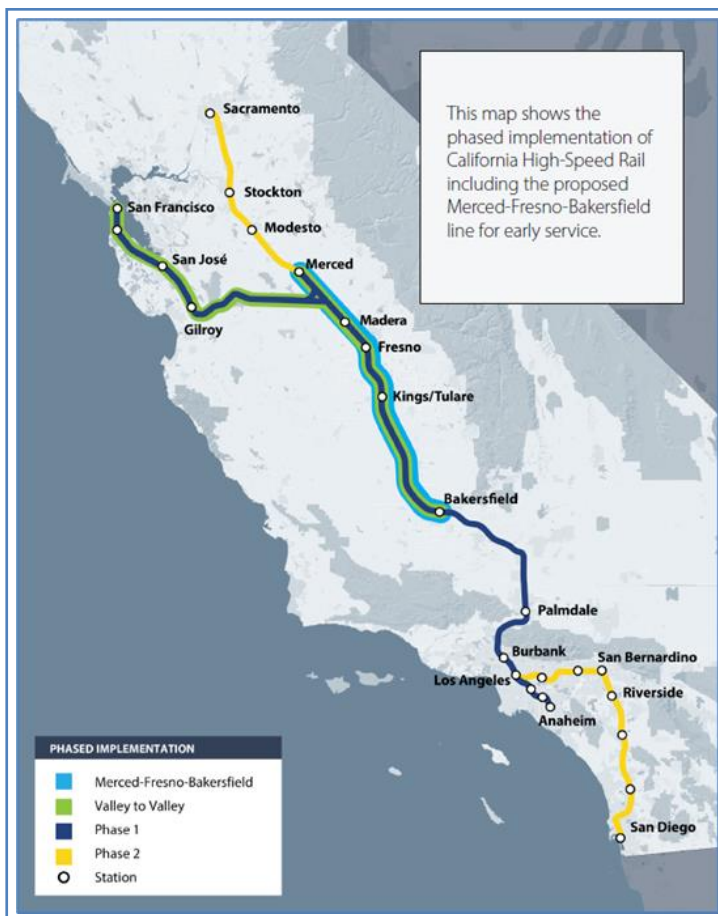


2 Introduction

The California High-Speed Rail Authority (Authority) is responsible for planning, designing, and building the first high-speed rail system in the nation. California's high-speed rail system will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands. The system is designed to run from San Francisco to the Los Angeles basin in under three hours at speeds capable of greater than 200 miles per hour. The system is planned to extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations. In addition, we are working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

Figure 1. California High-Speed Rail System

Construction is under way and the Authority has transitioned from a planning to a project delivery organization. As a result, the economic impact of its activities has grown substantially over the past years. Starting with just a few employees over a decade ago, the project has now supported thousands of jobs across all functions from planning and environmental clearance to engineering and construction. The investment has generated substantial economic benefits and spurred further economic impacts around California and across the country. To understand those economic impacts, the Authority develops the annual report "[Economic Impact Analysis – Technical Supporting Document](#)" which was first started in September 2017. This report details benefits that result from the investment in high-speed rail.



This 2021 Economic Impact Analysis – Technical Supporting Document outlines the methodology that was used in developing this Analysis, which covers the period of July 2020 to June 2021. This document serves as the methodological overview and provides the detailed data and assumptions supporting the results in the Analysis and other documents that may reference the results. In this 2021 Technical Supporting Document, the previous analyses that focused on July 2006 through June 2020 will be referenced as the Historical Analysis with subsequent analyses focusing on respective fiscal years.



3 Context and Objective

3.1 Purpose of the Report

The 2021 Economic Impact Analysis estimates the economic impact of the Authority's expenditure from July 2020 through June 2021 including job-years, labor income, and economic output.⁴ This analysis reports the economic impacts of the project on the State of California, as well as at regional, sub-regional, and national levels. A summary of the geographic breakdown of impacts can be found in *Section 4: Economic Impact Overview* and *Section 6: Results*.

The scope of this analysis is primarily limited to the economic impacts from historical project expenditures. Projected impacts by Project Segment are also included in this analysis that look to estimate the anticipated job-years, labor income, and economic output of project expenditures upon completion of Phase 1. This analysis does not attempt to quantify the many long-term benefits and impacts associated with future rail operations, such as increased accessibility, reduced vehicle miles traveled and vehicular congestion, increased safety, greenhouse gas emission reductions, increased economies of agglomeration and other benefits. Some of these benefits are described in the 2014 California High-Speed Rail Benefit-Cost Analysis and 2019 Equivalent Capacity Analysis Report or will be covered in separate analyses to be contained in future reporting.^{5, 6} Additionally, this analysis does not consider the economic effects resulting from changes in consumption due to the collection of revenues from operations. Lastly, the results of this analysis reflect the gross economic benefits of the project and do not consider the potential benefits of alternative uses of the state and federal funding sources used to pay for the project, including the potential benefit to other programs, services, or the State of California had funds not been allocated to the Program.

3.2 Literature Review and Validation

Several studies have estimated the economic impacts and overall benefits of investment in transportation infrastructure in general, and of the Program specifically. A review of studies was conducted for the previous Historical Analysis Technical Supporting Document to provide analytical context, ensure a methodology consistent with industry standards, and benchmark results when applicable.

For the Historical Analysis, the Authority requested review and validation from several industry experts both within and outside of government who reviewed inputs, assumptions, methodology, and outputs. Reviewers included the University of the Pacific, the California High-Speed Rail Peer Review Group, the State of California Department of Finance, and the California Department of Labor. All reviewers were positive in their review that the methodology used met industry standards. The FY 2020-2021 Analysis followed largely similar methods and approaches as the Historical Analysis. Thus, the review and validation conducted at that time remains relevant.

⁴ Technical definitions of these economic impact metrics are provided in Section 4.1 of this report

⁵ https://hsr.ca.gov/wp-content/uploads/docs/about/business_plans/BPlan_2014_Sec_7_CaHSR_Benefit_Cost_Analysis.pdf

⁶ https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_2019_Equivalent_Capacity_Analysis_Report.pdf



4 Economic Impact Overview

4.1 Types of Economic Impacts

The results of the Analysis are expressed in standard economic metrics including job-years, labor income, and firm output. The following section provides definitions of these metrics.

4.1.1 Job-Years and Full-Time Equivalents

In the context of the Program's economic impacts, job-years are defined as the equivalent number of one-year-long, full-time jobs supported by the project. For example, if one full-time job is supported for two years, it therefore represents two job-years. In 2009, the White House Council of Economic Advisers (CEA) produced estimates of job creation that would result from ARRA; those estimates were expressed in job-years because, as the report describes, "for some purposes, looking at the effects at a single point in time is not the most useful approach."⁷ The 2021 Analysis, and prior analyses considered historical, project-related spending over a 14-year period. Because the volume of spending was highly variable from year to year, throughout the analysis period, especially in the early years, and because the types of services procured with that spending changed substantially over the life of the project, reporting the results of this analysis as job-years is most appropriate.

Full-time equivalent (FTE) is a term frequently employed by agencies and other public employers. As described by the U.S. Government Accountability Office, an FTE is a measure of employment relative to the full-time hourly obligation for a given job.⁸ That is, if a job entails a 35-hour workweek with 15 days of paid time off, the FTE for that role would be equal to 1,700 annual hours—therefore, an employee who worked 850 hours in that role in a given year would be described as 0.5 FTE. This allows for standardization between full-time and part-time positions to create one easy-to-understand estimate of the total amount of employment generated. Full-time equivalents that were directly supported by the project were estimated based on a detailed review of historical invoices detailing employee hours worked. For the purposes of this analysis, FTEs calculated from this data review represent the equivalent of job-years as defined above. In other words, one FTE supported on a contract is equal to one direct job-year supported.

4.1.2 Labor Income/Earnings

In addition to jobs supported, input-output models also report the labor income generated by the project.⁹ This figure includes all forms of employment income, including compensation (wages, benefits, and payroll taxes) firms paid to employees, and income earned by self-employed workers or unincorporated sole proprietorships.

4.1.3 Output

The final economic-impact metric reported in this analysis is output, which represents the total value of industry production associated with the Authority's expenditures. For service-industry sectors, this value is equal to total sales, while for retail sectors, output is equal to businesses' gross margin. For manufacturing sectors, output is equal to sales, less any change in inventory.

⁷ <https://obamawhitehouse.archives.gov/administration/eop/cea/Estimate-of-Job-Creation/>

⁸ https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/memoranda_2010/m10-08.pdf

⁹ See Section 5.2.1 *IMPLAN Methodology* for more information on input-output models



4.1.4 Direct, Indirect, and Induced Economic Impacts

Direct impacts are the economic effects generated by direct spending on a project. In the case of California high-speed rail, these impacts result from the Authority's spending on Authority employees as well as its contractors (including both construction contractors and professional services).

Indirect impacts are the economic effects that occur in the next step in the supply chain. These impacts are dispersed among the industries that supply intermediate goods and services to firms with direct impacts. For California high-speed rail, these impacts can be observed in a diverse range of industries across the state. For example, this may include the materials producers who supply the construction firms, as well as the technology vendors who service the professional service firms.

Induced impacts are the economic effects that result when income earned by direct and indirect employees gets spent elsewhere in the economy. For example, both the civil engineer working full-time on California high-speed rail and the software engineer who codes a new version of AutoCAD spend their household income on housing, groceries, and other expenses in California.

4.2 Program Expenditure

For the period covered in this report, 2020-21, approximately \$1.25 billion of expenditure took place, for a total program investment of just under \$8.55 billion from July 2006 to June 2021. Funding for these contracts has been provided by a mix of federal and state sources.

4.2.1 Program Expenditure by Category

Program investments can be broken down into five general expenditure categories:

Construction – expenditure in this category includes the Design-Build (DB) contractors, California State Route 99 Relocation project being undertaken by Caltrans (through a contractor), portions of Project and Construction Management (PCM) contracts costs, Los Angeles Union Station funding, and Caltrain's electrification of the Peninsula Corridor. Tasks under the construction category include final design, construction administration, utility relocation, site clearing and civil works construction.¹⁰

Planning/Environmental – expenditure in this category includes Regional Consultant (RC) and Environmental and Engineering (E&E) costs. Tasks under the planning/environmental category cover the preparation of project site-specific Environmental Impact Report/Environmental Impact Statement (EIR/EIS) documents and preliminary engineering for all the project sections.¹¹ Although other parts of the organization also perform duties related to the planning and environmental clearance processes, simplifying the variety of services provided is appropriate for the purposes of this economic analysis.

The project has been divided into ten separate sections along the alignment. Each of the sections will go through the EIR/EIS process before permitting, right-of-way (ROW) acquisition, and construction can begin in the area. The project sections are listed in the following page.

¹⁰ The categories used in this analysis and described in this section are meant to be a summary for purposes of this analysis. The Authority's financial reporting may provide different breakdowns to manage and report on the program.

¹¹ The environmental review process must comply with the standards set forth in both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) review process. As such, both EIR and EIS documents are required.



- San Francisco to San Jose
- San Jose to Merced
- Merced to Sacramento
- Merced to Fresno
- Merced to Fresno – Central Valley Wye
- Fresno to Bakersfield
- Fresno to Bakersfield (Locally Generated Alternative)
- Bakersfield to Palmdale
- Palmdale to Burbank
- Burbank to Los Angeles
- Los Angeles to Anaheim
- Los Angeles to San Diego

Project Sections above are shown on the Authority's [Project Sections & Station Communities Interactive Map](#).

Program Administration – expenditure in this category includes Authority expenses and the Rail Delivery Partner (RDP)/Program Management Team (PMT) contracts costs. Tasks under the program administration category cover program management, program integration and coordination, and overall program delivery tasks. Although the Authority and RDP perform work across the other categories, they are included separately in this summary category for the purposes of this analysis.

Real Property Acquisition – expenditure in this category includes right-of-way (ROW) support services (mapping, surveying, appraisal, negotiation, and acquisition) contracts costs, relocation expenses, and land acquisition purchase payments.

Other – expenditure in this category includes Resource Agencies (RA), Third-Party Agreements (TPA), legal, financial services, and other miscellaneous contracts costs.

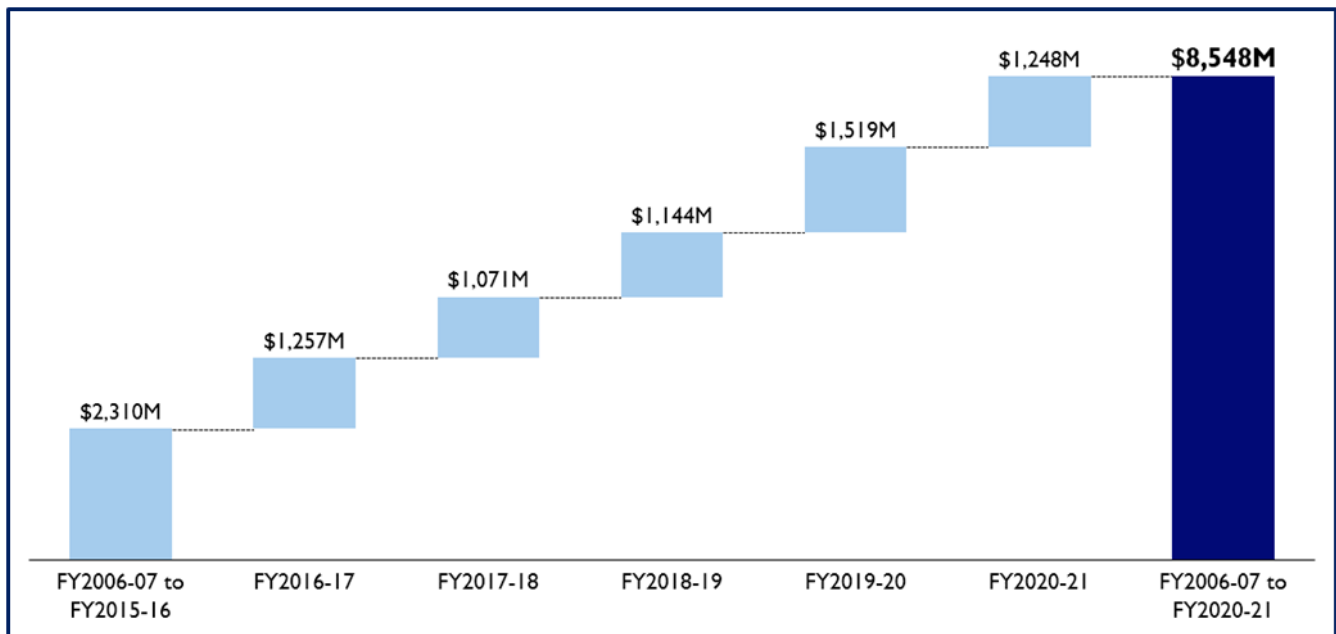
- RA contracts are agreements with local, state, and federal government agencies for station design, permits, review fees, etc.
- TPA contracts are agreements with utilities, railroads, and other stakeholders for utility relocation work along the alignment.
- Legal contracts are for various legal advisory services for the Program.
- Financial services contracts are for financial advisory services for the Program.

Bookend Projects – expenditure in this category primarily reflects projects that are defined under SB 1029 (Item 2665-104-6043 as added to Section 2.00 of the Budget Act of 2012) to receive specific project investments from Prop 1A and other commitments that the Authority made through agreements with local agencies. Authority expenditure for these projects includes Peninsula Corridor Electrification Project (Caltrain Electrification) and the San Mateo Grade Separation in the North as well as Rosecrans/Marquardt Grade Separation and Los Angeles Union Station in the South. This analysis also includes funding for the Caltrain Electrification and Los Angeles Union Station planning funds in FY 2020-2021. Moving forward, additional funds may be allocated to additional bookend projects.

The total expenditure by economic analysis timeframe is shown in **Figure 2** in the following page. Prior fiscal year historical expenditure data reflect slight changes from previous economic impact analyses due to data reconciliations and accrual adjustments reflected in the Authority's monthly financial reports.



Figure 2. Program Expenditure (\$ millions) by Economic Analysis (July 2006 – June 2021)^{12,13}



Out of the approximately \$1.25 billion of total program investments in 2020-21, \$1.16 billion was used as an input to the economic impact input-output modeling described in this report, with \$1.14 billion of that spending taking place in California. The economic impact calculations in this study exclude expenditure spent on ROW land acquisition payments. Payment to property owners for land acquisition is considered an economic transfer and is therefore excluded from the economic impact analysis. However, support activities for land acquisition, such as appraisal, surveying, and geotechnical services, do generate economic impacts and are included in the analysis.

4.3 Geographies Analyzed

The report analyzes the impact of program investments over several different geographies – ranging from statewide to specific regions and counties within California. See *Section 6: Results* for detailed analysis.

4.4 Analysis Horizons

This study analyzes economic impacts of expenditure during 2020-21. Additionally, the results will include the total impacts supported by the program by adding previous analyses that analyzed historical expenditures through June 2020.

¹² Source: Total Project Expenditures with Forecasts Reports, August 2021

¹³ Totals may not sum because of rounding



5 Methodology

The impacts presented in this report are estimated using an industry-standard approach. Project costs are aggregated and assigned to appropriate industry sectors to calculate the associated economic impacts at the statewide level by applying IMPLAN model multipliers. Then, spending profiles allocating share of spend by zip code by contract are created and applied to the full contract spend amounts in 2020-21. This approach relies on previous detailed invoice reviews into contracts.

IMPLAN

IMPLAN is a widely used, industry-standard input-output model that quantifies the aggregate economic impact of direct spending in a local economy. Economists use input-output models to assess and quantify the broader economic impacts, such as additional labor income and increased demand in intermediate goods and services, generated from an initial change in spending within a particular industry and in a given geography.

See *Section 5.2.1: IMPLAN Methodology* for a more in-depth discussion of IMPLAN models.

The approach involves a detailed review of contract-level costs, including invoice hours (which are converted to full-time equivalents), and produces estimates for economic impacts at the county and regional levels, in addition to statewide totals. This approach provides a reasonable range of outputs that can be used as a benchmark against other economic impact studies, and as estimates for the spatial distribution of economic impacts resulting from project investments.

5.1 Data Collection

As discussed above, expenditure data was collected as inputs to the IMPLAN input-output model. These inputs were categorized by industry sector and location at the zip code level by utilizing contract-level historical invoice cost data to create geographic spending profiles. The following sections detail the data collection process used to develop these inputs.

5.1.1 Data Collection Strategy

An inventory of all existing data sources on expenditure, labor hours, and work locations between July 2020 to June 2021 was completed (see the 2017 Technical Supporting Document for more information¹⁴). The data gathering process for the annual economic impact analysis relies on several different sources for collecting expenditure amount and geographic location, including but not limited to invoices, internal Authority invoice tracking sheets, right of way tracking sheets, and construction package expenditure tracking. Multiple sources of information are pulled together to develop a fiscal year (FY) spending profile that is used to model economic outputs using IMPLAN modeling software.

¹⁴ https://www.buildhsr.com/hsrinvestment/pdf/FY1617_CHSRA_Economic_Impact_Technical_Memorandum_FINAL_01122018_v2.pdf



The Authority utilizes historical data from the past three FYs to develop geographic spending profiles for the large professional services contracts. This historical expenditure data was combined and weighted to create a percent of contract spending breakdown by zip code that can be applied directly to the full contract spending amount in future FYs. This approach relies on previous bottom-up analyses into the selected contracts.

To ensure that the geographic breakdowns remain relevant with changing geographies for the large professional services contracts over time, detailed invoice review takes place every three years, a requirement that will coincide with the 2023-24 Economic Impact Analysis. The construction contracts are analyzed for geographic spending every fiscal year.

Enhancements to this methodology:

- Both WSP and KPMG LLP will be analyzed on an annual basis due to the effectiveness of the data available.
- Any new contract in a current FY that has spending above a certain amount (identified each year) on an annual basis will still go through contract review to develop the baseline for geographic spending.



5.1.2 Geographic Assumptions

The Authority has gathered specific geographic detail on where work was completed for a number of large contracts. This geographic information allows the Authority to develop geographic spending profiles by contract for the 2021 Economic Impact Analysis and describe exactly where the economic impacts of its spending are felt, particularly within the State of California. The contractor outreach process varied slightly depending on the contract category.

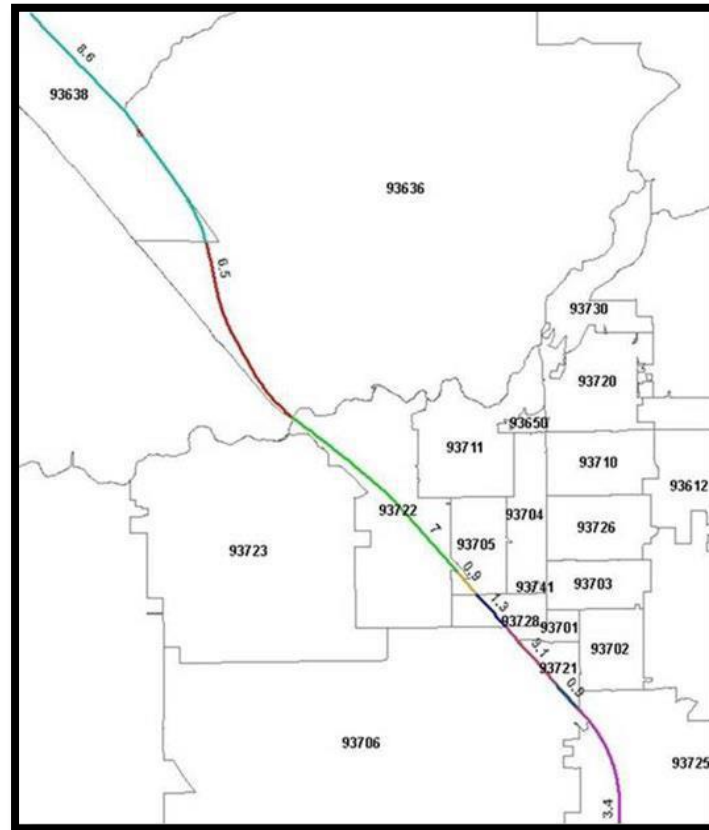
For professional service contracts, the goal was to match staff members with an office location where the work was performed. Many prime contractors provided a list of employee names and office locations for their direct employees. As described in the previous section, when this was not available, prime contractor's employees were assumed to have completed their work in the same office where they were employed in the previous geographic spending profile, or from a web search of employee or firm office addresses. For staff whose office addresses were not available, hours and expenditures were assigned to the most logical office location.¹⁵ Subcontractors were assumed to have completed all their work within the same office, the location of which was assigned per the same criteria.

For design-build contracts, subcontractor payments were allocated to the main regional office of that subcontractor. First, prime contractor costs were categorized as either professional services costs or construction costs. Next, professional services costs were assigned to the project office of each construction package (CP): CP1's project office is in Fresno, CP2-3's project office is in Selma and CP4's project office is in Wasco. Construction costs were allocated by linear miles per zip code along the alignment for each CP. This was done by plotting each of the CP alignments over a shapefile of zip codes, and then calculating the percentage of the total alignment length that falls within each zip code.

Figure 3 in the following page shows an example of the CP1 alignment-zip code map overlay. This same process was undertaken for Caltrans' work on SR-99 realignment.

¹⁵ Expenditures were assigned to the California office where available. For contractors with more than one office in California, expenditures were assigned to either the largest office in the state, or the office located closest to where the work was being performed. Expenditures by out-of-state subcontractors were assigned to the head office.



Figure 3. CP1 Alignment Zip Code Map Overlay

The location of work for costs not included in the major contracts (such as Authority costs, ROW services, ROW relocation, Resource Agencies, or Third-party Agreements) have been obtained through a variety of outreach and data gathering methods. Location of Authority costs were allocated based on the number of staff and their authorized salaries for each of the Authority's offices. ROW relocation costs were allocated to the recipient of the compensation. For other contracts such as ROW services firms, Resource Agencies, and Third-party Agreements, the study team determined the location of prime contractor offices based on either internal Authority tracking sheets, the 2019-20 geographic spending profile, or a web search.

5.1.3 Data Quality Assurance / Quality Control

To ensure data reliability, the study team conducted thorough quality assurance / quality control procedures in every step of the data collection process including invoice review, contractor outreach, and data gap interpolation. Consultant costs submitted by prime contractors or tabulated from submitted invoices were validated against the payment logs of the Authority's Financial Office. This was especially important, considering the various ways in which data was formatted. Employee office locations submitted by contractors were validated through web searches to confirm that companies have offices in the locations that they provided.



5.2 Analysis Approach

As described previously, the Analysis impacts presented in this report were estimated using input-output modeling software IMPLAN.

5.2.1 IMPLAN Methodology

Following the data-collection tasks detailed in Section 5.1, the expenditure database was analyzed using input-output modeling, a technique that quantifies the aggregate economic impact of direct spending in a local economy. Input-output models describe the purchasing between different industries (the inputs) produce each of the industries' outputs. Input-output models quantify the total economic activity across industries generated by a particular type of spending. For example, new expenditures in the construction sector will cycle through the intermediate steps in the supply chain and generate increased demand for intermediate goods and services ranging from concrete to carpenters. In addition, input-output modeling considers how the additional labor income generated by spending in a particular industry—e.g., the salaries earned by carpenters employed by the Program's contractors— will translate into increased consumer spending in the form of household expenditures.

For this analysis, IMPLAN was used to calculate economic impacts at the statewide level, at the regional level, and at the county level (for select counties). The analyses used pre-defined regional economies for states and counties embedded within IMPLAN. The expenditure data used for inputs were expressed in nominal dollars; IMPLAN is capable of interpreting inputs from different dollar-years and performing the conversion to constant dollar-years.¹⁶ Similarly, IMPLAN can generate outputs in any desired dollar-year. For this analysis, all inputs and outputs were expressed in 2021 dollars.

¹⁶ The base year for IMPLAN's multipliers is 2018, meaning that the multipliers reflect industry relationships as observed in 2012. This is industry standard and has little effect on the results.



6 Results

This section details the results of the 2020-21 as well as total impacts to date from prior analyses. See the Technical Supporting Documents for the Historical Analysis for details on the first 10 years studied.

Impacts are shown over a variety of geographies and results detail specific impacts in more depth. As discussed in the previous section, this analysis shows geographic outputs based on location of the work being performed or where companies are located,

rather than where those doing the work live. All inputs and results are expressed in constant 2020 dollars.

6.1 California Economic Impacts

For 2020-21 the Authority invested \$1.25 billion in planning and construction of the high-speed rail system, of which approximately \$1.16 billion was included in this fiscal year analysis and \$1.14 billion was retained in the State of California.¹⁷ This investment supported 10,130 job-years of in-state employment (including direct, indirect, and induced impacts) and generated \$2.2 billion in total in-state economic activity. Over the life of the project, Authority investments supported up to 70,500 job-years of employment and generated up to \$13.7 billion in total economic output in California.

As mentioned above, most of this economic activity has taken place in the State of California, with 99% of FY 2020-2021 investment expended to companies and workers in the state. This estimate was developed using the spending profile data, with spending in non-California zip codes filtered out. From analysis inception (FY 2006-2007) until June 2021, approximately 96% of the project expenditure has taken place in the State of California.

Table 1. California Economic Impacts, 2020-21 & Program Total

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	4,700	\$460 M	\$1,140 M
Indirect Effects	2,400	\$180 M	\$510 M
Induced Effects	3,100	\$190 M	\$580 M
2020-21 Total	10,100	\$840 M	\$2,230 M
Program Total¹⁸ (July 2006 – June 2021)	64,400 - 70,500	\$4,760 M - \$5,230 M	\$12,700 M - \$13,660 M

¹⁷ \$1.14 billion does not include ROW and other expenditure not captured in the economic impact analysis.

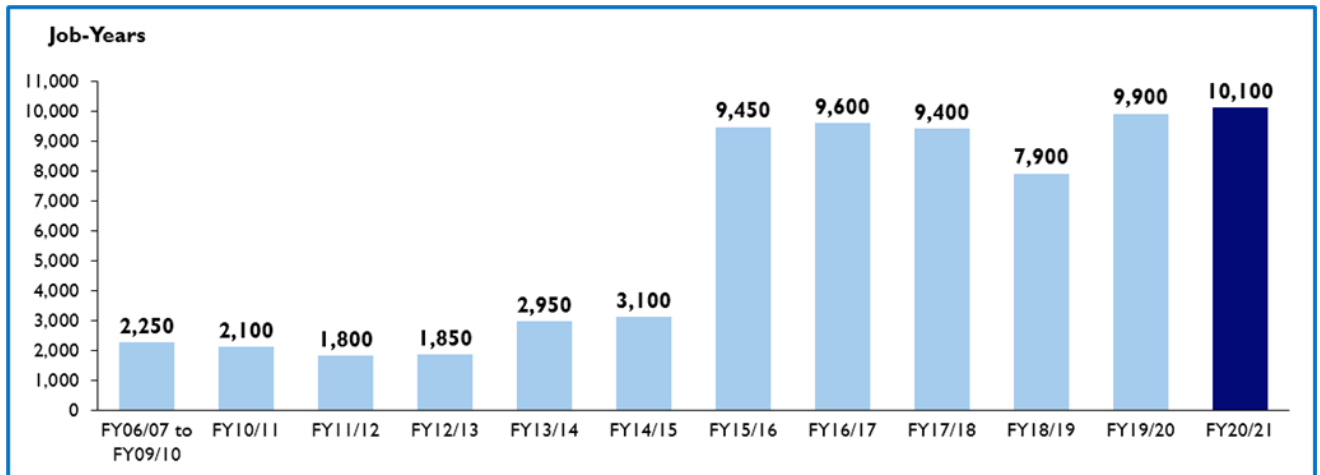
¹⁸ Totals may not sum due to rounding.



6.2 Employment Impact Overview

Job-years supported by the Authority’s expenditures have grown significantly over the past several years as construction commenced and ramped up in the Central Valley. **Figure 4** shows this growth in job-years from 2006-07 to the current analysis, with a noticeable increase starting in 2014-15, when construction in the Central Valley began. The historical jobs analysis took the results of the top-down statewide approach for the total impact shown in the Historical Analysis for statewide impacts and allocated them to each fiscal year based on the share of total expenditures that took place in that fiscal year.

Figure 4. Statewide Total Supported Job-Years of Employment per Fiscal Year, July 2006 - June 2021¹⁹



¹⁹ Note: includes direct, indirect, and induced



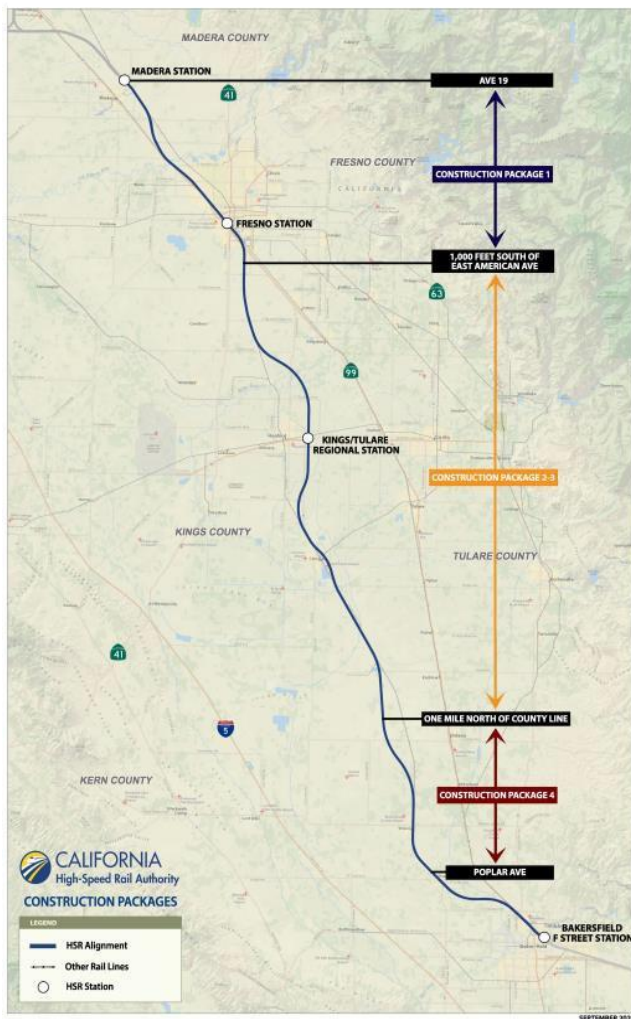
6.3 Breakdown by Region

The analysis breaks down the total expenditure by region to show the detailed impact throughout California. These regions include the Central Valley, Sacramento, Bay Area and Southern California. The Central Valley has seen the largest overall impact in job-years of employment, labor income and economic output because of increased construction investment over the past three years. However, as construction spending continues to ramp up, its effects are beginning to be seen in the Sacramento, Bay Area, and Southern California regions as local firms from those areas join construction teams in the Central Valley.

6.3.1 Central Valley Region

For this analysis (and as commonly defined), the Central Valley region includes the following counties: San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern— running through the center of California. The Central Valley section of the system is considered the “back bone” of the project with its connections to the Bay Area and the Los Angeles Basin being critical to improving accessibility and the mobility options of the region’s population.

Figure 5. Central Valley Segment (CVS) Construction Packages



Many communities in the Central Valley have been designated as disadvantaged based on a combination of economic and environmental conditions analyzed by the California Environmental Protection Agency.

Civil works construction for the first 119 miles of the system is ongoing through the CP1, CP2-3 and CP4 design-build contracts. **Figure 5** shows each of the construction package segments along the project alignment. Each team has set up a local project and construction management office in the Central Valley and is doing the majority of their work locally and on the construction sites.²⁰

Program investments have had significant impact on the Central Valley economy, generating nearly 5,030 job-years of employment and over \$950 million in total economic activity from July 2020 to June 2021.

Table 2 shows direct, indirect, and induced economic impacts of program investments in the Central Valley in terms of job-years of employment, labor income, and economic output generated during the analysis period for both FY 2020-2021 and since 2006.

²⁰ The CP1 project office is in Fresno, the CP2-3 project office is in Selma and the CP4 project office is in Shafter.

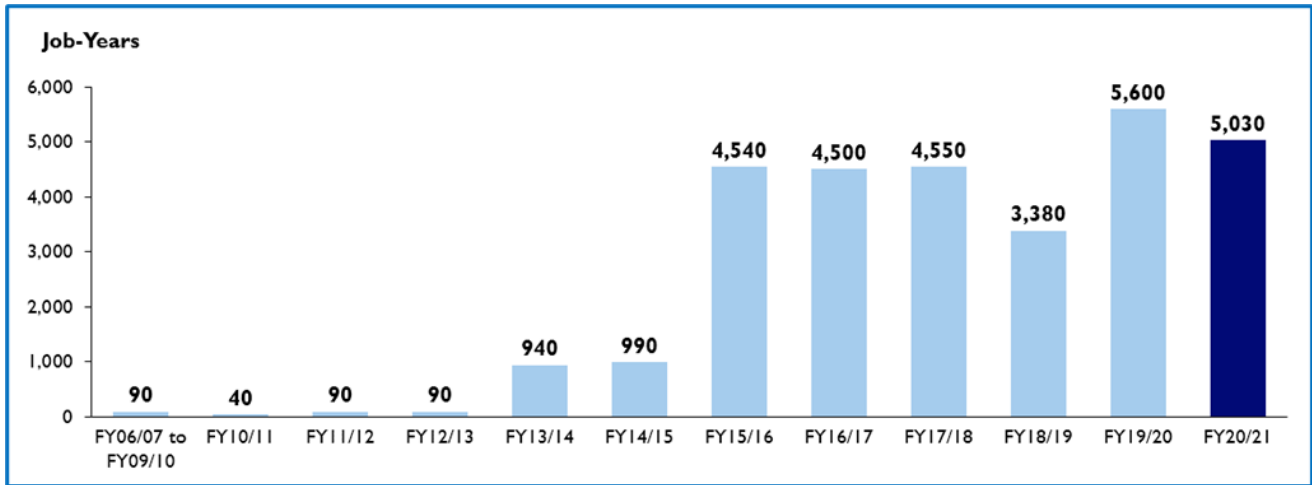


Table 2. Central Valley Economic Impacts, 2020-21 & Program Total²¹

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	2,820	\$210 M	\$590 M
Indirect Effects	1,060	\$60 M	\$180 M
Induced Effects	1,150	\$60 M	\$180 M
2020-21 Total	5,030	\$330 M	\$950 M
Program Total (July 2006 – June 2021)	29,600	\$1,690 M	\$5,420 M

Figure 6 shows the approximate job-years of employment generated in the Central Valley per fiscal year.

Figure 6. Central Valley Region Total Supported Job-Years of Employment per Fiscal Year, July 2006 – June 2021²²



²¹ Totals may not sum due to rounding.

²² Note: includes direct, indirect, and induced.



6.3.2 Sacramento Region

For purposes of this analysis, the Sacramento region includes Sacramento, Yolo, Placer, El Dorado, Sutter, and Yuba counties all located north of the Central Valley. The Authority and RDP headquarters are co-located in downtown Sacramento, comprising around 475 Authority and RDP staff members.

Most of these staff have been in the government and professional services fields providing overall guidance and oversight for the program.

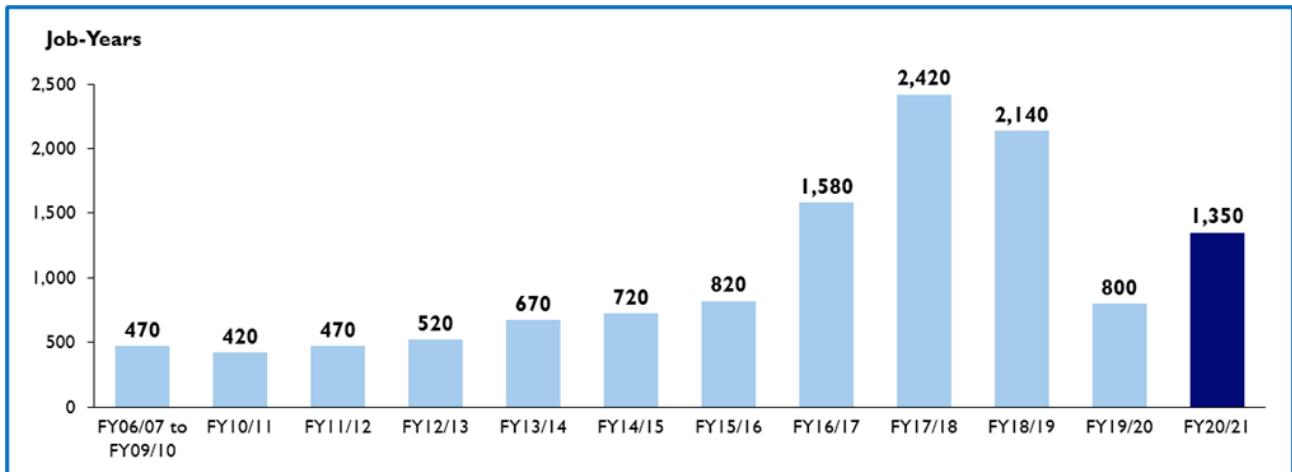
Table 3. Sacramento Region Economic Impacts, 2020-21 & Program Total²³

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	610	\$60 M	\$140 M
Indirect Effects	350	\$20 M	\$60 M
Induced Effects	390	\$20 M	\$60 M
2020-21 Total	1,350	\$100 M	\$260 M
Program Total	12,650	\$900 M	\$2,090 M

(July 2006 – June 2021)

Figure 7 shows the approximate job-years of employment generated in the Sacramento region per fiscal year.

Figure 7. Sacramento Region Supported Total Job-Years of Employment per Fiscal Year, July 2006 – June 2021²⁴



²³ Totals may not sum due to rounding.

²⁴ Note: includes direct, indirect, and induced.



6.3.3 Bay Area Region

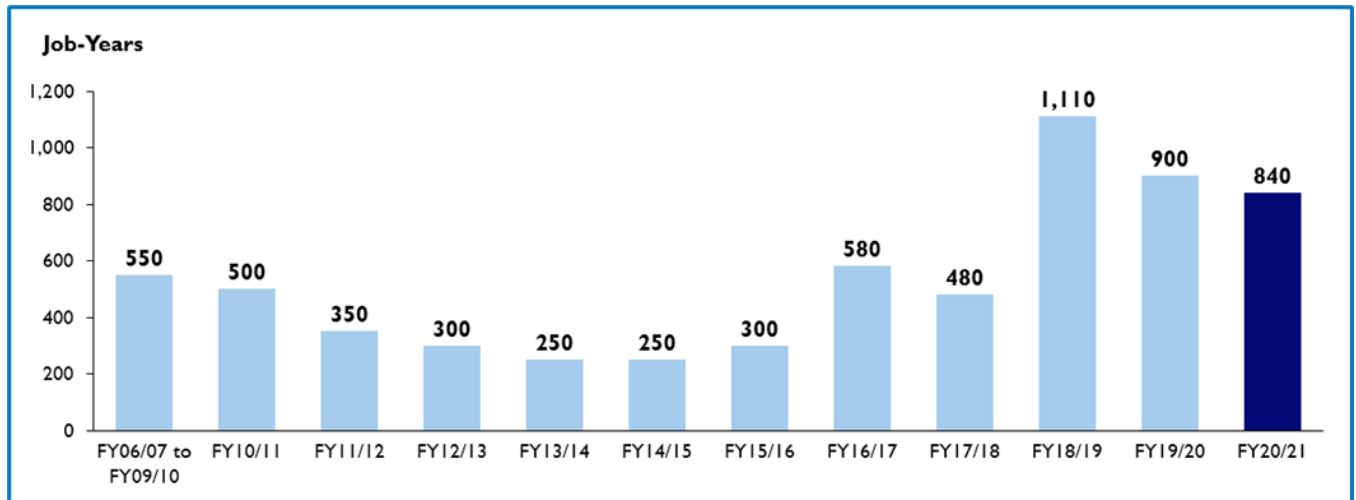
The Bay Area region includes the following counties: Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Sonoma, Napa, and Solano. These nine counties are part of the Metropolitan Transportation Commission region. The Bay Area has seen mostly planning, engineering, and environmental work with only a limited number of Bay Area firms working on the construction in the Central Valley.

Table 4. Bay Area Region Economic Impacts, 2020-21 & Program Total²⁵

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	480	\$60 M	\$130 M
Indirect Effects	150	\$20 M	\$40 M
Induced Effects	210	\$20 M	\$40 M
2020-21 Total	840	\$90 M	\$220 M
Program Totals (July 2006 – June 2021)	6,440	\$620 M	\$1,390 M

Job-years estimates in FY 2018-2019 have increased in the Bay Area Region, as can be seen in **Figure 8**. This is due to Caltrain spending, which is discussed more on the next page.

Figure 8. Bay Area Region Total Supported Job-Years of Employment per Fiscal Year, July 2006 – June 20



²⁵ Totals may not sum due to rounding.

²⁶ Note: includes direct, indirect, and induced.



6.3.4 Southern California Region

For purposes of this analysis, Southern California includes Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. These six counties are either in the Southern California Area Governments or San Diego Area Governments regions.

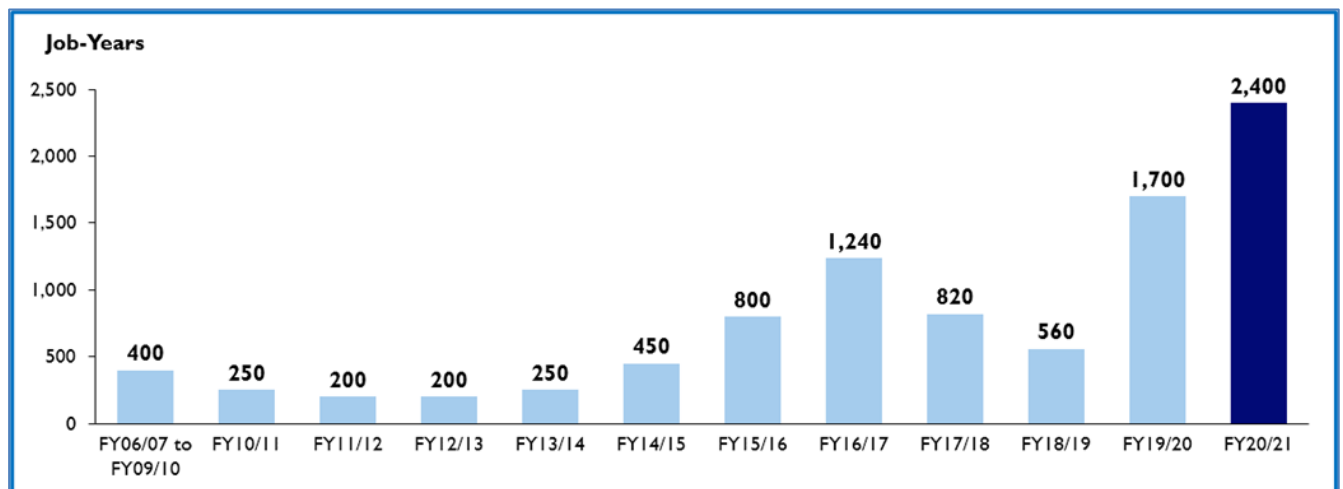
The Southern California region has seen mostly planning, engineering, and environmental work with a growing number of Southern California firms working on the construction in the Central Valley. Additionally, economic benefits have begun to accrue before high-speed rail construction starts in the region as connectivity and bookend projects in the region undergo construction.

Table 5. Southern California Region Economic Impacts, 2020-21 & Program Total²⁷

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	1,080	\$100 M	\$260 M
Indirect Effects	590	\$40 M	\$120 M
Induced Effects	730	\$40 M	\$130 M
2020-21 Total	2,400	\$180 M	\$510 M
Program Totals (July 2006 – June 2021)	9,200	\$680 M	\$1,780 M

Figure 10 shows the approximate job-years of employment generated in the Southern California region per fiscal year.

Figure 10. Southern California Region Total Supported Job-Years of Employment per Fiscal Year, July 2006 – June 2021²⁸



²⁷ Totals may not sum due to rounding.

²⁸ Note: includes direct, indirect, and induced.



6.3.4.1 Additional Southern California Investments

The Authority is also investing in two projects in Southern California that will support future connections of the high-speed rail project. As of December 2021, the Authority has supported \$40.6 million in investment in these projects. The calculated economics impacts of that investment have been included with the annual Analysis for the applicable geographic locations. For the Rosecrans/Marquardt grade separation, environmental clearance is complete. Metro has closed escrows for the required right-of-way acquisitions and is coordinating with Southern California (SoCal) Edison on upfront utility work. Metro plans to begin project construction in Spring 2022 and the new grade separation is expected to open in 2024. For the Link US run-through tracks project, the Final Environmental Impact Report (EIR) was certified by the LA Metro Board of Directors in June 2019. The Authority is serving as the federal lead agency for the Link US Environmental Impact Statement (EIS) based on an agreement between the Federal Railroad Administration (FRA) and the State of California. Metro staff are currently preparing this EIS.

Proposition 1A funds of \$76.7 million was approved for the Rosecrans/Marquardt Grade Separation Project. The Rosecrans Avenue and Marquardt Avenue intersection is considered one of the most hazardous grade crossings in the state, according to the California Public Utilities Commission. Metro, the lead agency on the project, estimates that more than 112 trains and more than 45,000 vehicles use the crossing daily.

Figure 11. Rosecrans/Marquardt Grade Separation Project Rendering



The Authority's partnership with the Los Angeles County Metropolitan Transportation Authority (Metro) is key to implementing high-speed rail improvements in Southern California. The Link US Project involves extensive track and station upgrades to Los Angeles Union Station (LAUS) in downtown Los Angeles. The upgrades will transform access for regional services as well as modernize the station into a world-class facility.



6.4 California County Impacts

The California counties that show the largest impacts in 2020-21 include Fresno County, Kings County, Kern County, Sacramento County, Madera County, San Mateo County, Los Angeles County, and Santa Clara County.

In 2020-21, Kings County has seen the biggest impacts with about 21% of total direct job-years supported as a proportion of the statewide analysis. Fresno County accounts for 18% of total program direct job-years, with Kern County accounting for 9%, Sacramento County accounting for 11%, Los Angeles County accounting for 11%, Madera County accounting for 8%, San Mateo County accounting for 5% and Santa Clara County accounting for 1%.

Table 6 shows the direct job-years (rounded to tens) attributed to the highest impact counties, with cumulative Program Totals from 2006 to current report.

Table 6. Direct Jobs for Selected California Counties²⁹

County	2020-21 Direct Job-Years	Program Totals Direct Job Years
Fresno	900	9,570
Sacramento	540	5,020
Los Angeles	570	2,320
Madera	380	2,120
Kern	440	2,070
Kings	1,050	2,520
Santa Clara	50	780
San Mateo	270	730

6.4.1 Key County – Fresno County

Fresno was the site of the system's groundbreaking in 2015 and has seen significant construction and economic benefits from the project thus far. About one-half of CP1 and one-fourth of CP2-3 is in the County. Further, the Authority's Central Valley regional office is in the City of Fresno.

Work in the Central Valley and Fresno has included planning, engineering, and site-work preparation, including right-of-way acquisition, in preparation for construction as well as major construction itself. In 2020-21, Fresno County accounted for an estimated 900 direct-job years in the Central Valley region, or 18% of total direct job-years generated in the region.

²⁹ Note: analysis of regions and counties does not capture spill-over effects from surrounding regions/counties that would be captured in the statewide analysis.



Table 7. Fresno County Economic Impacts, 2020-21 and Program Total³⁰

	Employment (job-years)	Labor Income	Economic Output
Direct Effects	900	\$70 M	\$190 M
Indirect Effects	330	\$20 M	\$60 M
Induced Effects	390	\$20 M	\$60 M
FY 2020-2021 Total	1,620	\$100 M	\$320 M
Program Totals (July 2006 – June 2021)	17,100	\$930 M	\$2,970 M

³⁰ Totals may not sum due to rounding.



Figure 12. California Counties, Total Supported Job-Years of Employment, 2020-21



6.5 HSR Project Segment Impact Forecast

In addition to measuring the economic impact of the annual expenditures related to Authority activities for 2020-21, the Analysis includes an evaluation of the economic impact of the total programmed expenditures for each section within the Phase 1 plan. The Phase 1 plan is broken into the following project sections: San Francisco to San Jose, San Jose to Merced, Merced to Fresno, Fresno to Bakersfield, Bakersfield to Palmdale, Palmdale to Burbank, Burbank to LA Union Station, and LA Union Station to Anaheim. The programmed expenditures by project section include track and structure construction, professional services, real estate transaction costs, rolling stock procurement and legal services. In alignment with the methodology outlined in Section 5, the purchase of right-of-way and other real estate is regarded as a transfer payment and is excluded from the economic impact analysis. System-wide programmed expenditures were allocated by segment via the percentage of Capex for each segment to ensure capture of all Project costs.

Table 8. Total Programmed Expenditures by Project Section, 2006-07 to 2033-34

Project Section	Total Programmed Expenditures (in nominal dollars)
San Francisco to San Jose	\$2.8 B
San Jose to Merced	\$14.6 B
Merced to Fresno	\$12.2 B
Fresno to Bakersfield	\$9.5 B
Bakersfield to Palmdale	\$18.8 B
Palmdale to Burbank	\$17.8 B
Burbank to LA Union Station	\$2.7 B
LA Union Station to Anaheim	\$2.4 B

Using the methodology described in Section 5, the programmed expenditures from FY 2006-07 to 2033-34 for each project section are organized by major asset category and attributed to their related industry sector based on the IMPLAN sectoring scheme. As the analysis includes evaluating expenditures in future years, the IMPLAN model applies a deflation factor to the future year impacts and generates outputs in constant 2021 dollars.



Table 9. Phase 1 Economic Impact by Project Section, 200-07 to 2033-34

Project Section	Total Employment (Job-Years)	Total Labor Income (2021\$)	Total Economic Output (2021\$)
San Francisco to San Jose	24,000	\$1.9 B	\$5 B
San Jose to Merced	118,000	\$9.1 B	\$25.4 B
Merced to Fresno	116,000	\$9.1 B	\$23.2 B
Fresno to Bakersfield	87,000	\$6.8 B	\$18 B
Bakersfield to Palmdale	139,000	\$10.7 B	\$31.5 B
Palmdale to Burbank	133,000	\$10.2 B	\$29.8 B
Burbank to LA Union Station	26,000	\$1.9 B	\$5 B
LA Union Station to Anaheim	23,000	\$1.8 B	\$4.4 B

The analysis measures the independent economic impact on households and businesses within the state of California for each project section included in Phase 1. The following analysis illustrates the independent impact of Phase 1 based on the programmed expenditures over the construction period to 2034.

Table 10. Total Programmed Expenditures by Project Stage, 2006-07 to FY 2033-2034

Project Stage	Total Programmed Expenditures (in nominal dollars)
Merced to Bakersfield	\$21.5 B
Valley to Valley Expansion	\$16.5 B
Phase 1 Buildout	\$42.8 B
Total Phase 1	\$80.8 B

Using the methodology described above, the programmed expenditures included in each stage of Phase 1 are attributed to the corresponding industry sector and evaluated in the IMPLAN input-output model. The results below illustrate the incremental economic impact of each stage; added together, they represent the total economic impact of Phase 1.

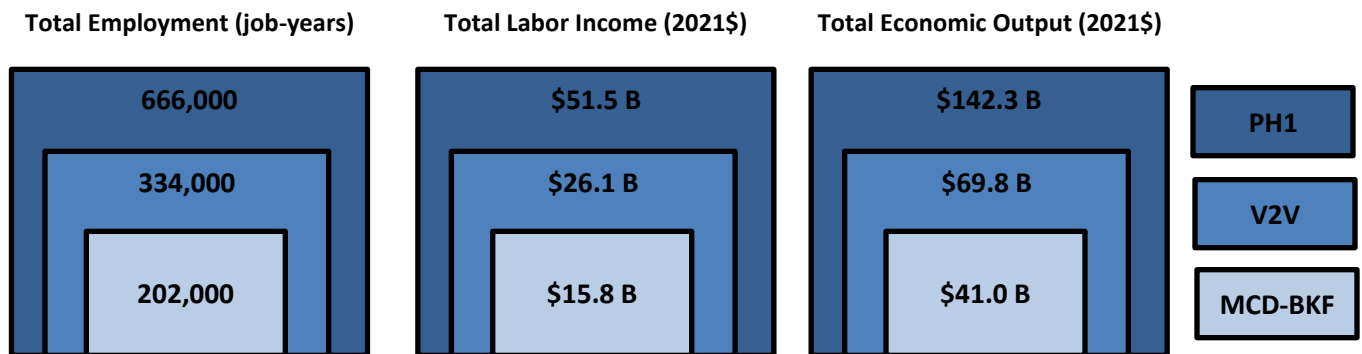


Table 11. Phase 1 Economic Impact by Project Section, 2006-07 to 2033-34

Project Section	Total Employment (Job-Years)	Total Labor Income (2021\$)	Total Economic Output (2021\$)
Merced to Bakersfield Section	202,000	\$15.8 B	\$41.0 B
Valley to Valley Expansion	132,000	\$10.3 B	\$28.8 B
Phase 1 Buildout	332,000	\$25.4 B	\$72.5 B
Total Valley to Valley	334,000	\$26.1 B	\$69.8 B
Total Phase 1	666,000	\$51.5 B	\$142.3 B

The figure below illustrates the cumulative economic impact of each stage of the Phase 1, which include Merced to Bakersfield (MCD-BKF), Silicon Valley to Central Valley Line (V2V) and Phase 1 buildout (PH1), as their total value following their completion. The analysis measures the following metrics: total employment (in job-years), total labor income (in 2021 dollars) and total economic output (in 2021 dollars).

Figure 13. Phase 1 Cumulative Economic Impact by Project Stage, 2006-07 to 2033-34



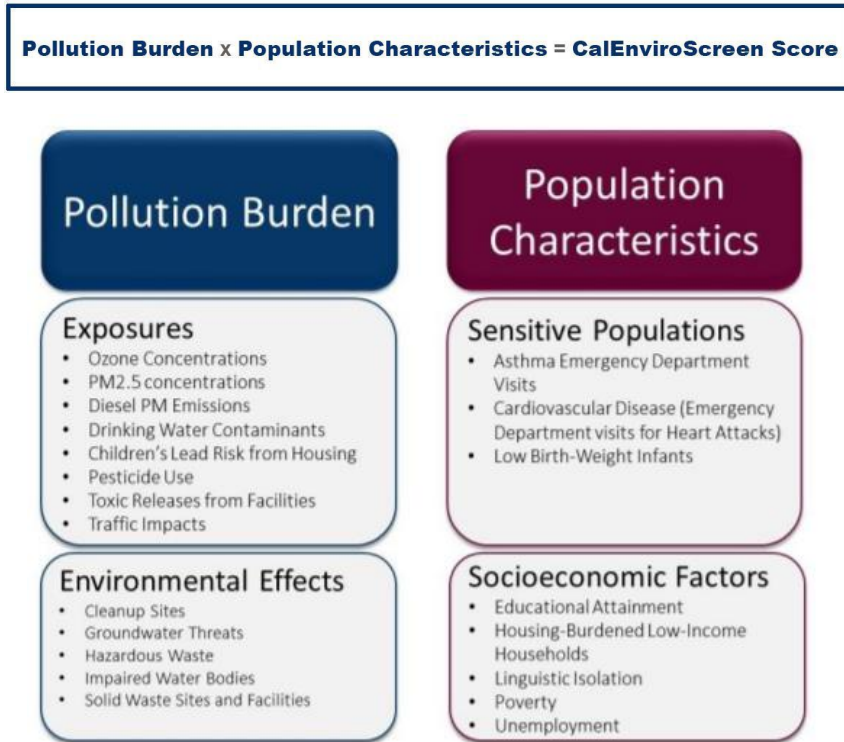
6.6 Disadvantaged Communities and Small Business

The Authority is committed to ensuring small businesses and disadvantaged communities throughout California benefit and play an active role in building the Program. Investments made by the Program have promoted employment and business opportunities for small and disadvantaged businesses and workers.

California recognizes specific areas as disadvantaged communities based on a combination of environmental and socioeconomic factors. This analysis is conducted by the California Environmental Protection Agency (CalEPA) using a tool called CalEnviroScreen. Disadvantaged communities are defined as those that score in the top 25% of the most impacted communities based on an index made up of four components in two broad groups. Exposure and Environmental Effects components comprise a Pollution Burden group, and the Sensitive Populations and Socioeconomic Factors components comprise a Population Characteristics group.



Figure 14. CalEnviroScreen 4.0 Indicator and Component Scoring



An advantage to starting construction on the high-speed rail system in the Central Valley is the opportunity that construction generates for residents of disadvantaged communities that are disproportionately (though not exclusively) located in the Central Valley. Under the guidelines of the ARRA grant, one of the priorities to be considered for project selection was whether the project was in an Economically Distressed Area. Project investments in the Central Valley have positively affected the local economy, stimulating economic activities and generating employment. **Figure 14** shows the locations of disadvantaged communities in the state.

Fifty-seven (57%) of the investment in the system in 2020-21 occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. Additionally, fifty-six (56%) of the total program investment from July 2006 through June 2021 occurred in designated disadvantaged communities.



Figure 15. Disadvantaged Communities in California and Project Alignment



From the implementation of the Authority’s Small and Disadvantaged Business Enterprise Program in 2012, professional services contractors collectively have a 28.2% small business utilization (1.8% lower than the 30% target), while design-build contractors are working to attain their utilization target as construction activities ramp-up. As of July 2021, 634 small businesses were either committed, utilized, or actively working on the project.



Figure 16. Small Business Participation in the California High-Speed Rail Program through July 2021



Furthermore, the Authority Board of Directors approved a Community Benefits Policy in 2012 to ensure that jobs created through program investments benefit disadvantaged communities. The Authority's Community Benefits Agreement contains a Targeted Worker Program which ensures that 30% of all project work hours are performed by National Targeted Workers, and at least 10% of those work hours shall be performed by Disadvantaged Workers, including veterans.^{31,32}

As of July 2021, more than 6,000 construction labor workers have been dispatched to the three high-speed rail construction packages in the Central Valley. Each of the project's design-builders is implementing the Targeted Worker Program, where 30 percent of all project work hours are performed by workers from disadvantaged communities where annual household incomes range from \$32,000 to \$40,000. Out of the more than 6,000 jobs created, 2,230 went to residents from Fresno County, 1,039 from Kern County, 217 from Kings County, 291 from Madera County, and 588 from Tulare County.

³¹ A Targeted Worker is an individual whose primary place of residence is within an Economically Disadvantaged Area or an Extremely Economically Disadvantaged Area in the United States.

³² A Disadvantaged Worker is an individual who meets the income requirements of a Targeted Worker, and faces other barriers to employment (e.g. being a veteran, lacking a GED or high school diploma, being homeless, etc.)



6.7 National Impacts

While Program expenditure primarily takes place in California, expenditure has also impacted the economies of other US states through material purchases, companies based in other states working on the program, and other spillover effects. Over the lifetime of the program, companies from at least 41 different states have worked directly on the program, contributing to activities from planning and engineering to construction.

Table 12. US States with Highest Program Expenditure³³

State	2020-21 Expenditures	2020-21	
		Percent of Non- California Expenditure within US (excludes international)	Total Program Expenditures
Colorado	\$0.7 M	6%	\$32 M
New York	\$5.5 M	43%	\$27 M
Virginia	\$0.3 M	2%	\$3 M
Texas	\$0.7 M	6%	\$18 M
Washington (state)	\$3.4 M	27%	\$25 M
Washington, D.C.	\$0.6 M	5%	\$14 M
Oregon	\$0.1 M	0%	\$12 M
Massachusetts	\$0.3 M	3%	\$5 M
All other states	\$1.2 M	10%	\$75 M
Total	\$12.8 M	100%	\$211 M

In 2020-21 specifically, out-of-state spending accounted for about 1% (about \$16 million) of total fiscal year expenditures and includes spending across the United States as well as some expenditures for specialized services that could only be provided from experts abroad (since certain high-speed rail expertise is lacking in the United States). Of this out-of-state spending, nearly 82% of it stayed within the US (\$12.8 million). About 18% of out-of-state spending was international (\$2.7 million).

³³ Totals may not sum due to rounding.



7 Future Analyses

The Authority undertakes an update the economic impact analysis on an annual basis. A fully updated technical supporting document is completed once per year, including the total FY spending and results. Future analyses are expected to follow the same methodology discussed in this and previous technical supporting documents, though some changes may be included to show new data, types of expenditure, or more streamlined approaches to data gathering and/or modeling methodology.

