California High-Speed Rail Authority

# *Fiscal Year 2019-2020 Impact Analysis*

## *Technical Supporting Document*

## Economic Impact Methodology Documentation

January 2021


CALIFORNIA High-Speed Rail Authority

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# Acronyms & Terms

| Acronym/Term | Usage and Meaning |
|---|---|
| Analysis | Fiscal Year 2019-2020 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 increasing investment have continued to ripple through the California economy. Starting with just a few employees over a decade ago, the Authority now 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, have generated substantial economic benefits around California 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 benefits that resulted from the historical investment in high-speed rail from July 2006 through June 2016 (Historical Analysis). Updated reports for FY 2016-2017 and FY 2017-2018 were published in subsequent years with the latest updated version published in January 2020 documenting the economic impacts associated with spending that occurred in Fiscal Year 2018-2019.[1,2]

This report, the Fiscal Year 2019-2020 ("FY 2019-2020") Analysis Technical Supporting Document, provides an updated snapshot of the economic impacts resulting from Authority spending that took place over FY 2019-2020, which corresponds to July 2019 through June 2020. The methodology used to estimate the magnitude of these impacts consists of two components, both of which use the IMPLAN input-output model: a "top-down" approach, and a "bottom-up" approach.

The top-down approach aggregates project costs and assigns the appropriate industry sectors to calculate the associated economic impacts at the statewide level. The bottom-up approach involves a more 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.

During FY 2019-2020, the Authority expended approximately $1.54 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 9,600-9,900 job years within the State of California; approximately $750-$770 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 60,400 job-years, nearly $4.4 billion in labor income, and about $11.4 billion in total economic output across the state.[3]

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

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

[3] These terms are defined in Section 4.1 of this report.

Table ES-1. California Economic Impacts, FY 2019-2020 & Program Total[4]

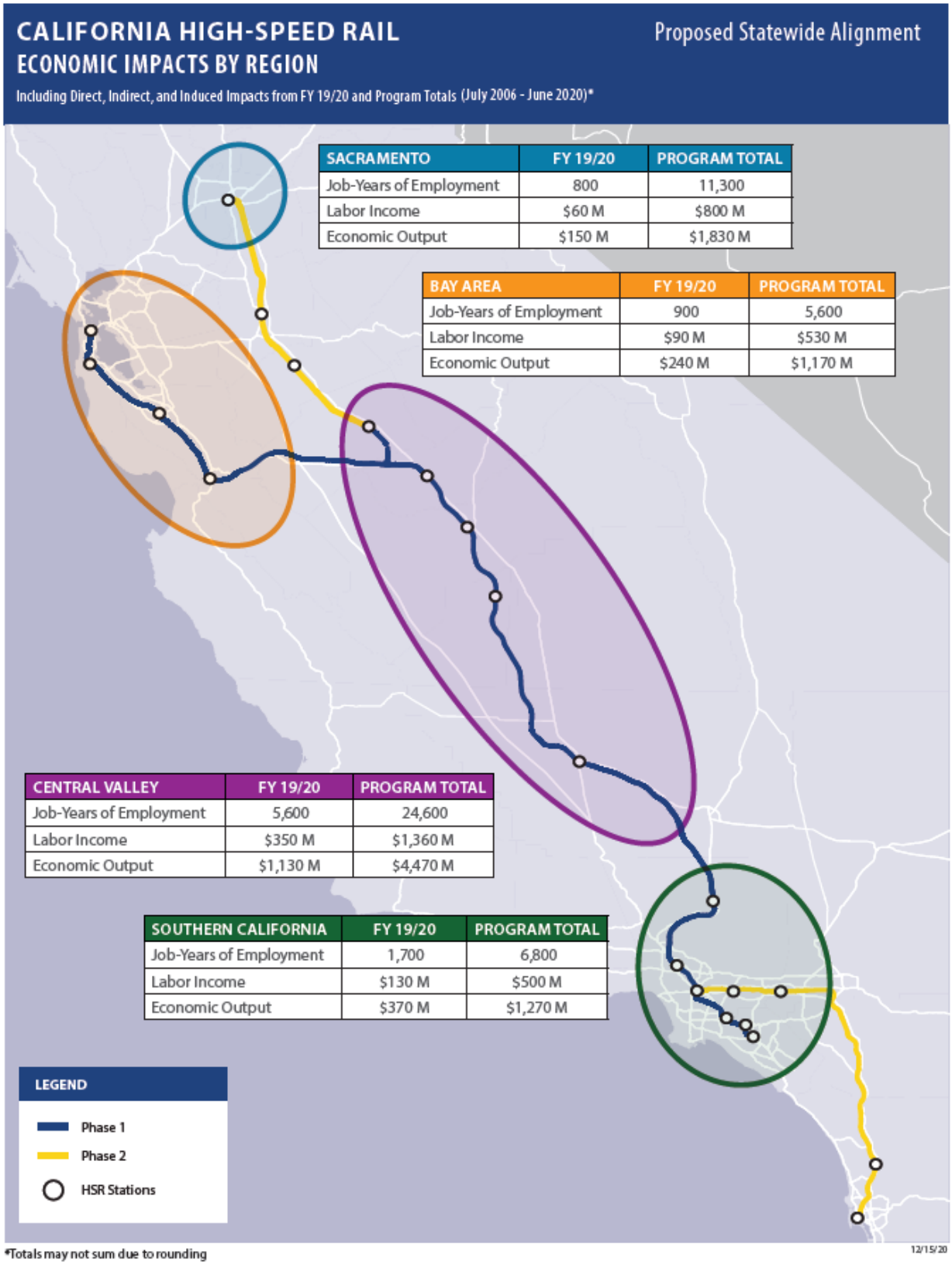
| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 4,800 - 4,900 | $410 M - $420 M | $1,140 M - $1,160 M |
| Indirect Effects | 2,100 | $170 M | $510 M - $520 M |
| Induced Effects | 2,800 - 2,900 | $170 M - $180 M | $520 M - $530 M |
| **FY 2019-2020 Total** | **9,600 - 9,900** | **$750 M - $770 M** | **$2,160 M - $2,210 M** |
| **Program Total[4] (July 2006 – June 2020)** | **54,300 - 60,400** | **$3,900 M - $4,400 M** | **$10,500 M - $11,400 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 5,600 job-years in the Central Valley region in FY 2019-2020 alone.

The economic impacts of Authority expenditures have been felt beyond the State of California, as well. Approximately $18.7 million (2%) of the Authority's expenditures went to contractors outside the state, with approximately 84% of that out-of-state spending retained within the United States.

[4] Note: totals may not sum due to rounding

Figure ES-1. *Economic Impacts by Region, FY 2019-2020*



# 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 will run from San Francisco to the Los Angeles basin in under three hours at speeds capable of over 200 miles per hour. The system will eventually 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 has spurred further economic impacts around California and across the country. To understand those economic impacts, the Authority develops the annual report *"High-Speed Rail: Investing in California's Economy",* which was started in September 2017. This report details benefits that result from the investment in high-speed rail.

This FY 2019-2020 Analysis Technical Supporting Document outlines the methodology that was used in developing this Analysis, which covers the period of July 2019 to June 2020. 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 FY 2019-2020 Technical Supporting Document, the previous analysis that focused on July 2006 through June 2016 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 FY 2019-2020 Analysis estimates the economic impact of the Authority's expenditure from July 2019 through June 2020 including job-years, labor income, and economic output.[5] 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 strictly limited to the economic impacts from historical project expenditures. It 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 2019 Equivalent Capacity Analysis Report.[6] Additionally, this analysis does not consider the economic effects resulting from changes in consumption due to the collection of revenues. 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 if funds had 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 2019-2020 Analysis followed similar methods and approaches as the Historical Analysis, so the review and validation conducted at that time remains relevant.

[5] Technical definitions of these economic impact metrics are provided in Section 4.1 of this report

[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 value added. 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 FY 2019-2020 Analysis, and prior analyses considered historical, project-related spending over a 13- year period. Because the volume of spending was highly variable from year to year throughout the analysis period, 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

[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

manufacturing sectors, output is equal to sales, less any change in inventory.

### 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—including, for example, 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 covering this report, FY 2019 – 2020, about $1.5 billion in expenditure took place, for a total program investment of just over $7.2 billion from July 2006 to June 2020. 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, this simplification of the variety of services provided is appropriate for the purposes of this type of 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

[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.

begin in the area. The project sections include:

- 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, for this analysis they are included separately in this summary category.

*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.

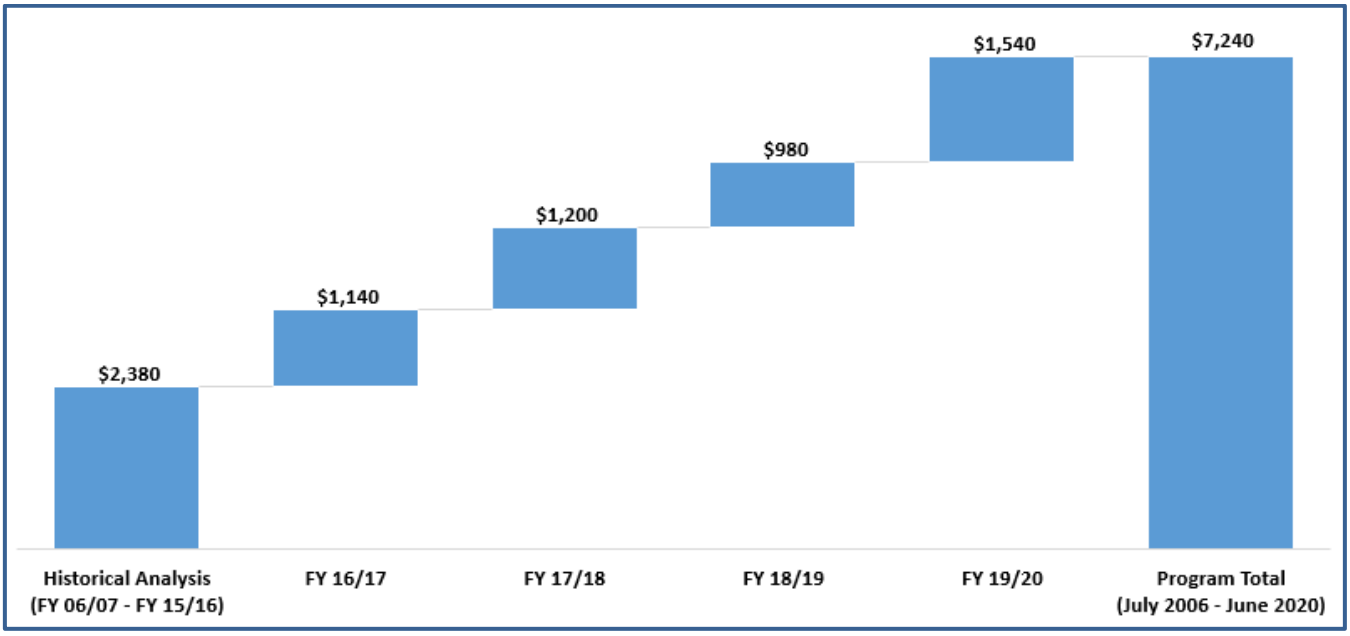
*Other* – expenditure in this category includes Resource Agencies (RA), Third-Party Agreements (TPA), legal, financial services, and other miscellaneous contracts costs.

- 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 has 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 in FY 2019 - 2020. Moving forward, additional funds may be allocated to additional bookend projects.

The total expenditure by economic analysis timeframe is shown in **Figure 2.**

*Figure 2 .Program Expenditure ($ millions) by Economic Analysis (July 2006 – June 2020)* [12,13]




Out of the approximately $1.54 billion of total program investments in FY 2019-2020, $1.2 billion was used as an input to the economic impact input-output modeling described in this report, with $1.17 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 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 Fiscal Year 2019-2020, from July 2019 through June 2020. Additionally, the results will include the total impacts supported by the program by adding previous analyses from 2006 to 2019. New analysis was only undertaken for spending that occurred from July 2019 through June 2020.

[12] Source: Total Project Expenditures with Forecasts Reports, August 2020

[13] Totals may not sum because of rounding

# 5 Methodology

The impacts presented in this report were estimated using an industry-standard approach. To estimate a range for the statewide results, both a top-down and a bottom analysis were used. The top-down approach applies IMPLAN model multipliers to total project costs, allocated by industry sector. The bottom-up approach incorporates a review of contract-level costs, translating the labor- hours expended by Authority staff and external parties into FTEs; these FTEs were then used as an input to the IMPLAN model to estimate economic impacts at the county, regional, and state levels. This process involved rigorous internal and external research on detailed project expenditures, and customized geographic economic impact modeling using IMPLAN software.

**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 combination of the top-down and bottom-up approaches provide a reasonable range of outputs that can be used as benchmarks against other economic impact studies, and as estimates for the spatial distribution of economic impacts resulting from project investments.

This study captured expenditures that were incurred between July 2019 and June 2020, hereafter referred to as the 'study period' in this section.

## 5.1 Data Collection

As discussed above, expenditure and labor hours data were collected as inputs to the IMPLAN input-output model. These inputs were categorized by industry sector and location at the zip code level. 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 2019 to June 2020 was completed. Please see the FY 16-17 Technical Supporting Document for more information.[14]

The bottom-up approach was based on a review of invoices that have been approved and paid by the Authority, as recorded in its accounting systems. As with previous expenditures analyses, the data collection focused on the contracts with the highest expenditures. This approach significantly reduced the number of invoices reviewed for employee-level data, while still capturing most of the applicable program costs.

Twenty-seven of the largest contracts in FY 2019-2020 – which together comprised most of the total

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

contract expenditures – were reviewed in detail, as were the Authority's direct expenditures. These 27 major contracts are shown in **Table 1**, and correspond to 23 different contractors/agencies. Each of these contracts include a prime contractor (which is sometimes a joint venture) and multiple subcontractors. The Authority's Small Business Enterprise (SBE) goals apply to these contracts that are with private entities.

The study team worked with contract managers of the major prime contractors to gather spreadsheet-based information on the hours, cost, and/or location of work performed during the study period. These were then cross-checked against the Authority Financial Office's accounting records to ensure consistency. Where such information was not available, the study team mined data from copies of the detailed invoices that were submitted by each contractor. These invoices contain the labor hours and fully-burdened labor cost for each employee working on the contract for a given month, as well as the industry in which the contractor operates.[15] Assumptions inherent to the data collection process are discussed further in *Section 5.1.3*.

**Table 1.** ***Major Contracts Reviewed***

| Contract Number | Prime Contractor | Contract Category |
|---|---|---|
| | Construction | |
| HSR13-06 | Tutor Perini Zachary Parsons Joint Venture | DB |
| HSR13-57 | Dragados-Flatiron Joint Venture | DB |
| HSR12-06 | Caltrans (SR-99) | CMGC |
| HSR14-32 | California Rail Builders, LLC | DB |
| HSR16-108, HSR18-40 | Peninsula Corridor Joint Powers Board (Caltrain) | Construction |
| HSR11-20 | Wong-Harris, JV | PCM |
| HSR13-81 | Arcadis | PCM |
| HSR 15-01 | HNTB | PCM |
| | Planning/Environmental | |
| HSR15-34 | HNTB | RC |
| HSR13-44 | T.Y. Lin | RC |
| HSR14-39 | STV | RC |
| HSR08-05 | Parsons Transportation Group | RC |
| HSR14-42 | SENER | RC |

[15] Labor burden is the actual cost of a company to have an employee, aside from the salary the employee earns. Labor burden costs include benefits that a company must, or chooses to, pay for employees included on their payroll (for example, the cost of health insurance coverage).

| | | |
|---|---|---|
| HSR 14-56, HSR18-16, HSR19-51 | Westervelt | Environmental |
| HSR 15-172 | Kleinfelder | Geotech |
| Program Administration | | |
| HSR14-66 | WSP | PM |
| Other | | |
| HSR15-92 | KPMG | Financial |
| HSR17-20 | DB Engineering and Consulting | Early Train Operator |
| HSR08-10 | Nossaman | Legal |
| HSR13-65 | Hernandez, Kroone & Associates | ROW Professional Services |
| HSR14-77 | Ebbin Moser + Skags, LLP | Legal |
| HSR15-43 | Rutan & Tuker | Legal |
| HSR16-08 | Continental Acquisition Services, Inc | ROW Professional Services |
| HSR16-09 | Associated Right of Way Services, Inc. | ROW Professional Services |

Expenditures from other, smaller contracts not listed in **Table 1**. were captured at the contract level using the Authority financial office's existing contract expenditure database.

### 5.1.2 Invoice Review

The invoice review process entailed extracting monthly expenditure and labor hours data from each of the major contracts stated above. Building off the previously established methodology, the study team worked with contract managers to receive a spreadsheet accounting for expenditures and work location by employee directly from the prime contractors, where possible. Where such data was not available, the study team referred to contractor-submitted invoices, copies of which are stored on FI$Cal, the state of California's Financial Information System. These invoices typically contain labor hours, hourly rates, and direct costs by staff member for each firm. The study team received updated office locations for the majority of prime contractor employees, however when not available, prime contractor's employees were assumed to have completed their work in the same office to which they were assigned in the FY 2018-2019 geographic spending profile.[16] A web search was used to determine office locations for staff who were not previously recorded in the database, as needed. Subcontractors were assumed to have completed all their work within the same office, which was assigned as either the California office closest to the project site or the head office (for out-of-state firms). Additional assumptions inherent to

[16] As detailed in *Fiscal Year 2018-2019: Economic Impact Analysis Technical Supporting Document* https://www.buildhsr.com/hsrinvestment/pdf/FY1617_CHSRA_Economic_Impact_Technical_Memorandum_FINAL_01122018_v2.pdf

the invoice review process are discussed further in *Section 5.1.3*.

Overall, the result of the invoice review process was a detailed database of information that provided information on when, what type, and how much expenditure and how many labor hours the Program's investments yielded.

### 5.1.3 Geographic Assumptions

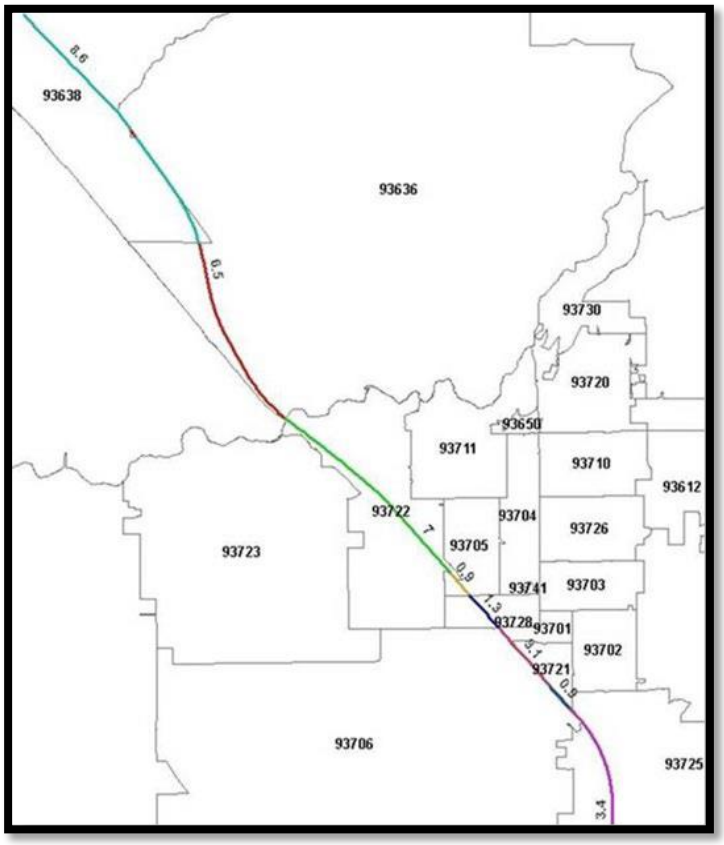
As mentioned previously, the study team worked with contract managers of the major contracts to receive as much expenditure information as possible, including a focus on the specific geographic detail on where work was completed. This geographic information allows the Authority to describe where exactly 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, where this was not available, prime contractor's employees were assumed to have completed their work in the same office where they were employed in FY 2018-2019 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.[17][19] 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. Prime contractor costs were first 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 4 shows an example of the CP1 alignment-zip code map overlay. This same process was undertaken for Caltrans' work on SR-99 realignment.

[17] 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) were 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 FY 2018-2019 geographic spending profile, or a web search.

### 5.1.4 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 when considering the many ways in which data were formatted. Employee office locations submitted by contractors were validated through web searches to confirm that companies do have offices in the locations that they provided.

## 5.2 Analysis Approach

As described previously, the Analysis was performed using both a top-down and bottom-up approach, providing a range of impacts and allowing for internal quality checks. The input-output modeling software IMPLAN was used to conduct both types of analysis.

### 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 how relationships between different industries determine the total economic impact of a particular type of spending; for example, how 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.[18] Similarly, IMPLAN can generate outputs in any desired dollar-year. For this analysis, all inputs and outputs were expressed in 2020 dollars.

[18] The base year for IMPLAN's multipliers is 2018, meaning that the multipliers reflect industry relationships as observed in 2014. This is industry standard and has little effect on the results.

# 6 Results

This section details the results of the FY 2019-2020 as well as total impacts to date from prior analyses. Please 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. In addition, all inputs and results are expressed in constant 2020 dollars.

**What are Direct, Indirect, and Induced Impacts?**
**Direct impacts** are the economic effects generated by direct spending on a project.

**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.

**Induced impacts** are the economic effects that result when income earned by direct and indirect employees gets spent elsewhere in the economy.

## 6.1 California Economic Impacts

For Fiscal Year 2019-2020 the Authority invested $1.54 billion in planning and construction of the high-speed rail system, of which approximately $1.19 billion was included in this fiscal year analysis and $1.17 billion was retained in the State of California.[19] This investment has supported 9,600 to 9,900 job- years of in-state employment (including direct, indirect, and induced impacts) and generated $2.16 to $2.21 billion in total in-state economic activity. Over the life of the project, the Authority has invested over $6.5 billion, has supported 54,300 to 60,400 job-years of employment, and generated $10.5 billion to $11.4 billion in total economic output.

As mentioned above, the majority of this economic activity has taken place in the State of California, with 98% of FY 2019-2020 investment expended going to companies and workers in the state. This estimate was developed using the spending profile data, from which spending taking place in non-California zip codes was filtered out. From analysis inception (FY 2006-2007) until June 2020, about 97% of the project expenditure has taken place in the State of California.

[19] $1.17 billion does not include ROW and other expenditure not captured in the economic impact analysis.

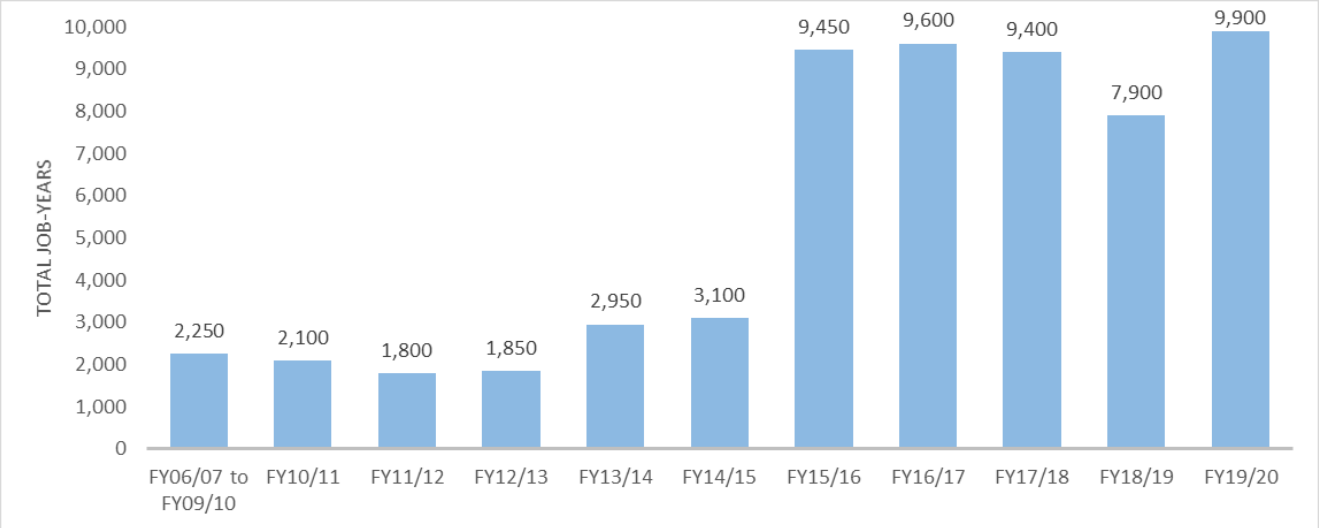
Table 2. *California Economic Impacts, FY 2019-2020 & Program Total*

| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 4,800 - 4,900 | $410 M - $420 M | $1,140 M - $1,160 M |
| Indirect Effects | 2,100 | $170 M | $510 M - $520 M |
| Induced Effects | 2,800 - 2,900 | $170 M - $180 M | $520 M - $530 M |
| **FY 2019-2020 Total** | **9,600 - 9,900** | **$750 M - $770 M** | **$2,160 M - $2,210 M** |
| **Program Total[20] (July 2006 – June 2020)** | **54,300 - 60,400** | **$3,900 M - $4,400 M** | **$10,500 M - $11,400 M** |

## 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 FY 2006-2007 to the current analysis, with a noticeable increase from FY 2014-2015 to FY 2016-2017, 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 Job-Years per Fiscal Year, July 2006 - June 2020*[21]




[20] Note: totals may not sum due to rounding

[21] Includes direct, indirect, and induced job-years.

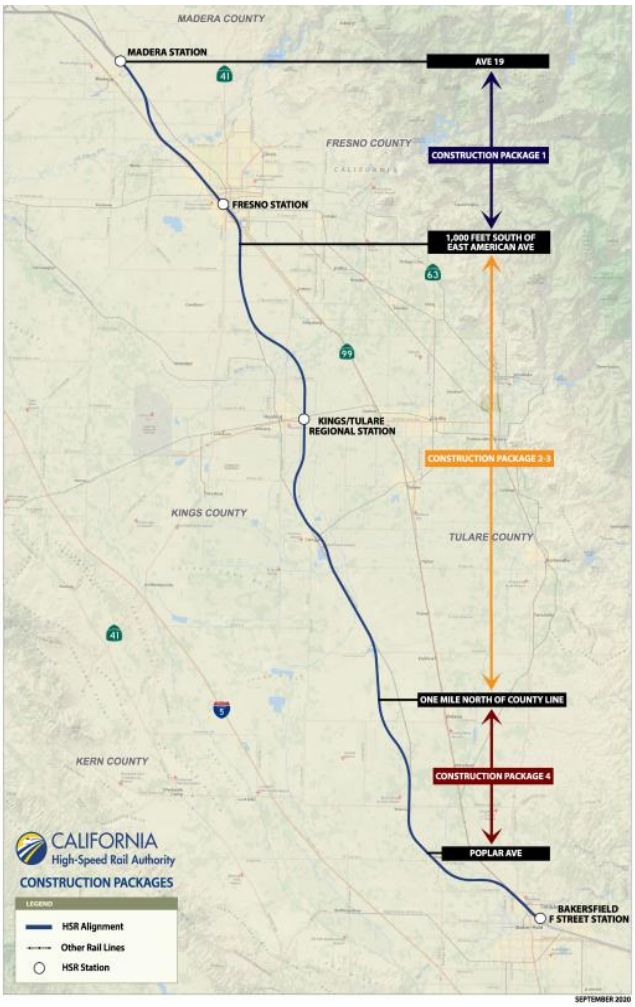
## 6.3 Breakdown by Region

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 in the region. 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 Construction Contracts as of September 2020***




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 7 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.[22]

Program investments have had significant impact on the Central Valley economy, generating nearly 5,660 job- years of employment and about $1.14 billion in total economic activity from July 2019 to June 2020. **Table 3** 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 2019-2020 and since 2006.

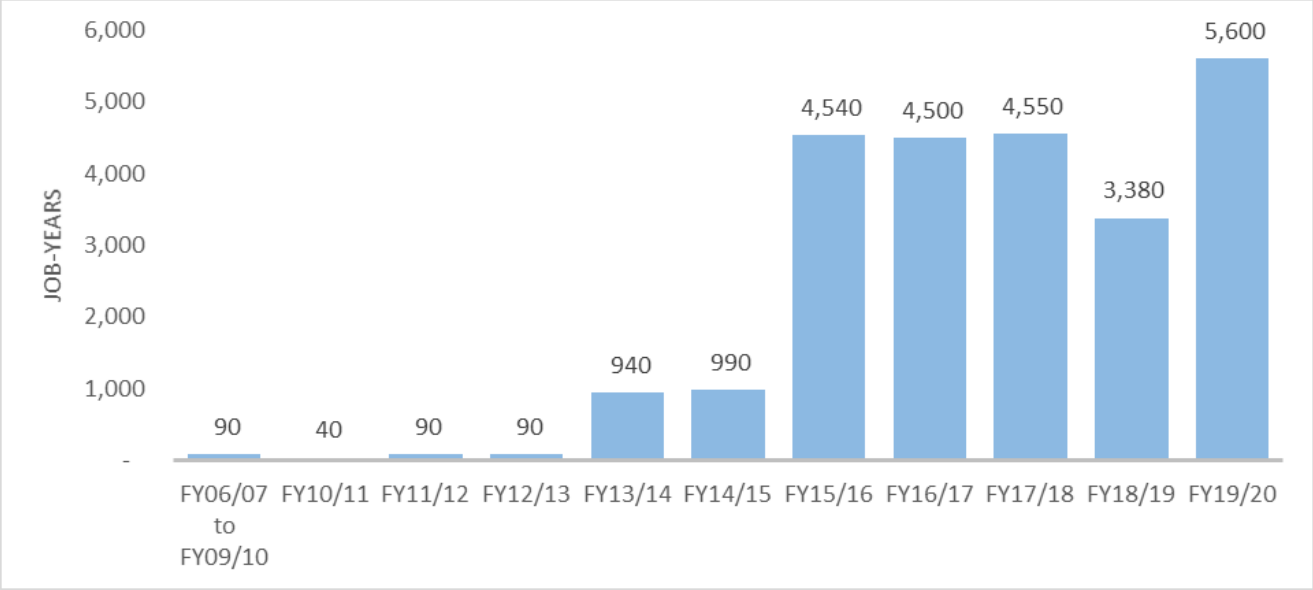
[22] The CP1 project office is in Fresno, the CP2-3 project office is in Selma and the CP4 project office is in Shafter.

Table 3. *Central Valley Economic Impacts, FY 2019-2020 & Program Total*[23]

| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 3,300 | $230 M | $710 M |
| Indirect Effects | 1,000 | $60 M | $230 M |
| Induced Effects | 1,200 | $60 M | $190 M |
| **FY 2019-2020 Total** | **5,600** | **$350 M** | **$1,130 M** |
| **Program Total (July 2006 – June 2020)** | **24,600** | **$1,360 M** | **$4,470M** |

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

Figure 6. *Central Valley Region Total Job-Years per Fiscal Year, July 2006 – June 2020*[24]




[23] Note: totals may not sum due to rounding

[24] Note: includes direct, indirect, and induced

### 6.3.2 Sacramento Region

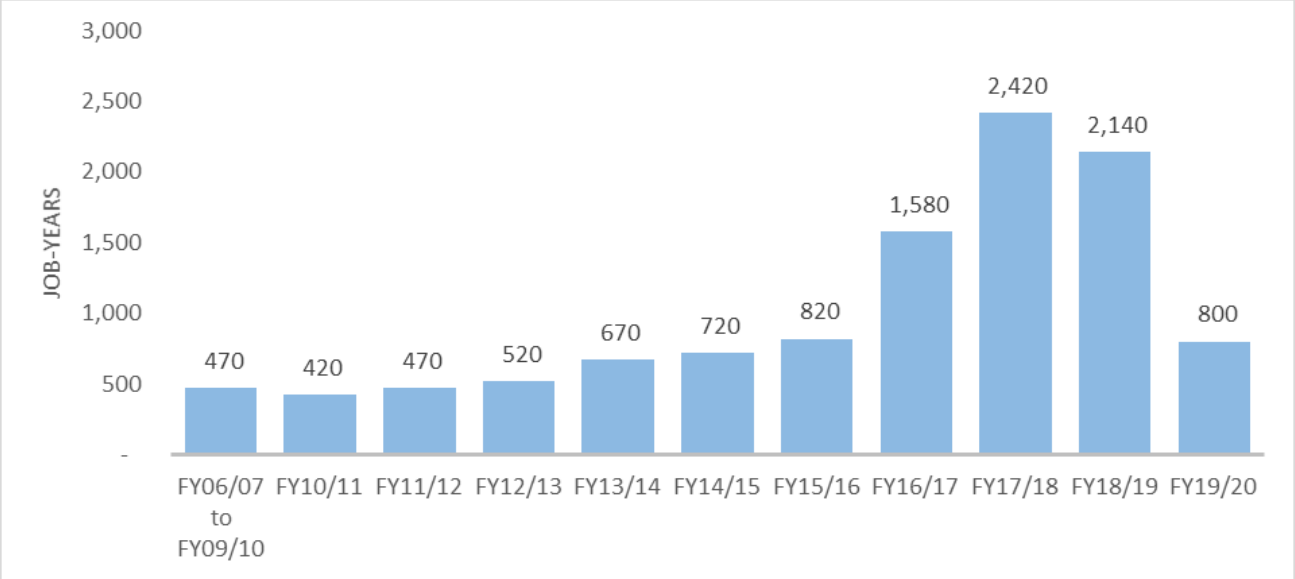
For purposes of this analysis, the Sacramento region includes Sacramento, Yolo, Placer, El Dorado, Sutter, and Yuba counties all located north of the Central Valley. The Authority and RDP headquarters are co-located in downtown Sacramento comprising around 400 Authority and RDP staff members. Most of these staff have been in the government and professional services fields providing overall guidance and oversight for the program.

Table 4. *Sacramento Region Economic Impacts, FY 2019-2020 & Program Total*[25]

| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 400 | $40 M | $80 M |
| Indirect Effects | 200 | $10 M | $30 M |
| Induced Effects | 200 | $10 M | $40 M |
| **FY 2018-2019 Total** | **800** | **$60 M** | **$150 M** |
| **Program Total (July 2006 – June 2020)** | **11,300** | **$800 M** | **$1,830 M** |

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

Figure 7. *Sacramento Region Total Job-Years per Fiscal Year, July 2006 – June 2020*




[25] Note: totals may not sum due to rounding

### 6.3.3 Bay Area Region

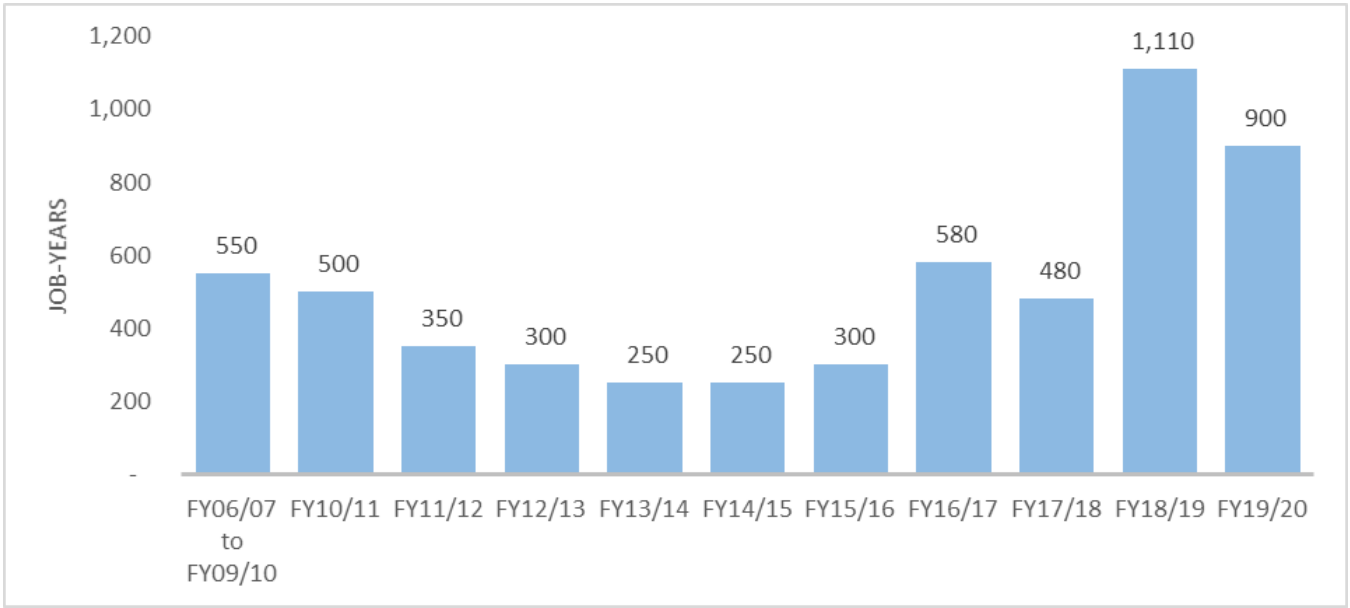
The Bay Area region includes the following counties: Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Sonoma, Napa, and Solano. These nine counties are part of the Metropolitan Transportation Commission region. The Bay Area has seen mostly planning, engineering, and environmental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

**Table 5.** ***Bay Area Region Economic Impacts, FY 2019-2020 & Program Total***[26][9]

| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 600 | $60 M | $150 M |
| Indirect Effects | 100 | $15 M | $45 M |
| Induced Effects | 200 | $15 M | $45 M |
| **FY 2019-2020 Total** | **900** | **$90 M** | **$240 M** |
| **Program Totals (July 2006 – June 2020)** | **5,600** | **$530 M** | **$1,170 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 Job-Years per Fiscal Year, July 2006 – June 2020***[27]




[26] Note: totals may not sum due to rounding

[27] Note: includes direct, indirect, and induced

### *6.3.3.1 Caltrain Electrification*

The California High-Speed Rail Authority is working in partnership with the Peninsula Corridor Joint Powers Board (Caltrain) and regional stakeholders to modernize the Caltrain corridor to keep pace with increasing ridership demands while also preparing its line for high-speed service. The San Francisco Bay Area will see the benefits of improved safety, reliability, efficiency and air quality through the long-awaited electrification of the Caltrain corridor.

Figure 9. *Caltrain Alignment*


Specifically, Caltrain Electrification will electrify the line between the 4th and King station in San Francisco and the Tamien Station in San Jose and provides signal and safety improvements that will allow Caltrain to operate an electrified fleet by 2022. This electrification project is a key component of the blended system that will accommodate high-speed rail service on the corridor. Once the electrification project is completed, it will result in faster commute service for the region while also preparing for the integration of high-speed rail service. The state's commitment to this project will leverage funding to bring the total investment in the corridor to $2 billion.

In FY 2016 – 2017, the Authority's share of the investment in development of the project was nearly $77 million, which was nearly 50% of the $163.5 million total expenditure for the project in FY 2016-2017. This investment was not included in measuring the impacts of the Authority expenditure in FY 2016 – 2017 and was removed from the total expenditure analyzed. However, a separate analysis was undertaken to estimate the impact of Caltrain Electrification (including funding provided by other sources). This can be found in the FY 2016 – 2017 Analysis and Technical Document.

For this FY 2019-2020 analysis, there was additional expenditure in the Caltrain Electrification Project from the Authority. Through two contracts with Caltrain, the Authority funded over $100 million in construction and other costs for the project. This $100 million is included as a construction cost in the primary economic impact analysis and is reflected in this analysis' results.

### 6.3.4 Southern California Region

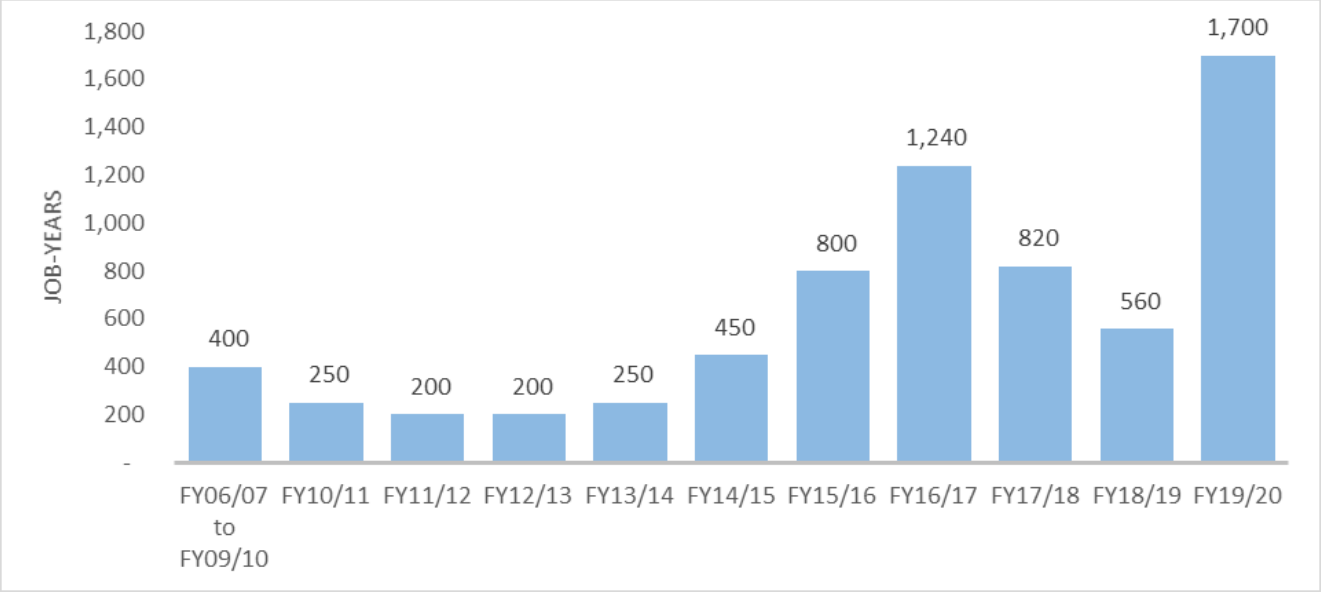
For purposes of this analysis, Southern California includes Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. These six counties are either in the Southern California Area Governments or San Diego Area Governments regions.

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 go through construction.

Table 6. *Southern California Region Economic Impacts, FY 2019-2020 & Program Total*[28]

| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 750 | $70 M | $190 M |
| Indirect Effects | 450 | $30 M | $90 M |
| Induced Effects | 500 | $30 M | $90 M |
| **FY 2018-2019 Total** | **1,700** | **$130 M** | **$370 M** |
| **Program Totals (July 2006 – June 2020)** | **6,800** | **$500 M** | **$1,270 M** |

Figure 10. *Southern California Region Total Job-Years per Fiscal Year, July 2006 – June 2020*[29]




[28] Note: totals may not sum due to rounding

[29] 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 June 2020, the Authority has supported $25.5 million in investment in these Southern California projects. The last few years have been focused on completing environmental documentation on several projects in Southern California. In 2021 the first construction is about to begin. The Rosecrans/Marquardt grade separation project is finalizing pre-construction work and is poised to break ground in 2021. In addition, the Link US project will be selecting a preferred alternative and releasing a Draft EIR/EIS on this extensive rail access and station upgrade project.

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.

The Federal Railroad Administration (FRA) approved the Finding of No Significant Impact (FONSI) for the Rosecrans/Marquardt project in November 2018. Metro is completing final design and acquisition of right of way. Metro is working closely with Southern California Edison on advancing utility relocations to clear the way for construction. Construction is scheduled to being in 2021 and complete by 2023.

*Figure 10.1. 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 FY 2019-2020 include Fresno County, Kings County, Kern County, Sacramento County, Madera County, Tulare County, Los Angeles County, and Riverside County.

In FY 2019-2020, Fresno County has seen the biggest impacts with about 23% of total direct job-years supported as a proportion of the statewide analysis (bottom-up results). Kings County accounts for 15% of total program direct job-years, with Kern County accounting for 14%, Sacramento County accounting for 8%, Madera County accounting for 7%, Tulare County accounting for 6%, Los Angeles County accounting for 5% and Riverside County accounting for 4%.

**Table 7** shows the direct job-years attributed to the highest impact counties.

Table 7. *Major Employment Sectors for Select California Counties*[30]

| County | FY 2019-2020 Direct Job-Years | Program Totals Direct Job Years |
|---|---|---|
| Fresno | 1,170 | 8,680 |
| Sacramento | 390 | 4,480 |
| Los Angeles | 250 | 1,740 |
| Madera | 370 | 1,870 |
| Kern | 700 | 1,630 |
| Kings | 740 | 1,460 |
| Santa Clara | 200 | 740 |
| San Mateo | 220 | 470 |

### 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 FY 2019-2020, Fresno County accounted for an estimated 1,170 direct-job years in the Central Valley region, or 35% of total direct job-years generated in the region.

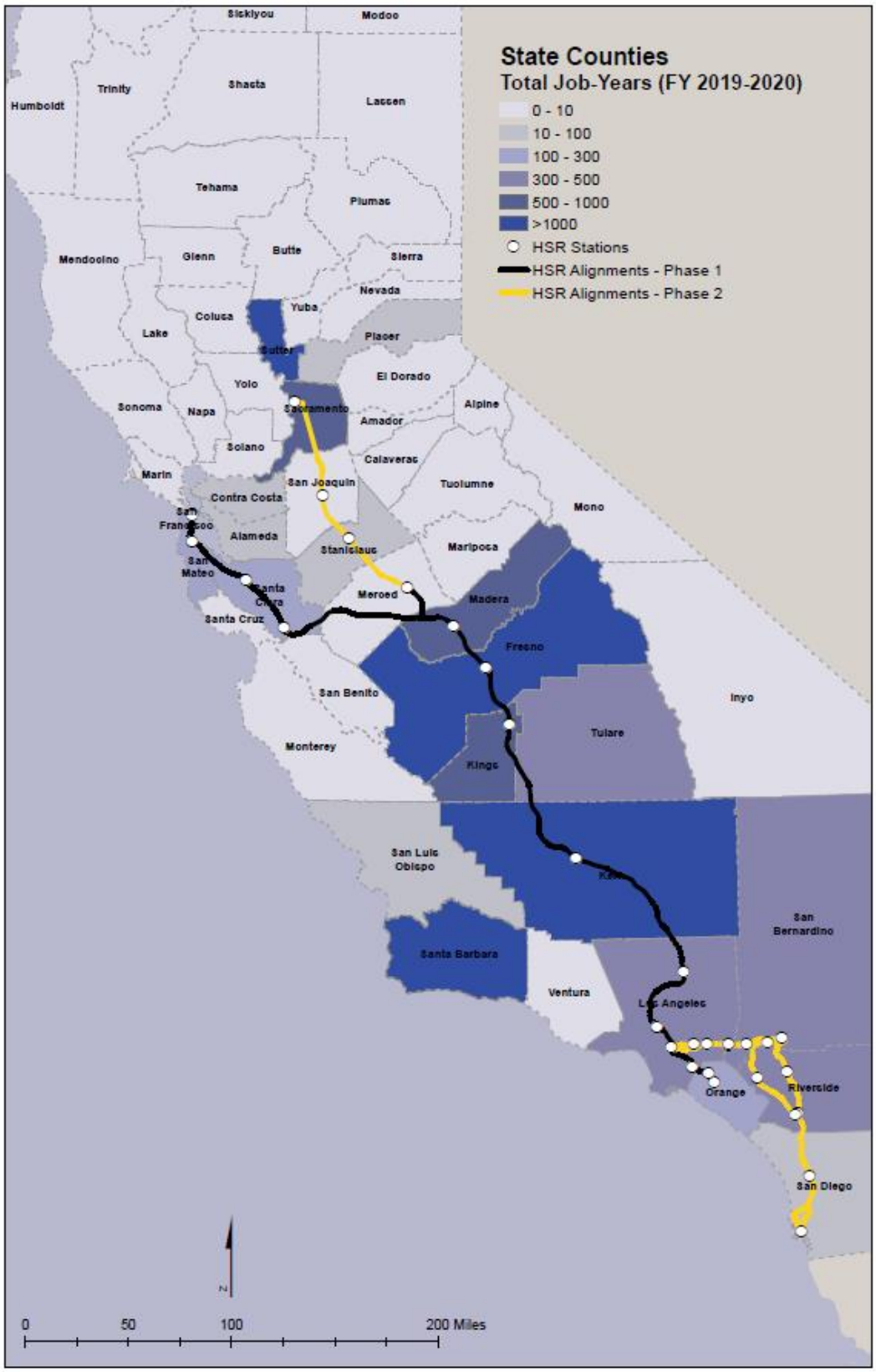
[30] Note: analysis of regions and counties does not capture spill-over effects from surrounding regions/counties that would be captured in the statewide analysis.

Table 8. *Fresno County Economic Impacts, FY 2019-2020 and Program Total*[31]

| | Employment (job-years) | Labor Income | Economic Output |
|---|---|---|---|
| Direct Effects | 1,170 | $80 | $240 |
| Indirect Effects | 390 | $20 | $80 |
| Induced Effects | 490 | $20 | $80 |
| **FY 2019-2020 Total** | **2,040** | **$130** | **$390** |
| **Program Totals (July 2006 – June 2020)** | **15,500** | **$830 M** | **$2,650 M** |

[31] Note: totals may not sum due to rounding

*Figure 11.California Counties, Total Job-Years, FY 2019-2020*



## 6.5 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 12. *CalEnviroScreen 2.0 Indicator and Component Scoring*

**Pollution Burden** x **Population Characteristics** = **CalEnviroScreen Score**

| Pollution Burden | | Population Characteristics | |
|---|---|---|---|
| **Exposure Indicators** | **Environmental Effects Indicators** | **Sensitive Population Indicators** | **Socioeconomic Factors Indicators** |
| • Ozone Concentrations<br>• PM2.5 Concentrations<br>• Diesel PM Emissions<br>• Drinking Water Contaminants<br>• Pesticide Use<br>• Toxic Releases from Facilities<br>• Traffic Density | • Cleanup Sites (1/2)<br>• Groundwater Threats (1/2)<br>• Hazardous Waste (1/2)<br>• Impaired Water Bodies (1/2)<br>• Solid Waste Sites and Facilities (1/2) | • Children and Elderly<br>• Low Birth-Weight Births<br>• Asthma Emergency Departmental Visits | • Education Attainment<br>• Linguistic Isolation<br>• Poverty<br>• Unemployment |

One of the advantages to starting construction on the high-speed rail system in the Central Valley is the opportunity that construction has generated for residents of disadvantaged communities that are disproportionally (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 13** shows the locations of disadvantaged communities in the state.

Sixty-four (64%) of the investment in the system in FY 2019-2020 occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. Additionally, fifty-five (55%) of the total program investment from July 2006 through June 2020

occurred in designated disadvantaged communities.

**Figure 13.** ***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 have collectively met the 30% small business utilization target, while design-build contractors are working to attain their utilization target as construction activities ramp-up. As of July 2020, 560 small businesses were either committed, utilized, or actively working on

the project.

Figure 14. *Small Business Participation in the California High-Speed Rail Program*


Further, 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.[32,33]

As of September 2020, 4,746 construction labor workers have been dispatched to the three high-speed rail construction packages in the Central Valley, which includes 3,121 Targeted Workers. This is at a rate of more than twice the 30% Goal (66%).

## 6.6 National Impacts

Despite the majority of expenditure taking place in California, Program 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

[32] 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.

[33] 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.)

41 different states have worked directly on the program, contributing to everything from planning and engineering to construction.

Table 9. *US States with Highest Program Expenditure*[34]

| State | FY 2019-2020 Expenditures | FY 2019-2020 Percent of Non- California Expenditure within US (excludes international) | Total Program Expenditures |
|---|---|---|---|
| Colorado | $2.0 M | 13% | $32 M |
| New York | $0.1 M | 1% | $22 M |
| Pennsylvania | $1.0 M | 6% | $9 M |
| Texas | $0.7 M | 4% | $18 M |
| New Jersey | $0.5 M | 3% | $15 M |
| Washington (state) | $6.3 M | 40% | $22 M |
| Washington, D.C. | $1.2 M | 8% | $13 M |
| Oregon | $0.1 M | 1% | $12 M |
| Massachusetts | $0.3 M | 2% | $10 M |
| All other states | $3.4 M | 22% | $43 M |
| **Total** | **$15.6 M** | **100%** | **$196 M** |

In FY 2019-2020 specifically, out-of-state spending accounted for about 2% (about $18.7 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 84% of it stayed within the US ($15.6 million). About 16% of out-of-state spending was international ($3.1 million).

[34] 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.