APPENDIX 6-B: PRELIMINARY ENGINEERING FOR PROJECT DEFINITION RECORD SET CAPITAL COST ESTIMATE REPORT

California High-Speed Rail Authority

Los Angeles to Anaheim Project Section

Preliminary Engineering for Project Definition Record Set Capital Cost Estimate Report

December 2025

CALIFORNIA High-Speed Rail Authority

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 22, 2024, and executed by the Federal Railroad Administration and the State of California.

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1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this report is to present the Capital Cost Estimating Methodology (CCEM) in the preparation of reasonably reliable and accurate capital cost estimates for the Preliminary Engineering for Project Definition (PEPD) Design Level.

This document describes the methodology for preparation of estimated capital cost for the California High-Speed Rail Project (CHSRP) Los Angeles to Anaheim PEPD document. In addition, it presents the summary of Capital Cost Estimates along with detailed Federal Railroad Administration (FRA) Standard Cost Categories (SCC) and sub-categories or cost elements. Refinement of these cost estimates will be ongoing during the advancement of engineering during subsequent project development phases.

The primary objectives of this report are:

- Identify the methods and processes used to develop the capital cost estimate during PEPD Design Level Phase;
- Identify the source documents and/or methodology used for pricing work;
- Specify how estimating assumptions have been documented during the course of the estimate development;
- Describe Unit Price Elements (UPE);
- Define the approach and methodology with respect to FRA SCCs;
- Present estimates have been developed for each complete alignment alternative for the Los Angeles to Anaheim Project Section.

The estimating approach has been done in a manner that (1) allows consistent application to each alternative to facilitate comparisons; (2) provides the proper foundation for more detailed estimates as selected alternative(s) are further evaluated; and (3) provides the basis for subsequent construction package procurement level estimates with additional guidelines for a more detailed capital cost estimate.

Considering CHSRP's size, complexity, phased design, and number of participants, it is important that the CCEM is flexible enough to be applied at each point in the project development process to appropriately support the tracking, monitoring and control of cost changes through each of the program's design and implementation phases. This document addresses only the capital cost estimating requirements for the PEPD Design level. Additional guidelines have been developed for the preparation of capital cost estimates for subsequent phases of the CHSRP.

1.2 Statement of Technical Issue

The document is intended to address the preparation of a program cost estimate, including construction, acquisition of right-of-way, vehicles, and professional services during execution of the project.

The CCEM is intended to provide guidelines for accurately and consistently estimating the costs of capital infrastructure and systems for the PEPD Design level. It also provides a framework for defining the scope and technical basis for the estimates, the roles and responsibilities for specific estimating tasks among the project participations, and the structure, organization, and format for reporting capital costs for all geographic sections of CHSRP.

1.3 General Information

1.3.1 Definition of Terms

Technical terms, acronyms, or other cost-estimating terminology specifically used for capital cost estimating purposes, unless otherwise indicated, will follow the standard definition of terms

published by the Association for the Advancement of Cost Engineering (AACE) International in their Recommend Practice No. 10S-90 – Cost Engineering Terminology.

The following acronyms used in this document have specific connotations with regard to the California High-Speed Rail System.

Acronyms

AACE	Association for the Advancement of Cost Engineering
CCEM	Capital Cost Estimating Methodology
Authority	California High-Speed Rail Authority
CHSRP	California High-Speed Rail Project
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HST	High-Speed Train
LCCA	Life Cycle Cost Analysis
NIST	National Institute of Standards and Technology
PEPD	Preliminary Engineering for Project Definition
PMT	Program Management Team
RC	Regional Consultant(s)
SCC	Standard Cost Categories
TM	Technical Memorandum
UPE	Unit Price Element
WBS	Work Breakdown Structure

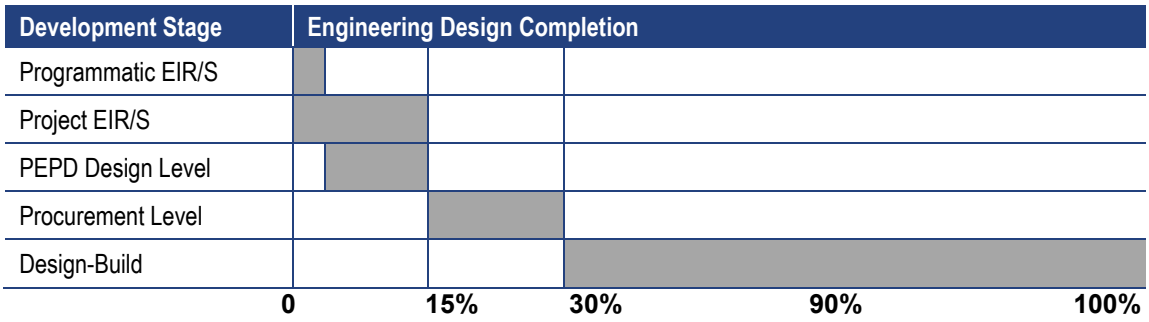
1.3.2 Units

The California High-Speed Rail Project is based on U.S. Customary Units consistent with guidelines prepared by the California Department of Transportation and defined by the National Institute of Standards and Technology (NIST). U.S. Customary Units are officially used in the United States, and are also known in the U.S. as “English” or “Imperial” units. In order to avoid confusion, all formal references to units of measure shall be made in terms of U.S. Customary Units.

Guidance for units of measure terminology, values, and conversions can be found in the California Department of Transportation’s Metric Program Transitional Plan, Appendix B, Metric Units to U.S. Customary Units General Primer (https://dot.ca.gov/-/media/dot-media/programs/design/documents/2005-08-02-rev-appendix-b-us-customary-general-primer-a11y.pdf). The California Department of Transportation’s Metric Program Transitional Plan, Appendix B can also be found as an attachment to the CHSRP Mapping and Survey Technical Memorandum.

2.0 CAPITAL COST ESTIMATING METHODOLOGY

Estimating methodologies are not static and must be flexible enough to adjust to the needs of the project's stage in the development process. The development process is described by the overall level of engineering design associated with the major development stages defined for the CHSRP:



Each development stage is represented by a range of engineering design completion and influenced by ongoing updates to the ridership demand forecast and associated revisions to estimated system capacity, service design and operating plans. Because of this variability, the appropriate estimating methods or procedures at a given milestone will be based on the actual levels of project engineering and scope definition present at that time. Because the program will be designed in multiple segments, the level of engineering design completed for major high-speed rail system elements will be at different levels at any point in time. The goal of using established estimating methodologies is to assure that project estimates are prepared in a consistent and uniform manner, organized and standardized in methods, and formatted in order to facilitate estimate review and reporting.

2.1 Estimating Format

A consistent format is developed for the reporting, estimating, and managing of the project's capital costs. This document recommends using SCCs established by the FRA as part of American Recovery and Reinvestment Act grant application requirements. Preparation of capital costs in SCC format is adopted throughout the PEPD Design phase.

2.2 Estimating Software

Commercially available database software systems are used depending on the type of work elements. For example, Timberline is used for surface heavy construction work elements and HCSS is used for underground work elements. However, in order to provide uniformity between numerous work elements and sections of the corridor and to provide consistent platform for reporting and analysis requirements, the cost data are exported to Microsoft Excel. This will better enable the review, edit consolidation and reporting of estimate components over the course and provide more flexibility to make adjustments.

2.3 Federal Railroad Administration Standard Cost Category

The methodology used for generating capital cost estimates has been consistent with FRA guidelines for estimating capital costs. The heart of the FRA guidance is the SCC, which enables FRA-funded projects to develop budget baselines that summarize to the SCC. This cost structure is used for capital cost detail and summary sheets and is described below. Where the level of design does not support quantity measurements, parametric estimating techniques were utilized.

2.3.1 Work Breakdown Structure

This involves the development of the Work Breakdown Structure (WBS) that is applied to cost estimating and cost reporting. The WBS for estimating includes a coding system that is used for estimating elements. The WBS for reporting includes the development of a coding system that

allows the cost estimates to be sorted and presented by categories and subcategories as prescribed by the FRA.

The WBS for capital cost estimates for the PEPD Design level is based upon the FRA Standard Cost Categories is presented in Appendix A.

The primary WBS for quantities and unit prices are UPEs. UPEs were originally developed as an estimating tool to assist in the development of conceptual level cost estimates and provide a method for translating typical construction items into a unit-based unit of measurement. The scope and definition of UPE's are developed by the Regional Consultant based on the unique design present in their project section.

2.3.2 Estimated Unit Costs

The development of construction unit costs for each of the construction activities that is identified and quantified from the design documents. The development of individual or composite estimated unit costs is accomplished through the use of historical bid data and by unit cost analysis, as appropriate, using labor, equipment and material rates. Unit costs are expressed in current year dollars and are adjusted to reflect any regional variations.

These methods are used either individually or in combination. For the PEPD Design level, when limited engineering details are available, the historical bid price method is typically used.

2.3.2.1 Historical Bid Price Method

Historical bid prices are typically used to develop costs for common construction elements. When using this method, the time of bid and conditions of the historical project used for pricing is taken into account and factors applied as needed:

- Adjust bid prices where the bid date is older than 12 months from the current date by using an appropriate escalation factor
- Adjust bid prices to reflect conditions of the project, such as type of terrain, geographical location, soil, traffic and other related factors. For location factor adjustments, the City Cost Index as published by RS Means is used.

Sources for historical bid prices that are used may come from local, regional, statewide and national levels, as well as from international high-speed rail projects with unique high-speed elements. Historical unit prices that are used for the CHSRP will be verified for appropriateness and documented as to their source as well as any adjustments for site, escalation or location factors.

2.3.2.2 Unit Cost Analysis Method

The estimated unit cost analysis method is typically used to develop costs for complex construction elements including but not limited to viaducts, retained earth systems, tunneling and underground structures. This method allows for unit costs to be developed based on current local construction and market conditions, such as changes which might affect productivity or the cost of labor or materials. The following steps are required in order to develop a unit price using this method:

- Analyze the proposed construction conditions
- Estimate production rates where applicable
- Obtain materials prices using local available sources
- Determine labor and equipment rates where applicable
- Calculate direct unit price using the above factors

The following sources are used to obtain basic cost data that is input into the database estimating program in order to develop any needed construction unit prices:

- Labor Rates – RS Means national wages adjusted by City Cost Index factor, Federal Davis-Bacon Wage Determination and/or California Department of Industrial Relations Prevailing Wage Determinations.
- Equipment Rates – RS Means and/or Corp of Engineers Construction Equipment Ownership and Operating Expense Schedule, Region VII.
- Material Prices - Material and supply prices for locally available material are obtained from local supplier quotes, if possible. Secondary sources of material cost data may be taken from RS Means, Engineering News-Record or other published resource.

A list of prototypical work elements and the units of measure are estimated for PEPD Design level with corresponding estimated unit cost. Appendix A presents the list of variable cost elements within each FRA SCC 10s to 60s series. When required, additional project-specific work elements reflecting unique site conditions and configurations are identified and their estimated costs are developed in addition to prototypical unit costs. Examples of these project-specific unit costs include very high and/or long span iconic bridge structures, grade separations, specific roadway improvements, unique utility relocations, staged construction to accommodate existing rail or vehicular traffic, or restrictive site access conditions in urban areas.

2.3.3 Quantity Takeoffs

The task of quantity takeoffs involves preparation of estimated quantities either by direct measurement and calculation of construction elements that are shown in design drawings, sketches, electronically calculated from CADD files or established as an allowance quantity based on professional experience and judgment. Quantity take-offs have been prepared by the Regional Consultant and are presented in the Los Angeles to Anaheim PEPD 'Basis of Quantity Report Revision 1 dated 2018-5-24.

2.3.4 Allocated and Unallocated Contingencies

Contingency, in the statistical sense, is the estimated percentage by which a calculated value may differ from its true or final value and is typically included in an estimate as an allowance for the level of engineering design completion or to address imperfections in the estimating methods used at the various project development stages. Contingency is typically added to a particular item or group of items by the use of percentage multipliers. Contingency is generally greatest for the early stage of project development and decreases with advancement in the level of engineering design and pricing detail. During the preliminary design of the high-speed rail project, the limited level of design information that is available requires the use of contingency allowances that are allocated against specific construction or procurement cost categories. The percentage selected for a given cost category are generally based on level of definition of the scope of work involved and substantiated by professional judgment and experience relative to level of uncertainty and historical cost variability typically seen for work within a particular cost category. For the purposes of this estimating program, contingency is assigned into two major categories – allocated and unallocated.

Allocated contingency is added to each cost category based on an assessment of the quality of design information; means and methods; and site accessibility available for individual items of work. This contingency typically falls in a range of 10 percent to 25 percent. The exact percentage selected for each cost category is based on professional judgment and experience related to the cost variability typically seen for items of work within a particular cost category. The contingency is generally higher for underground elements reflecting the additional exposure for unknowns as well as the construction complexity. It is also higher for stations, terminals, storage yard facilities and utilities since their design progress is still in the conceptual level and identification of all the utilities are not determined. The percentages shown in Table 2-1 are the values that are normally used; however, slightly higher or lower values are used if a project-specific condition warrants.

Unallocated contingency is typically included to address uncertainties that are more global in nature like schedule delays, changes in contracting environment, or other such issues that are not associated with individual construction activities. Unallocated contingencies will be estimated at 5 percent of the total construction costs.

Table 2-1 Allocated Contingency Percentages by Cost Category

Cost Category No.	Description	Allocated Contingency Percentage
10 Track Structures and Track		
10.01	Guideway: At-grade	15%
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)	15%
10.03	Guideway: At-grade semi-exclusive (allows cross-traffic)	15%
10.04	Guideway: Aerial structure	15%
10.05	Guideway: Built-up Fill	15%
10.07	Guideway: Underground Tunnel	25%
10.08	Guideway: Retained Cut or Fill	20%
10.09	Track: Direct fixation	15%
10.11	Track: Ballasted	15%
10.12	Track: Special (Switches, Turnouts)	15%
10.14	Special Structures	15%
20 Stations, Terminals, Intermodal		**25%**
30 Support Facilities: Yards, Shops, Admin. Bldgs.		**25%**
40 Sitework and Special Conditions		
40.01	Demolition, clearing, site preparation	25%
40.02	Site utilities, utility relocation	25%
40.03	Hazardous material, contaminated soil removal/mitigation, ground water treatments	15%
40.04	Environmental mitigation: wetlands, historic/archaeology, parks	20%
40.05	Site structures including retaining walls, sound walls	25%
40.06	Pedestrian/bike access & accommodation, landscaping	25%
40.07	Automobile, bus, van accessways including roads, parking lots	25%
40.08	Temporary facilities and other indirect costs during construction	10%
50 Systems		**15%**
60 Right-of-Way, Land, Existing Improvements		**15%**
70 Vehicles		**0%**
80 Professional Services		**20%**

2.3.5 Environmental Mitigation

An allowance to account for the cost of environmental mitigation that relates to hydrology and water resources; wetland impact; hazardous material and waste; historic/archaeology; safety and security; noise, vibration and air quality during construction and permanent aesthetic is included in the total capital cost. This allowance is based on 3 percent of the total cost of track structures, track work, station buildings, roadway modification and highway grade separation.

2.3.6 Right-of-Way Cost Estimate

This involves preparing estimated quantities of impacted properties, either permanent takes or temporary easements, which result from construction, operation, and maintenance of proposed high-speed rail alignment alternatives. In order to arrive at the estimated cost, professional experience and judgment in the area of property valuation, business damages, and legal and administrative issues as they relate to the estimation of right-of-way costs have been applied. The values used in the cost estimate were developed by the Regional Consultant and are presented in the Los Angeles to Anaheim Preliminary Right-of-Way Report 241202_016_LO-PEPD-ROW-Reqt-Report-Draft_Final_3.pdf.

2.3.7 Vehicle Estimate

The costs for the Los Angeles to Anaheim Project Section do not include acquisition of high-speed train vehicles. Acquisition of trainsets is considered to be a system-wide procurement and is not associated with construction of individual sections of the CHSRP System. Consistent with the Revised 2016 Business Plan, the cost of vehicles was determined by using publicly available data regarding recent sales of comparable equipment to other CHSRP projects around the world and by informal consultations with the manufacturers.

2.3.8 Program Implementation/Professional Services Add-ons

Program Implementation costs are included to represent the costs of engineering, project and construction management, contract administration, permits and fees, training/start-up/testing and any force account work. These add-on costs are calculated as a percentage of construction costs only (applied individually and not cumulatively and excluding vehicle procurement and right-of-way costs) and presented under Professional Services cost category in the estimate. The management and administration cost associated with right-of-way and rolling stock are included with the respective items.

Preliminary Engineering	2.0%
Program Management	3.0%
Final Design	6.0%
Construction Management	4.0%
Agency Costs	0.5%
Total	15.5%

In addition, an allowance for system start-up and pre-revenue testing is added to the Professional Services cost category in the amount of 6 percent of the Train Controls, Communications and Electrification construction costs.

2.3.9 Escalation

Estimates are prepared in Base Year dollars with the Base Year defined as 2023 for this estimate. Unit costs are updated annually or as required. For cost estimates with a base year that is older than the current calendar by one or more years, actual historical construction cost index values are used to calculate the escalation rate to be applied to bring a cost from the period in question to the present.

2.3.10 Finance Charge

Finance charges are not included in the capital cost estimates.

2.4 Estimate Validation

Following preparation of the PEPD Design Level estimates, cost estimates are subjected to a validation process including reviews by subject matter experts in the areas of engineering and construction.

2.5 Estimate Reconciliation

Reconciliations are made between current cost estimates and cost estimates that were developed in previous design phases. The goal of reconciliation is to identify and document significant changes that may have occurred since the preparation of the prior capital cost estimate. Significant changes are identified in the reconciliation under one of three categories that best reflects the cause for the change: Quantity, Unit Price, or Scope, as applicable.

2.6 Estimate Assumption and Exclusions

Estimate assumptions and exclusions are identified as follows:

- This Basis of Estimate provides two primary alternatives and both include no HSR platforms at the Norwalk/Santa Fe Springs and Fullerton Stations, but include options to add HSR facilities at the Norwalk/Santa Fe Springs or Fullerton Stations.
  - 1st Alternative (Preferred) is for the LMF to be located at 26th Street.
    - Option to Add HSR at Norwalk/Santa Fe Springs Station
    - Option to Add HSR at Fullerton Station
  - 2nd Alternative is for the LMF to be located at 15th Street.
    - Option to Add HSR at Norwalk/Santa Fe Springs Station
    - Option to Add HSR at Fullerton Station
- Clear Right-of-Way has been obtained and out of sequence work not anticipated. There may be additional costs due to restrictions for working in an active rail corridor.
- Utility Company Relocation Agreements have been obtained and out of sequence work not anticipated.
- At the request of the Authority the following UPE quantities, which were not part of the Basis of Quantity report, were carried over from the 2018 estimate.
  - 40.01.050 Demolition Allowance, Building
  - 40.02.050 Trk Drainage – Station S239+85 to 423+49
  - 40.02.050A Trk Drainage – Station S10+00 to S272+18
  - 40.02.050B Trk Drainage – Station SBN 590+19 to SBN 1319+98
  - 40.02.050C Trk Drainage – Station SOC 1404+76 to SOC 1613+64
  - 40.02.060C RCP Drainage Culvert
  - 40.08.0051 Roadway Undercrossing HSR – 4 lane roadway under 5 Tracks
- WYE River crossing was removed from the Los Angeles to Anaheim Project Section and included in another segment.
- Unit prices were developed in 2018 dollars and escalated to 2023 dollars using the methods described above.

APPENDIX A WORK BREAKDOWN STRUCTURE (WBS)

WORK BREAKDOWN STRUCTURE (FRA STANDARD COST CATEGORIES)

Category	Description
10 TRACK STRUCTURES & TRACK	
10.01	Guideway: At-grade exclusive right-of-way
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)
10.03	Guideway: At-grade semi-exclusive (allows cross-traffic)
10.04	Guideway: Aerial structure
10.05	Guideway: Built-up Fill
10.06	Guideway: Underground Cut and Cover
10.07	Guideway: Underground Tunnel
10.08	Guideway: Retained Cut or Fill
10.09	Track: Direct fixation
10.11	Track: Ballasted
10.12	Track: Special (Switches, Turnouts)
10.14	Special Structures
20 STATIONS, TERMINALS, INTERMODAL	
20.01	At-Grade Station, Stop, Shelter, Mall, Terminal, Platform
20.02	Aerial station, stop, shelter, mall, terminal, platform
20.03	Underground station, stop, shelter, mall, terminal, platform
20.04	Major Stations, Landings, Terminals, Intermodal, Ferry, Trolley
20.05	Joint Development
20.06	Automobile parking multi-story structure
20.07	Elevators, escalators
20.08	Passenger Overpass
20.09	Underground Interconnecting Tunnel:
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	
30.01	Administration Building: Office, sales, storage, revenue counting
30.02	Light Maintenance Facility
30.03	Heavy Maintenance Facility
30.04	Storage or Maintenance of Way Building
30.05	Yard and Yard Track
40 SITEWORK AND SPECIAL CONDITIONS	
40.01	Demolition, Clearing, Earthwork
40.02	Site Utilities, Utility Relocation

Category	Description
40.03	Haz. Matl, Contaminated Soil removal/mitigation, Ground Water Treatments
40.04	Environmental Mitigation, e.g. Wetlands, Historic/Archaeologic, Parks
40.05	Site Structures including Retaining Walls, Sound Walls
40.06	Pedestrian/Bike Access & Accommodation, Landscaping
40.07	Automobile, bus, van accessways including roads, parking lots
40.08	Temporary Facilities and other indirect costs during construction
50 SYSTEMS	
50.01	Train control and signals
50.02	Traffic Signals and Crossing Protection
50.03	Traction Power Supply: Substations
50.04	Traction Power Distribution: Catenary and Third Rail
50.05	Communications
50.06	Fare collection system and equipment
50.07	Central Control System
60 RIGHT-OF-WAY, LAND, EXISTING IMPROVEMENTS	
60.01	Purchase or lease of Real Estate
60.02	Relocation of Existing households and businesses
60.03	Services
60.04	Other Real Estate Costs
70 VEHICLES	
70.03	Commuter Rail
70.06	Non-Revenue Vehicles
70.07	Spare Parts/Routable Components
70.08	Intercity Passenger Rail
70.13	Vehicle refurbished: Non-passenger loco-hauled car w/o ticketed space
70.14	Vehicle refurbishment: Maintenance of way vehicles
70.15	Spare parts
80 PROFESSIONAL SERVICES (applies to Cats. 10-60)	
80.01	Preliminary Engineering
80.02	Engineering
80.03	Project Management for Design and Construction
80.04	Construction Administration & Management
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.
80.07	Surveys, Testing, Investigation, Inspection
80.08	Start up

Category	Description
90 UNALLOCATED CONTINGENCY	
100 FINANCE CHARGES	

APPENDIX B TYPICAL UNIT COST ELEMENTS

No.	DESCRIPTION	UNIT
10.01	**Track structure: Viaduct**	
10.01.122	Elevated Structure - 1 Track (20' Avg. Pier Ht)	Route Mile
10.01.123	Elevated Structure - 1 Track (30' Avg. Pier Ht)	Route Mile
10.01.124	Elevated Structure - 1 Track (40' Avg. Pier Ht)	Route Mile
10.01.125	Elevated Structure - 1 Track (50' Avg. Pier Ht)	Route Mile
10.01.126	Elevated Structure - 1 Track (60' Avg. Pier Ht)	Route Mile
10.01.127	Elevated Structure - 1 Track (70' Avg. Pier Ht)	Route Mile
10.01.222	Elevated Structure - 2 Track (20' Avg. Pier Ht)	Route Mile
10.01.223	Elevated Structure - 2 Track (30' Avg. Pier Ht)	Route Mile
10.01.224	Elevated Structure - 2 Track (40' Avg. Pier Ht)	Route Mile
10.01.225	Elevated Structure - 2 Track (50' Avg. Pier Ht)	Route Mile
10.01.226	Elevated Structure - 2 Track (60' Avg. Pier Ht)	Route Mile
10.01.227	Elevated Structure - 2 Track (70' Avg. Pier Ht)	Route Mile
10.01.242	Elevated Structure - 4 Track (20' Avg. Pier Ht)	Route Mile
10.01.243	Elevated Structure - 4 Track (30' Avg. Pier Ht)	Route Mile
10.01.244	Elevated Structure - 4 Track (40' Avg. Pier Ht)	Route Mile
10.01.245	Elevated Structure - 4 Track (50' Avg. Pier Ht)	Route Mile
10.01.246	Elevated Structure - 4 Track (60' Avg. Pier Ht)	Route Mile
10.01.247	Elevated Structure - 4 Track (70' Avg. Pier Ht)	Route Mile
10.01.322	Elevated Structure (LS) - 1 Track (20' Avg. Pier Ht)	Route Mile
10.01.323	Elevated Structure (LS) - 1 Track (30' Avg. Pier Ht)	Route Mile
10.01.324	Elevated Structure (LS) - 1 Track (40' Avg. Pier Ht)	Route Mile
10.01.325	Elevated Structure (LS) - 1 Track (50' Avg. Pier Ht)	Route Mile
10.01.326	Elevated Structure (LS) - 1 Track (60' Avg. Pier Ht)	Route Mile
10.01.327	Elevated Structure (LS) - 1 Track (70' Avg. Pier Ht)	Route Mile
10.01.422	Elevated Structure (LS) - 2 Track (20' Avg. Pier Ht)	Route Mile
10.01.423	Elevated Structure (LS) - 2 Track (30' Avg. Pier Ht)	Route Mile
10.01.424	Elevated Structure (LS) - 2 Track (40' Avg. Pier Ht)	Route Mile
10.01.425	Elevated Structure (LS) - 2 Track (50' Avg. Pier Ht)	Route Mile
10.01.426	Elevated Structure (LS) - 2 Track (60' Avg. Pier Ht)	Route Mile
10.01.427	Elevated Structure (LS) - 2 Track (70' Avg. Pier Ht)	Route Mile
10.01.431	Elevated Structure (LS-Tall) - 2-Single Tracks (110' Avg. Pier Ht)	Route Mile
10.01.432	Elevated Structure (LS-Tall) - 2-Single Tracks (120' Avg. Pier Ht)	Route Mile

No.	DESCRIPTION	UNIT
10.01.512	Elevated Structure Straddle over 2 RR - 1 Track (20' Avg. Pier Ht)	Route Mile
10.01.513	Elevated Structure Straddle over 2 RR - 1 Track (30' Avg. Pier Ht)	Route Mile
10.01.514	Elevated Structure Straddle over 2 RR - 1 Track (40' Avg. Pier Ht)	Route Mile
10.01.515	Elevated Structure Straddle over 2 RR - 1 Track (50' Avg. Pier Ht)	Route Mile
10.01.522	Elevated Structure Straddle over 2 RR - 2 Track (20' Avg. Pier Ht)	Route Mile
10.01.523	Elevated Structure Straddle over 2 RR - 2 Track (30' Avg. Pier Ht)	Route Mile
10.01.524	Elevated Structure Straddle over 2 RR - 2 Track (40' Avg. Pier Ht)	Route Mile
10.01.525	Elevated Structure Straddle over 2 RR - 2 Track (50' Avg. Pier Ht)	Route Mile
10.01.612	Elevated Structure Straddle over 4 RR - 1 Track (20' Avg. Pier Ht)	Route Mile
10.01.613	Elevated Structure Straddle over 4 RR - 1 Track (30' Avg. Pier Ht)	Route Mile
10.01.614	Elevated Structure Straddle over 4 RR - 1 Track (40' Avg. Pier Ht)	Route Mile
10.01.615	Elevated Structure Straddle over 4 RR - 1 Track (50' Avg. Pier Ht)	Route Mile
10.01.622	Elevated Structure Straddle over 4 RR - 2 Track (20' Avg. Pier Ht)	Route Mile
10.01.623	Elevated Structure Straddle over 4 RR - 2 Track (30' Avg. Pier Ht)	Route Mile
10.01.624	Elevated Structure Straddle over 4 RR - 2 Track (40' Avg. Pier Ht)	Route Mile
10.01.625	Elevated Structure Straddle over 4 RR - 2 Track (50' Avg. Pier Ht)	Route Mile
10.01.944	Elevated Structure - 2 Track w/ 2 Single Trenches	Route Mile
10.02	**Track structure: Major/Movable bridge**	
10.02.013	Bridge Structure - 3 span with 1 Track	Route Mile
10.02.023	Bridge Structure - 3 span with 2 Track	Route Mile
10.02.043	Bridge Structure - 3 span with 4 Track	Route Mile
10.05	**Track structure: Cut and Fill (> 4' height/depth)**	
10.05.111	At-Grade Track-bed in Cut - 1 Track (5' Avg. Exc Depth)	Route Mile
10.05.112	At-Grade Track-bed in Cut - 1 Track (10' Avg. Exc Depth)	Route Mile
10.05.113	At-Grade Track-bed in Cut - 1 Track (15' Avg. Exc Depth)	Route Mile
10.05.114	At-Grade Track-bed in Cut - 1 Track (20' Avg. Exc Depth)	Route Mile
10.05.121	At-Grade Track-bed in Cut - 2 Track (5' Avg. Exc Depth)	Route Mile
10.05.122	At-Grade Track-bed in Cut - 2 Track (10' Avg. Exc Depth)	Route Mile
10.05.123	At-Grade Track-bed in Cut - 2 Track (15' Avg. Exc Depth)	Route Mile
10.05.124	At-Grade Track-bed in Cut - 2 Track (20' Avg. Exc Depth)	Route Mile
10.05.126	At-Grade Track-bed in Cut - 2 Track (40' Avg. Exc Depth)	Route Mile
10.05.128	At-Grade Track-bed in Cut - 2 Track (60' Avg. Exc Depth)	Route Mile
10.05.130	At-Grade Track-bed in Cut - 2 Track (80' Avg. Exc Depth)	Route Mile
10.05.132	At-Grade Track-bed in Cut - 2 Track (100' Avg. Exc Depth)	Route Mile
10.05.211	At-Grade Track-bed in Fill - 1 Track (5' Avg. Fill Ht)	Route Mile

No.	DESCRIPTION	UNIT
10.05.212	At-Grade Track-bed in Fill - 1 Track (10' Avg. Fill Ht)	Route Mile
10.05.213	At-Grade Track-bed in Fill - 1 Track (15' Avg. Fill Ht)	Route Mile
10.05.214	At-Grade Track-bed in Fill - 1 Track (20' Avg. Fill Ht)	Route Mile
10.05.221	At-Grade Track-bed in Fill - 2 Track (5' Avg. Fill Ht)	Route Mile
10.05.222	At-Grade Track-bed in Fill - 2 Track (10' Avg. Fill Ht)	Route Mile
10.05.223	At-Grade Track-bed in Fill - 2 Track (15' Avg. Fill Ht)	Route Mile
10.05.224	At-Grade Track-bed in Fill - 2 Track (20' Avg. Fill Ht)	Route Mile
10.05.226	At-Grade Track-bed in Fill - 2 Track (40' Avg. Fill Ht)	Route Mile
10.05.228	At-Grade Track-bed in Fill - 2 Track (60' Avg. Fill Ht)	Route Mile
10.05.230	At-Grade Track-bed in Fill - 2 Track (80' Avg. Fill Ht)	Route Mile
10.05.232	At-Grade Track-bed in Fill - 2 Track (100' Avg. Fill Ht)	Route Mile
10.06	**Track structure: At-grade (grading and subgrade stabilization)**	
10.06.210	At-Grade Track-bed with Closed Drainage - 1 Track	Route Mile
10.06.220	At-Grade Track-bed with Closed Drainage - 2 Track	Route Mile
10.06.230	At-Grade Track-bed with Closed Drainage - 3 Track	Route Mile
10.06.240	At-Grade Track-bed with Closed Drainage - 4 Track	Route Mile
10.07	**Track structure: Tunnel**	
10.07.101	TBM Single Track Twin Tunnel 30ft ID Unpressurized TBM in hard rock	Route Mile
10.07.102	TBM Single Track Twin Tunnel 30ft ID Slurry TBM in hard rock	Route Mile
10.07.103	TBM Single Track Twin Tunnel 30ft ID in soft ground	Route Mile
10.07.104	TBM Double Track Tunnel 50ft ID in soft ground	Route Mile
10.07.105	TBM Double Track Tunnel 40ft ID in soft ground	Route Mile
10.07.201	D&B Single Track Twin Tunnel 30ft ID in hard rock	Route Mile
10.07.202	D&B Single Track Twin Tunnel 30ft ID in rock	Route Mile
10.07.203	D&B Double Track Tunnel 40ft ID in hard rock	Route Mile
10.07.204	D&B Double Track Tunnel 40ft ID in rock	Route Mile
10.07.205	D&B Double Track Tunnel 50ft ID in hard rock	Route Mile
10.07.206	D&B Double Track Tunnel 50ft ID in rock	Route Mile
10.07.301	SEM Single Track Twin Tunnel 30ft ID in soft ground	Route Mile
10.07.302	SEM Single Track Twin Tunnel 30ft ID in soft ground	Route Mile
10.07.303	SEM Double Track Tunnel 40ft ID in soft ground	Route Mile
10.07.304	SEM Double Track Tunnel 40ft ID in soft ground	Route Mile
10.07.305	SEM Double Track Tunnel 50ft ID in soft ground	Route Mile
10.07.306	SEM Double Track Tunnel 50ft ID in soft ground	Route Mile
10.07.401	RH Single Track Twin Tunnel 30ft ID in soft rock	Route Mile

No.	DESCRIPTION	UNIT
10.07.402	RH Single Track Twin Tunnel 30ft ID in soft rock	Route Mile
10.07.403	RH Double Track Tunnel 40ft ID in soft rock	Route Mile
10.07.404	RH Double Track Tunnel 40ft ID in soft rock	Route Mile
10.07.405	RH Double Track Tunnel 50ft ID in soft rock	Route Mile
10.07.406	RH Double Track Tunnel 50ft ID in soft rock	Route Mile
10.07.207	D&B Cross Passage conservative cost in rock	Linear Feet
10.07.407	RH Cross Passage conservative cost in soft rock	Linear Feet
10.07.501	Cross Passage in Soft Ground	Linear Feet
10.07.502	Cross Passage in Soft Ground, including jet grout	Linear Feet
10.07.114	Cut & Cover Box - 1 Track/ 1 Box (40' Avg. Exc Depth)	Route Mile
10.07.115	Cut & Cover Box - 1 Track/ 1 Box (50' Avg. Exc Depth)	Route Mile
10.07.116	Cut & Cover Box - 1 Track/ 1 Box (60' Avg. Exc Depth)	Route Mile
10.07.214	Cut & Cover Box - 2 Track / 1 Box (40' Avg. Exc Depth)	Route Mile
10.07.215	Cut & Cover Box - 2 Track / 1 Box (50' Avg. Exc Depth)	Route Mile
10.07.216	Cut & Cover Box - 2 Track / 1 Box (60' Avg. Exc Depth)	Route Mile
10.07.224	Cut & Cover Box - 2 Track/ 2 Box (40' Avg. Exc Depth)	Route Mile
10.07.225	Cut & Cover Box - 2 Track / 2 Box (50' Avg. Exc Depth)	Route Mile
10.07.226	Cut & Cover Box - 2 Track / 2 Box (60' Avg. Exc Depth)	Route Mile
10.07.414	Cut & Cover Box - 4 Track / 1 Box (40' Avg. Exc Depth)	Route Mile
10.07.415	Cut & Cover Box - 4 Track / 1 Box (50' Avg. Exc Depth)	Route Mile
10.07.416	Cut & Cover Box - 4 Track / 1 Box (60' Avg. Exc Depth)	Route Mile
10.07.801	Ventilation Shaft	VF
10.07.802	Mid-Line Ventilation Structure	LS
10.07.803	Tunnel Portal Structure	LS
10.07.805	Emergency Access Shaft	VF
10.07.850	Pumping Station	EA
10.07.901	Mechanical & Electrical Allowance for Underground (Single)	Route Mile
10.07.902	Mechanical & Electrical Allowance for Underground (Double)	Route Mile
10.07.920	Ventilation Equipment Allowance	EA
10.07.922	Double Deck - 2 Track Trench on Top of 2 Track C&C Box	Route Mile
10.07.950	Allowance for Construction Monitoring	Route Mile
10.08	**Track structure: Retaining walls and systems**	
10.08.211	Retained Cut, Trench - 1 Track (10' Avg. Exc Depth)	Route Mile
10.08.212	Retained Cut, Trench - 1 Track (20' Avg. Exc Depth)	Route Mile
10.08.213	Retained Cut, Trench - 1 Track (30' Avg. Exc Depth)	Route Mile

No.	DESCRIPTION	UNIT
10.08.221	Retained Cut, Trench - 2 Track (10' Avg. Exc Depth)	Route Mile
10.08.222	Retained Cut, Trench - 2 Track (20' Avg. Exc Depth)	Route Mile
10.08.223	Retained Cut, Trench - 2 Track (30' Avg. Exc Depth)	Route Mile
10.08.241	Retained Cut, Trench - 4 Track (10' Avg. Exc Depth)	Route Mile
10.08.242	Retained Cut, Trench - 4 Track (20' Avg. Exc Depth)	Route Mile
10.08.243	Retained Cut, Trench - 4 Track (30' Avg. Exc Depth)	Route Mile
10.08.344	Retained Cut, Staged Trench - 4 Track (40' Avg. Exc Depth)	Route Mile
10.08.346	Retained Cut, Staged Trench - 4 Track (60' Avg. Exc Depth)	Route Mile
10.08.411	Retained Fill, Walls Both Sides - 1 Tracks (10' Avg. Wall Ht)	Route Mile
10.08.412	Retained Fill, Walls Both Sides - 1 Tracks (20' Avg. Wall Ht)	Route Mile
10.08.413	Retained Fill, Walls Both Sides - 1 Tracks (30' Avg. Wall Ht)	Route Mile
10.08.421	Retained Fill, Walls Both Sides - 2 Tracks (10' Avg. Wall Ht)	Route Mile
10.08.422	Retained Fill, Walls Both Sides - 2 Tracks (20' Avg. Wall Ht)	Route Mile
10.08.423	Retained Fill, Walls Both Sides - 2 Tracks (30' Avg. Wall Ht)	Route Mile
10.09	**Track new construction: Conventional ballasted**	
10.09.110	Ballasted Track - 1 Track	Route Mile
10.09.112	Ballasted Track (Track Laying Machine) - 1 Track	Route Mile
10.09.120	Ballasted Track - 2 Track	Route Mile
10.09.122	Ballasted Track (Track Laying Machine) - 2 Track	Route Mile
10.09.240	Ballasted Track - 2 Track (Station Track)	Route Mile
10.09.810	Ballasted Freight Track - 1 Track	Route Mile
10.09.820	Ballasted Freight Track - 2 Track	Route Mile
10.09.910	Ballasted Track Relocation - 1 Track (Temporary)	Route Mile
10.09.920	Ballasted Track Relocation - 1 Track (Permanent)	Route Mile
10.10	**Track new construction: Non-ballasted**	
10.10.110	Direct Fixation Track - 1 Track	Route Mile
10.10.120	Direct Fixation Track - 2 Track	Route Mile
10.10.140	Direct Fixation Track - 4 Track	Route Mile
10.10.210	Independent Dual Block Track - 1 Track	Route Mile
10.10.220	Independent Dual Block Track - 2 Track	Route Mile
10.10.240	Independent Dual Block Track - 4 Track	Route Mile
10.14	**Track: Special track work (switches, turnouts, insulated joints)**	
10.14.100	Direct Fixation Turnout (60 MPH)	EA
10.14.105	Direct Fixation Turnout (80 MPH)	EA
10.14.110	Direct Fixation Turnout (110 MPH)	EA

No.	DESCRIPTION	UNIT
10.14.115	Direct Fixation Turnout (150 MPH)	EA
10.14.130	Direct Fixation Crossover (60 MPH)	EA
10.14.135	Direct Fixation Crossover (80 MPH)	EA
10.14.140	Direct Fixation Crossover (110 MPH)	EA
10.14.145	Direct Fixation Crossover (150 MPH)	EA
10.14.200	Ballasted Turnout (60 MPH)	EA
10.14.205	Ballasted Turnout (80 MPH)	EA
10.14.210	Ballasted Turnout (110 MPH)	EA
10.14.215	Ballasted Turnout (150 MPH)	EA
10.14.300	Ballasted Crossover (60 MPH)	EA
10.14.305	Ballasted Crossover (80 MPH)	EA
10.14.310	Ballasted Crossover (110 MPH)	EA
10.14.315	Ballasted Crossover (150 MPH)	EA
10.14.400	Terminal - Bumping Post	--
20.01	**Station buildings: Intercity passenger rail only**	
20.01.105	Millbrae Station	LS
20.01.105	Millbrae Station - Site Elements	LS
20.02.200	Redwood/Palo Alto Station	LS
20.02.201	Redwood/Palo Alto Station - Site Elements	LS
20.02.215	Gilroy Station	LS
20.02.216	Gilroy Station - Site Elements	LS
20.02.225	San Jose Station	LS
20.02.226	San Jose Station-Site Elements	LS
20.01.100	Artic Station	LS
20.01.110	LA Union Station	LS
20.02.205	Norwalk Station	LS
20.02.206	Norwalk Station - Site Elements	LS
20.02.210	Tulare Station	LS
20.02.211	Tulare Station - Site Elements	LS
20.02.220	Burbank Station	LS
20.02.221	Burbank Station - Site Elements	LS
20.02.230	Merced Station	LS
20.02.231	Merced Station - Site Elements	LS
20.02.235	Fresno Station	LS
20.02.236	Fresno Station - Site Elements	LS

No.	DESCRIPTION	UNIT
20.02.240	Bakersfield Station	LS
20.02.241	Bakersfield Station - Site Elements	LS
20.02.245	Palmdale Station	LS
20.02.246	Palmdale Station - Site Elements	LS
20.02.250	Sylmar Station	LS
20.02.251	Sylmar Station - Site Elements	LS
20.06	**Pedestrian / bike access and accommodation, landscaping, parking lots**	
20.06.120	Pedestrian Access (Cut & Cover)	LF
20.06.140	Pedestrian Plaza	SF
20.06.160	Pedestrian Access, Vertical Structure, 30' Height	EA
20.06.210	Parking - At Grade	STL
20.06.250	Parking - Structured (Above Grade)	STL
20.06.800	Landscaping Allowance	SF
20.06.810	Landscaping Allowance, Guideway	Route Mile
20.07	**Automobile, bus, van accessways including roads**	
20.07.010	Roadway Modification, New AC Paving	SF
20.07.020	Roadway Modification, New AC Paving (including Curb & Sidewalk)	SF
20.07.710	Permanent Service/Emergency Access Road (20' Wide)	Route Mile
20.07.715	Access Road Entrance Point	EA
20.07.800	Streetscaping Allowance	ESF
30.02	**Light maintenance facility**	
30.02.010	Light Maintenance Facility (LMF)	EA
30.03	**Heavy maintenance facility**	
30.03.010	Heavy Maintenance Facility (HMF)	EA
30.04	**Storage or maintenance-of-way building/bases**	
30.04.010	Maintenance of Way Facility (MOWF)	EA
30.05	**Yard and yard track**	
30.05.110	Ballasted Track - Yard Track	Route Mile
30.05.200	Ballasted Turnout, No. 15	EA
30.05.210	Ballasted Diamond Crossover, No. 15	EA
30.05.250	Heavy Duty Rubber Grade Crossing	TF
40.01	**Demolition, clearing, site preparation**	
40.01.010	Demolition Allowance, Bridge	SF
40.01.050	Demolition Allowance, Building (1 Story)	SF
40.01.060	Demolition Allowance, Building (2 Story)	SF

No.	DESCRIPTION	UNIT
40.01.110	Demolition Allowance, Asphalt Pavement	SY
40.01.140	Demolition Allowance, Concrete Curb	LF
40.01.150	Demolition Allowance, Concrete Sidewalk	SY
40.01.810	Demolition Allowance, Remove Railroad Track	Route Mile
40.01.900	Miscellaneous Excavation & Support Items	LS
40.02	**Site utilities, utility relocation**	
40.02.001	Utility Relocation Allowance, Level 1	Route Mile
40.02.002	Utility Relocation Allowance, Level 2	Route Mile
40.02.003	Utility Relocation Allowance, Level 3	Route Mile
40.02.004	Utility Relocation Allowance, Level 4	Route Mile
40.02.005	Utility Relocation Allowance, Level 5	Route Mile
40.02.050	Site Utility Allowance	Route Mile
40.03	**Hazardous material, contaminated soil removal/mitigation, ground water treatments**	
40.03.100	Hazardous Material Removal Allowance, Light	Route Mile
40.03.105	Hazardous Material Removal Allowance, Medium	Route Mile
40.03.110	Hazardous Material Removal Allowance, Heavy	Route Mile
40.03.150	Removal of Contaminated Soil	CF
40.04	**Environmental mitigation: wetlands, historic/archaeology, parks**	
40.04.100	Environmental Mitigation Allowance, Light	Route Mile
40.04.105	Environmental Mitigation Allowance, Medium	Route Mile
40.04.110	Environmental Mitigation Allowance, Heavy	Route Mile
40.05	**Site structures including retaining walls, sound walls**	
40.05.012	Retaining Wall - 1 Wall (12' Avg. Height)	LF
40.05.111	Containment (Crash) Wall - 1 Wall (6' Avg. Height Above Rail)	LF
40.05.120	Blast Wall (At Stations) - 1 Wall (20' Avg. Height Above Platform)	LF
40.05.211	Sound Wall - 1 Wall (8' Avg. Height)	LF
40.05.310	Intrusion Protection Berm	LF
40.06	**Temporary facilities and other indirect costs during construction**	
40.08	**Highway/pedestrian overpass/grade separations**	
40.08.322	Roadway Overcrossing HSR - 2 lane retained fill roadway over 2 tracks	EA
40.08.324	Roadway Overcrossing HSR - 4 lane retained fill roadway over 2 tracks	EA
40.08.326	Roadway Overcrossing HSR - 6 lane retained fill roadway over 2 tracks	EA
40.08.342	Roadway Overcrossing HSR - 2 lane retained fill roadway over 4 tracks	EA
40.08.344	Roadway Overcrossing HSR - 4 lane retained fill roadway over 4 tracks	EA
40.08.346	Roadway Overcrossing HSR - 6 lane retained fill roadway over 4 tracks	EA

No.	DESCRIPTION	UNIT
40.08.422	Roadway Overcrossing HSR - 2 lane roadway on embankment over 2 tracks	EA
40.08.424	Roadway Overcrossing HSR - 4 lane roadway on embankment over 2 tracks	EA
40.08.426	Roadway Overcrossing HSR - 6 lane roadway on embankment over 2 tracks	EA
50.01	**Wayside signaling equipment**	
50.01.010	Train Controls (ATC)	Route Mile
50.01.020	Wayside Protection System	Route Mile
50.01.030	Train Control, Wayside Facility Site Work	EA
50.03	**Traction power supply: Substations**	
50.03.100	Traction Power Supply	Route Mile
50.03.010	Traction Power, Supply Station Site Work	EA
50.03.020	Traction Power, Switching Station Site Work	EA
50.03.030	Traction Power, Paralleling Station Site Work	EA
50.04	**Traction power distribution: Catenary and third rail**	
50.04.100	Traction Power Distribution	Route Mile
50.05	**Communications**	
50.05.010	Communications (w/Fiber Optic Backbone)	Route Mile
60.01	**Purchase or lease of real estate**	
Right-of-Way Required for Segment		
60.01.100	Dense Urban	Acre
60.01.101	Urban	Acre
60.01.102	Dense Suburban	Acre
60.01.103	Suburban	Acre
60.01.104	Farmland	Acre
60.01.105	Undeveloped	Acre
Right-of-Way Required for Stations and Maintenance Facilities		
60.01.200	Dense Urban	Acre
60.01.201	Urban	Acre
60.01.202	Dense Suburban	Acre
60.01.203	Suburban	Acre
60.01.204	Undeveloped	Acre

APPENDIX C DETAILED COST BUDGET

SHARED PASSENGER TRACK ALTERNATIVES A AND B

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
10.01.222	Elevated Structure - 2 Tracks (20' Avg. Pier Ht)	0.22	RM	$101,039,355	/RM	$22,228,658
10.01.222A	Elevated Structure - 2 Tracks (20' Avg. Pier Ht), Commerce Yd	0.43	RM	$93,562,923	/RM	$40,232,057
10.01.222B	Elevated Structure 2 Tracks (30' Avg. Pier Ht) Commerce Yd	0.74	RM	$93,274,507	/RM	$69,023,136
10.01.222C	Elevated Structure 2 Tracks (40' Avg. Pier Ht) Commerce Yd	0.02	RM	$118,227,118	/RM	$2,364,543
10.01.223	Elevated Structure 2 Tracks (30' Avg. Pier Ht)	0.47	RM	$111,513,905	/RM	$52,411,535
10.01.224	Elevated Structure - 2 Tracks (40' Avg. Pier Ht)	0.58	RM	$169,392,375	/RM	$82,247,578
10.01.225	Elevated Structure - 2 Tracks (50' Avg. Pier Ht)	0.45	RM	$174,027,458	/RM	$78,312,356
10.01.226	Elevated Structure - 2 Tracks (60' Avg. Pier Ht)	0.03	RM	$146,217,886	/RM	$4,386,537
10.02.0112	Bridge - 2sp 11trk, Hobart Yard BNSF Extension, 259+07	1.00	EA	$2,337,431	/EA	$2,337,431
10.02.011A	Bridge - 1sp 1trk, Culvert Ext on N. Side, Rio Hondo access, 513+81	1.00	EA	$1,252,473	/EA	$1,252,472
10.02.011B	Bridge - 2sp 2trk culvert ext, Coyote Creek, 1055+80	1.00	EA	$2,119,610	/EA	$2,119,611
10.02.011C	Culvert Ext N & S side, Single box 1 new trk, Carbon Creek, 1404+67	1.00	EA	$1,090,137	/EA	$1,090,137
10.02.012	Bridge - 2sp 1trk, Rio Hondo RR Bridge, 516+00	1.00	EA	$6,808,178	/EA	$6,808,178
10.02.013	Bridge - 3sp 1trk, Brea Creek Widening, 1085+85	1.00	EA	$4,639,682	/EA	$4,639,683
10.02.014	Bridge - 2sp 4trk, Hobart Yd Mainline Extension, 259+07	1.00	EA	$1,487,580	/EA	$1,487,580
10.02.014A	Bridge - 2sp 4trk, Hobart Yd Mainline Extension, 259+07	1.00	EA	$1,487,580	/EA	$1,487,580
10.02.014C	Bridge - 2sp 4trk, Drainage Channel - 26th St (veh culvert), 73+44	1.00	EA	$825,510	/EA	$825,510
10.02.015	Bridge - 5sp 1trk, La Mirada Creek,	1.00	EA	$2,012,848	/EA	$2,012,849
10.02.018	Bridge - 8sp 1trk, San Gabriel Rvr, HSR Widen, 612+00	1.00	EA	$9,141,041	/EA	$9,141,041
10.02.022	Bridge - 2sp 2trk, Drainage Channel, 1319+87	1.00	EA	$1,514,383	/EA	$1,514,383
10.02.032	Bridge - 2sp 3trk, N Fork/Coyote Creek, 907+03	1.00	EA	$4,498,196	/EA	$4,498,196
10.02.042	Bridge - 2sp 4trk, Drainage Channel - 26th St (veh culvert), 73+44	1.00	EA	$825,510	/EA	$825,510

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
10.02.147	Bridge - 7sp w/4 lanes, Stanton Ave, 610+00	1.00	EA	$1,859,686	/EA	$1,859,686
10.05.111	Basin Excavation	11,018.00	CY	$26.44	/CY	$291,266
10.05.1A	Grading Cut (Exc w/Haul) - LA - Ana Tracks	175,766.00	CY	$9.33	/CY	$1,639,930
10.05.1B	Grading Cut (Exc w/Haul) BNSF Tracks	378,633.00	CY	$9.33	/CY	$3,532,716
10.05.2A	Grading Fill (Embank w/Haul & Compaction) LA - Ana Tracks	248,804.00	CY	$4.66	/CY	$1,160,694
10.05.2B	Grading Fill (Embank w/Haul & Compaction) - BNSF Tracks	52,059.00	CY	$4.66	/CY	$242,860
10.05.3A	Grading Cut (Excavation w/Haul and Disposal) LA - Ana Tracks	73,038.00	CY	$23.33	/CY	$1,703,645
10.05.3B	Grading Cut (Excavation w/Haul and Disposal) BNSF Tracks	326,574.00	CY	$12.89	/CY	$4,210,199
10.08.220	Dale to Gilbert, Braced Trench Quantity	1.00	LS	$88,042,040	/LS	$88,042,040
10.08.221	Retained Cut, Trench 2 track (10' Ave Exc Depth)	0.19	RM	$107,737,278	/RM	$20,470,082
10.08.222	Retained Cut, Trench 2 track (20' Ave Exc Depth)	0.19	RM	$140,841,939	/RM	$26,759,968
10.08.223	Retained Cut, Trench 2 track (30' Ave Exc Depth)	0.19	RM	$141,806,801	/RM	$15,943,293
10.09.110	Ballasted Track - 1 Track	21,250.00	RF	$615.79	/RF	$13,085,584
10.09.120	Ballasted Track - 2 Track	75,364.00	RF	$1,202	/RF	$90,590,452
10.10.110	Direct Fixation Track - 2 Track	19,448.00	RF	$2,799	/RF	$54,436,030
10.11.110	Ballasted Freight Track - 1 Track	116,666.00	RF	$1,109	/RF	$129,351,905
10.11.120	Ballasted Freight Track - 2 Track	17,074.00	RF	$2,217	/RF	$37,861,150
10.11.910	Ballasted Track Relocation - 1 Track (Temp)	1,950.00	RF	$653.11	/RF	$1,273,570
10.11.920	Ballasted Track Relocation - 1 Track (Permanent)	46,187.00	LF	$653.11	/LF	$30,165,328
10.11.990	Ballasted Track Removal - 1 Track (Permanent)	37,072.00	LF	$73.09	/LF	$2,709,858
10.14.106	Direct Fixation Turnout #15Turnout (35 MPH)	4.00	EA	$132,178	/EA	$528,710
10.14.201	Ballasted #9 Turnout (15 MPH)	18.00	EA	$116,627	/EA	$2,099,292
10.14.202	Ballasted #11 Turnout (25 MPH)	33.00	EA	$116,627	/EA	$3,848,701
10.14.203	Ballasted #15 Turnout (35 MPH)	4.00	EA	$116,627	/EA	$466,509
10.14.204	Ballasted #20 Turnout (40 MPH)	7.00	EA	$116,627	/EA	$816,391

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
10.14.205	Direct Fixation Turnout (80 MPH)	5.00	EA	$132,178	/EA	$660,888
10.14.206	Ballasted #24 Turnout (50 MPH)	2.00	EA	$116,627	/EA	$233,255
10.14.207	Ballasted #11 Doubleslip (25 MPH)	1.00	EA	$287,681	/EA	$287,681
10.14.305	Ballasted Crossover (80 MPH)	4.00	EA	$178,829	/EA	$715,314
10.14.306	Ballasted #11 Crossover (25 MPH)	6.00	EA	$178,829	/EA	$1,072,971
10.14.307	Ballasted #15 Crossover (35 MPH)	8.00	EA	$178,829	/EA	$1,430,628
10.14.308	Ballasted #20 Crossover (40 MPH)	20.00	EA	$178,829	/EA	$3,576,571
10.14.309	Ballasted #24 Crossover (50 MPH)	34.00	EA	$178,829	/EA	$6,080,170
10.14.400	Terminal - Bumping Post	2.00	EA	$38,876	/EA	$77,752
10.14.800	Ballasted OWL Diamond	3.00	EA	$178,829	/EA	$536,486
10.14.990	Turnout Removal	122.00	EA	$38,876	/EA	$4,742,844
10.31.00	Retaining Walls (Type 1-4)	38,810.00	CY	$2,099	/CY	$81,473,506
20.01.400	LA Union Upgrade	1.00	LS	$1,443,776	/LS	$1,443,776
20.02.003	Anaheim Station	1.00	LS	$96,041,156	/LS	$96,041,156
20.02.005	Commerce Metrolink	1.00	LS	$19,867,447	/LS	$19,867,447
20.02.006	Buena Park Metrolink	1.00	LS	$20,454,625	/LS	$20,454,625
20.07.021	Anaheim Station Sitework Allowance	1.00	LS	$487,652	/LS	$487,652
30.05.110	Ballasted Freight Track - 1 Track	133,450.00	RF	$1,075	/RF	$143,475,149
30.05.120	Ballasted Track - 2 Track	2,872.00	RF	$1,202	/RF	$3,452,255
30.05.201	Ballasted #9 Turnout (15 MPH)	28.00	EA	$116,627	/EA	$3,265,565
30.05.202	Ballasted #11 Turnout (25 MPH)	11.00	EA	$116,627	/EA	$1,282,900
30.05.203	Ballasted #15 Turnout (35 MPH)	5.00	EA	$116,627	/EA	$583,137
30.05.207	Ballasted #11 Doubleslip (25 MPH)	2.00	EA	$287,681	/EA	$575,361
30	LMF (minus Professional Services and Contingency)	1.00	EA	$361,343,053	/EA	$361,343,053
30	Staging Tracks	1.00	LS	$560,842,286	/EA	$560,842,286

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
40.01.050	Demolition Allowance, Building	2,981,000.00	SF	$41.74	/SF	$124,424,098
40.02.001	Major Utilities - Level 1 (w Removal of Anaheim Grade Seps)	325,875.00	LF	$619	/LF	$151,710,634
40.02.002	Major Utilities - Level 2	113,385.00	LF	$460	/LF	$52,183,284
40.02.003	Major Utilities - Level 3	21,701.00	LF	$458	/LF	$9,931,973
40.02.004	Major Utilities - Level 4	18,080.00	LF	$521	/LF	$9,415,120
40.02.005	Major Utilities - Level 5	11,970.00	LF	$810	/LF	$9,694,856
40.02.006	Major Utilities - Level 6	2,000.00	LF	$1,141	/LF	$2,281,839
40.02.007	Major Utilities - Level 7	943.00	LF	$1,563	/LF	$1,474,364
40.02.008	Major Utilities - Level 8	3,750.00	LF	$2,125	/LF	$7,969,533
40.02.009	Major Utilities - Level 9	800.00	LF	$6,423	/LF	$5,138,363
40.02.050	Trk Drainage - Station S239+85 to 423+49	1.00	LS	$6,902,139	/LS	$6,902,139
40.02.050A	Trk Drainage - Station S10+00 to S272+18	1.00	LS	$3,159,924	/LS	$3,159,924
40.02.050B	Trk Drainage - Station SBN 590+19 to SBN 1319+98	1.00	LS	$24,947,173	/LS	$24,947,173
40.02.050C	Trk Drainage - Station SOC 1404+76 to SOC 1613+64	1.00	LS	$1,525,451	/LS	$1,525,451
40.02.060C	RCP Drainage Culvert	90.00	CY	$5,259	/CY	$473,270
40.03.105	Hazardous Material Removal Allowance, Medium	1.00	LS	$5,022,749	/LS	$5,022,749
40.04	Environmental Mitigation (% Calculation)	1.00	LS	$83,148,281	/LS	$83,148,281
40.06	Temp Facilities	1.00	LS	$101,625,677	/LS	$101,625,677
40.08.0044	Roadway Undercrossing HSR - 4 lane roadway under 5 tracks, Rosemead, P	1.00	EA	$12,317,204	/EA	$12,317,203
40.08.005	Roadway Undercrossing HSR - 4 lane roadway under 4 tracks Los Nietos, Santa Fe Springs	1.00	EA	$11,066,825	/EA	$11,066,825
40.08.0051	Roadway Undercrossing HSR - 4 lane roadway under 5 tracks, Rosemead, P	1.00	EA	$17,299,782	/EA	$17,299,782
40.08.0054	Roadway Undercrossing HSR - 4 lane roadway under 4 tracks Add 4 tra	1.00	EA	$29,585,519	/EA	$29,585,520
40.08.0062	Rd Undercrossing HSR - 4 ln under 5 trks, Carmenita, Santa Fe Springs	1.00	EA	$7,094,338	/EA	$7,094,338
40.08.0068	Rd Overcrossing HSR - 6 ln over 5 trks, Alondra Blvd, Santa Fe Spring	1.00	EA	$11,487,787	/EA	$11,487,786
40.08.0073	Rd Undercrossing HSR - 4 ln under 5 trks, Dale St., Buena Park	1.00	EA	$6,241,639	/EA	$6,241,640

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
40.08.0076	Rd Undercrossing HSR - 4 ln under 7 trks, Commonwealth Ave, Fullerton	1.00	EA	$14,669,650	/EA	$14,669,650
40.08.0096	Rd Undercrossing HSR - 4 ln under 2 trks, Lewis St., Anaheim	1.00	EA	$30,514,428	/EA	$30,514,428
40.08.0097	Rd Undercrossing HSR - 4 ln under 5 trks, Cerritos Ave, Anaheim	1.00	EA	$44,481,287	/EA	$44,481,286
40.08	State College Blvd Grade Separation (minus Professional Services and Contingency)	1.00	EA	$160,358,549	/EA	$160,358,549
40.08.0098	Rd Undercrossing HSR - 8 ln under 4 trks, Katella Ave, Anaheim	1.00	EA	$22,962,057	/EA	$22,962,057
40.08.0102	Rd Undercrossing HSR - 4 ln under 4 trks, Douglas Rd., Anaheim	1.00	EA	$20,950,014	/EA	$20,950,015
40.08.104	Rd Undercrossing HSR - 2sp 4ln Platform Bridge Harbor Blvd, 1298+00	1.00	EA	$1,468,793	/EA	$1,468,793
40.08.114	Rd Undercrossing HSR - 2sp 4ln under 1 trk, S Downey Rd	1.00	EA	$3,402,395	/EA	$3,402,395
40.08.114A	Rd Undercrossing HSR - 1sp 4ln under 1 trk, Rosemead, 560+20	1.00	EA	$3,312,669	/EA	$3,312,670
40.08.114B	Rd Undercrossing HSR - 1sp 4ln under 1 trk, Passons Blvd, 587+80	1.00	EA	$2,835,852	/EA	$2,835,852
40.08.114C	Rd Undercrossing HSR - 4sp 4ln under 1 trk, Santa Fe Springs, 723+10	1.00	EA	$3,172,568	/EA	$3,172,568
40.08.114D	Rd Undercrossing HSR - 4sp 4ln under 2 trk, Carmenita Rt, 745+20	1.00	EA	$6,292,383	/EA	$6,292,383
40.08.114E	Rd Undercrossing HSR - 4sp 4ln under 1 trk, Valley View Ave, Freight B	1.00	EA	$5,571,116	/EA	$5,571,115
40.08.114F	Rd Undercrossing HSR - 4sp 4ln under 1 trk, Dale St, 1105+95	1.00	EA	$3,808,204	/EA	$3,808,204
40.08.114G	Rd Undercrossing HSR - 2sp 4ln under 2 trk, Commonwealth Ave, 1201+90	1.00	EA	$7,423,200	/EA	$7,423,200
40.08.114H	Rd Undercrossing HSR - 2sp 4ln under 1 trk, Cerritos Ave, 1547+00 Frei	1.00	EA	$3,360,678	/EA	$3,360,677
40.08.116	Rd Undercrossing HSR - 4sp 6ln under 1 trk, Atlantic Blvd, 331+90	1.00	EA	$4,378,459	/EA	$4,378,458
40.08.116A	Rd Undercrossing HSR - 2sp 6ln under 1 trk, Telegraph Rd, 745+21	1.00	EA	$2,688,331	/EA	$2,688,331
40.08.116B	Rd Undercrossing HSR - 2sp 6ln under 1 trk, Beach Blvd, 1065+76	1.00	EA	$4,537,805	/EA	$4,537,804
40.08.124	Rd Undercrossing HSR - 4sp 4ln under 2 trk, Eastern Ave, 369+60	1.00	EA	$6,627,163	/EA	$6,627,162
40.08.124A	Rd Undercrossing HSR - 2sp 4ln under 2 trk, Florence Ave, 1163+33	1.00	EA	$3,695,406	/EA	$3,695,406
40.08.124B	Rd Undercrossing HSR - 2sp 4ln under 2 trk, Gilbert St, 1163+33	1.00	EA	$4,690,125	/EA	$4,690,125
40.08.124C	Rd Undercrossing HSR - 2sp 4ln under 2 trk, Commonwealth Ave, 1202+10	1.00	EA	$9,902,042	/EA	$9,902,041
40.08.124D	Rd Undercrossing HSR - 2sp 4ln under 2 trk, Euclid St, 1244+90	1.00	EA	$3,251,653	/EA	$3,251,654
40.08.124E	Rd Undercrossing HSR - 2sp 4ln under 2 trk, Harbor Blvd, 1298+00	1.00	EA	$5,613,803	/EA	$5,613,802

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
40.08.124F	Rd Undercrossing HSR - 4sp 4ln under 2 trk, Lemon St, 1312+37	1.00	EA	$7,912,339	/EA	$7,912,340
40.08.124G	Rd Undercrossing HSR - 4sp 4ln under 2 trk, Lewis St, 1538+90	1.00	EA	$18,250,609	/EA	$18,250,609
40.08.124H	Rd Undercrossing HSR - 1sp 4ln under 2 trk, Douglas Rd, 1608+37	1.00	EA	$9,955,808	/EA	$9,955,808
40.08.126A	Rd Undercrossing HSR - 2sp 6ln under 2 trk, Ball Rd, 1517+15	1.00	EA	$1,256,498	/EA	$1,256,498
40.08.144	Rd Undercrossing HSR - 4sp 4ln under 4 trk, Pioneer, 632+16	1.00	EA	$8,069,474	/EA	$8,069,475
40.08.144A	Rd Undercrossing HSR - 4sp 4ln under 4 trk, Pioneer, 632+16	1.00	EA	$418,094	/EA	$418,093
40.08.144B	Rd Undercrossing HSR - 2sp 4ln under 4 trk, Norwalk, 676+25	1.00	EA	$6,289,697	/EA	$6,289,697
40.08.144C	Rd Undercrossing HSR - 2sp 4ln under 4 trk, Los Nietos, 679+40	1.00	EA	$21,362,864	/EA	$21,362,864
40.08.144D	Rd Undercrossing HSR - 2sp 4ln under 4 trk, Cerritos, 1547+00	1.00	EA	$10,904,494	/EA	$10,904,494
40.08.148	Rd Undercrossing HSR - 2sp 8ln under 4 trk, Katella Ave, 1588+35	1.00	EA	$9,633,272	/EA	$9,633,272
40.08.216	Rd Undercrossing HSR - 1sp 6ln under 5 trk, Alondra Blvd, 1015+76	1.00	EA	$26,505,024	/EA	$26,505,024
40.08.5027	2 Lane Retained Cut and/or fill adjacent to 20trks in BNSF Hobart Yard	1.00	EA	$19,099,878	/EA	$19,099,878
40.08.5036	Roadway Parallel to HSR - 2 lane roadway retained cut and/or fill adja	1.00	EA	$530,677	/EA	$530,677
40.08.5074	Rd Retained Cut/fill - 2 ln adjacent to 6 trks, Artesia Ave, Fullerton	1.00	EA	$6,906,245	/EA	$6,906,244
40.08.5077	Rd Retained Cut/fill - 2 ln adjacent to 5 trks, Walnut Ave, Fullerton	1.00	EA	$6,486,030	/EA	$6,486,030
50.01.010	Train Controls (ATC) - 2 Track	31.00	RM	$1,700,625	/RM	$52,719,378
50.01.030	Train Control - Site A, Wayside Facility Site Work	31.00	RM	$69,139	/RM	$2,143,321
50.03	Traction Power Supply: Substations	31.00	RM	$19,911	/RM	$617,255
50.03.100	Traction Power Supply - 2 Tracks	31.00	RM	$6,574,397	/RM	$203,806,317
50.04.100	Traction Power Distribution - 2 Tracks	31.00	RM	$2,828,249	/RM	$87,675,725
50.05.010	Communications (w/Fiber Optic Backbone) - 2 Track	31.00	RM	$838,478	/RM	$25,992,830
50.07.010	Hazardous Detectors	31.00	RM	$71,905	/RM	$2,229,050
60.01	Right of Way Purchase (From Regional Consultant) (w Removal of Anaheim Grade Seps)	1.00	LS	$1,743,650,916	/LS	$1,743,650,916
80.00.00	Professional Services	1.00	LS	$754,676,213	/LS	$754,676,213
90.00.00	Unallocated Contingency	1.00	LS	$251,558,738	/LS	$251,558,738

UPE	Description	Takeoff Quantity	Unit	Grand Total Unit Price	Unit	Grand Total
TOTAL Shared Passenger Track Alternatives A and B						**$6,593,080,044**
Option 1 - Add for HSR Stop @ Norwalk/Santa Fe Springs Station						$120,249,043
Option 2 - Add for HSR Stop @ Fullerton Station						$253,146,644

1. All costs are good through Q4 2023$.
2. Allocated Contingency is included in the unit costs.
3. Please see Basis of Estimate narrative for additional information.

DETAIL COST BUDGET DATA (BY MAJOR TASK) – SHARED PASSENGER TRACK ALTERNATIVES A AND B

Task	Description[1]	Shared Passenger Track Alternatives A and B[2]	With HSR Station at Norwalk/Santa Fe Springs[2]	With HSR Station at Fullerton[2]
10.00	Track Structure & Track	$1,025,224,485	$1,052,224,485	$1,052,224,485
20.00	Stations, Terminal, Intermodal	$138,294,657	$238,502,193	$349,250,194
30.00	Support Facilities, Yards, and Shops	$1,074,819,706	$1,099,819,706	$1,099,819,706
40.00	Sitework and Special Conditions	$1,229,671,453	$1,229,671,453	$1,229,671,453
50.00	Systems	$375,183,877	$375,183,877	$375,183,877
60.00	ROW, Land, Existing Improvements	$1,743,650,916	$1,743,650,916	$1,743,650,916
80.00	Professional Services	$754,676,213	$769,707,343	$786,319,543
90.00	Unallocated Contingency	$251,558,738	$256,569,114	$262,106,514
TOTAL[3]		**$6,593,080,044**	**$6,713,329,087**	**$6,846,226,688**
Early Action Project Total Costs		$3,014,000,000		
Total with Early Action Project Costs Removed		$3,579,080,044	$3,699,329,087	$3,832,226,688

[1] The FRA's Standard Cost Categories do not include items specifically excluded such as allowances for agreements or right-of-way costs with the Los Angeles County Metropolitan Transportation Authority, or Orange County Transportation Authority for shared use in the Los Angeles to Anaheim Project Section. These agreements would be required and would have an associated fee.
[2] Costs are in Quarter 4 2023$ (rounded to the nearest $million), except for Cost Category 30. The project cost includes an estimate of savings accrued from value engineering refinements that the Authority has deemed as reasonable refinements for the LA-A Project Section. More detail on the refinements is found in PEPD General Notes.
[3] Although the Authority anticipates the funding for early action projects to come in part, and potentially in whole, from other agencies and entities, this cost estimate reflects combined spending anticipated by the Authority and others. Costs do not include optional intermediate high-speed rail station facilities at Norwalk/Santa Fe Springs or Fullerton. Totals may not add up because of rounding.