TRANSIT CORRIDOR
ALTERNATIVES ANALYSIS

WATSONVILLE/PAJARO
to
SANTA CRUZ

Transit Corridor Alternatives Analysis & Rail Network Integration Study

Business Plan for
Electric Passenger Rail on the
Santa Cruz Branch Rail Line

DRAFT
March 2021

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1 - INTRODUCTION

The Transit Corridor Alternatives Analysis and Rail Network Integration Study (TCAA/RNIS) was prepared to evaluate high-capacity transit investment options and identify a locally preferred transit system that utilizes all or part of the length of the Santa Cruz Branch Rail Line Right-of-Way (SCBRL ROW). The TCAA/RNIS analyzed various transit alternatives to identify a locally preferred alternative (LPA) that provides the greatest benefit to Santa Cruz County residents, businesses, and visitors in terms of the triple bottom line goals of improving economy, equity, and the environment.

At the February 4, 2021 commission meeting, the Santa Cruz County Regional Transportation Commission (RTC) accepted the Transit Corridor Alternatives Analysis and Rail Network Integration Study that selects Electric Passenger Rail as the LPA. Electric passenger rail could be either commuter rail transit (CRT) or light rail transit (LRT). After acceptance of the TCAA/RNIS, the final component of the TCAA/RNIS included development of a 25-year strategic business plan to serve as a guiding document for funding and implementation of the LPA.

The Business Plan outlines the funding and implementation strategy for passenger rail on the SCBRL and is organized into the following sections:

- A description of electric passenger rail including high-level service alignment, potential station, siding, and maintenance facility locations, service frequency and span, as well as a discussion of vehicle types are presented in **Section 2: Locally Preferred Alternative.**

- Evaluation of potential governance options needed to implement electric passenger rail including the objectives, responsibilities, and advantages and disadvantages of each strategy, as well as a discussion on existing policies related to rail transit are presented in **Section 3: Governance.**

- Estimate of costs for all components of project implementation including pre-construction, construction, and operations and maintenance for an electric passenger rail transit system is presented in **Section 4: Cost Estimation.**

- A component approach to implementation, including preliminary design and environmental documentation, final design and permitting, right-of-way acquisition, construction, and vehicle procurement, is presented in **Section 5: Implementation Plan.**

- Information on potential funding sources including grant programs and farebox recovery are presented in **Section 6: Project Financing.**

- Prototypical cash-flow analysis, incorporating federal, state, and local funding of environmental review and clearance, system design and permitting, and construction, as well as daily operations and maintenance is presented in **Section 7: Funding Strategy - Cash Flow Model**.

- Risks to project funding and cost escalation as well as ways to mitigate risks are presented in **Section 8: Risk Identification and Mitigation Factors**.

The 25-year business plan is based on the best information currently known for the rail transit cost estimates and available funds from various grant programs and other sources. It is difficult to predict what fund sources may be available out into the future for rail transit. A recent Executive Order by Governor Newsom of California (EO N-70-20) directs state agencies to "Build towards an integrated, statewide rail and transit network, consistent with the 2018 California State Rail Plan, to provide seamless, affordable multimodal travel options for all".

At the Federal level, numerous policies and programs are under development with the new Biden-Harris administration. Legislation that embraces a climate resiliency approach to improving transportation infrastructure including alternative modes of transportation is being developed. This administration's Secretary of Transportation has an agenda that includes "investing in robust transit and transportation infrastructure" in both urban and rural communities.

Given the direction at both the Federal and State level, it is highly likely that funding for transit will increase in the near future. This document seeks to serve as a roadmap that can be updated periodically as key inputs, particularly changes to the transit funding landscape and cost estimates as project design advances, develop over the course of the implementation process.

2 - LOCALLY PREFERRED ALTERNATIVE

This section provides a description of Electric Passenger Rail that was selected as the Locally Preferred Alternative (LPA) in the TCAA/RNIS Final Report. A decision on whether the rail option will be electric commuter rail (CRT) or electric light rail (LRT) was not determined in the TCAA/RNIS. With similar infrastructure needs for either CRT or LRT, deferring this decision will maintain flexibility for future decisions on station locations, service frequency, and vehicle type, while clean energy rail technologies advance. The electric rail vehicle types would therefore be better evaluated in the preliminary engineering and environmental analysis and final design components of project delivery. **Figure 2.1** and **Figure 2.2** show the respective alignments, station locations, service frequency and span for CRT and LRT that were considered in the TCAA/RNIS.

2.1 CHARACTERISTICS OF PASSENGER RAIL FOR THE SCBRL

The LPA will consider services operating on the Santa Cruz Branch Rail Line (SCBRL) Right of Way (ROW) with single or multiple individually-propelled clean energy cars. An overhead catenary system (poles and wires) running the length of the system or a live third rail are not being considered. Operations will be structured on a single track within the SCBRL ROW with periodic passing sidings allowing for two-way travel. The characteristics of the electric passenger rail alternative will include:

- **Vehicle Speeds** will be capable of traveling from 30 to 60 mph in the SCBRL ROW, with both CRT and LRT traveling at similar average and maximum travel speeds in the corridor.

- The number of **Stations** is expected to range from 11 to 13 stations on the SCBRL ROW, with the CRT configuration having the lower number of stations and LRT having the higher number of stations. This analysis was based on traditional station spacing and interactions for each passenger rail service. Both CRT and LRT could also include seasonal stations in the SCBRL ROW to better accommodate tourist and seasonal activity in the corridor. Although the TCAA/RNIS considered the number and location of station alternatives for CRT and LRT, a more detailed analysis in preliminary engineering and environmental review may consider different station locations.

- **Passing sidings** are needed to run a two directional system on a single track. Potential passing locations considered in the TCAA/RNIS include one stub-ended station track at both end stations (Pajaro Station and Natural Bridges Station), a siding between Buena Vista Rd and San Andreas Rd crossings, and sidings at Aptos station, Capitola station, 17th Avenue station, and the Downtown/Boardwalk station. Stringline charts are

needed to determine where the siding locations are best placed based on speed and frequency of the desired service. The greater the number of sidings, the more flexibility there is to change the frequency of service without impacting the travel time.

- The use of **FRA compliant or non-FRA compliant vehicles** will be determined in the next component of the analysis. If non-FRA compliant vehicles are identified for use, then electric passenger rail could be configured to operate with freight rail in this shared-use corridor only if temporally separated (i.e., freight rail and passenger rail operations will operate at different times of the day). This will require the implementation of Centralized Traffic Control (CTC) or similar signal systems. If FRA compliant vehicles are implemented, then the passenger rail vehicles can comingle with freight rail in this shared-use corridor, both Centralized Traffic Control (CTC) and Positive Train Control (PTC) would be required, and around-the-Bay, one seat rail service between Monterey and Santa Cruz as analyzed by the Transportation Agency for Monterey County (TAMC) would be possible.

Figure 2.1: CRT Proposed Alignment and Stations

Station #	Name	Station #	Name
1	Natural Bridges Station	9	Aptos Village Station
2	Bay Street Station	10	Downtown Watsonville Station
3	Downtown Santa Cruz/Boardwalk Station	11	Pajaro Station
4	Seabright Station		
5	17th Avenue Station		
6	41st Avenue Station		
7	Capitola Village Station		
8	Cabrillo College Station		

Figure 2.2: LRT Proposed Alignment and Stations

Station #	Name	Station #	Name
1	Natural Bridges Station	9	Capitola Village Station
2	Fair /Almar Avenue Station	10	Park Avenue/Cabrillo Station
3	Bay Street Station	11	Aptos Village Station
4	Downtown Santa Cruz Depot Park Station	12	La Selva Beach Station (seasonal)
5	Boardwalk Station (seasonal)	13	Ohlone Parkway Station
6	Seabright Station	14	Downtown Watsonville Station
7	17th Avenue Station	15	Pajaro Station
8	41st Avenue Station		

- **Frequency of service** would be established in a future component of project development and could increase over time as ridership increases assuming there are sufficient passing locations. A headway is the number of minutes between each train. Higher frequency (shorter headways) for major stops and lower frequency (longer headways) for minor stops could provide the best tradeoff of travel time versus ridership and is a common practice among rail systems. Both CRT and LRT in the TCAA/RNIS analysis considered 30-minute headways during peak periods, which is consistent with RTC's 2015 feasibility study, identifying two potential passing sidings located near 17th Avenue and San Andreas Avenue. CRT had a 60-minute headway for off-peak and LRT continued with a 30-minute frequency all day. The ridership analysis showed that a higher frequency service of 30-minute headways during mid-day served a demand that is not served by 60- minute headways mid-day. Transit service during the covid-19 pandemic showed a relative increase in demand during the mid-day with less substantial peaks during the AM and PM commute periods. If work from home continues post-COVID, service frequency should consider a transit demand that could continue to be spread out throughout the day.

- **Daily span of service** would be established in a future component of project development and will likely increase over time as ridership increases. Weekday span evaluated in the TCAA/RNIS was from 6AM to 9PM and 7AM to 10PM for weekend for both CRT and LRT.

- **Level platform boarding** is a common feature in both CRT and LRT services at each station, no matter the station size in order to provide universal access for all ages and abilities and ease of boarding for travelers with bicycles. Special consideration, such as gauntlet tracks, will be needed at the level boarding stations, if freight trains need to be accommodated.

- **A rail maintenance and operations facility** are needed to store and service rail cars off the main operating tracks and serve as an operations center. This facility should include space to clean, maintain, and repair rail vehicles and provide a workspace for rail operations employees and other rail staff. The primary location to consider for rail operations and maintenance is in the industrial area along West Beach St in Watsonville in vicinity of the tracks. Right of way would need to be acquired to locate this facility in Watsonville. This location may be appropriate for ultimate service, but a different location may be more suitable for an initial operating segment that might not start in Watsonville. The existing SCBRL right of way may be able to accommodate a maintenance and operations center near Natural Bridges Drive on the west side of Santa Cruz.

- The passenger rail service will utilize **clean energy technology** such as hydrogen fuel cell, battery or other future clean, or non-fossil fuel technologies. Clean energy technologies are advancing rapidly, along with trainsets. Given the pace of technology it would be premature to make a decision now on the vehicle type. Within the next decade, options for clean fuel trainsets will likely expand significantly compared to what is available today. Additional analysis, discussion and coordination is needed in the future to identify the vehicle fleet type. Examples of both battery and hydrogen fuel cell powered trainsets, that are operational today and becoming more readily available, are provided below.

Figure 2.3: Alstom's Coradia iLINT - hydrogen fuel cell operated in Germany and Austria. https://www.alstom.com/solutions/rolling-stock/coradia-ilint-worlds-1st-hydrogen-powered-train

Figure 2.4: Stadler FLIRT H2 - hydrogen fuel-cell train that will be used in the Redlands Passenger Rail Project. https://railway-news.com/stadler-wins-us-flirt-h2-hydrogen-contract/

Figure 2.5: Bombardier Flexity - battery electric train with MITRAC batteries allows 100km catenary free propulsion. https://rail.bombardier.com/en/solutions-and-technologies/urban/e-mobility-battery-technology.html

Figure 2.6: ACCUM EV-E801 - battery electric train with recharging at stations operating in Japan. Photo By: 掬茶 - Own work, CC BY-SA 4.0. https://commons.wikimedia.org/w/index.php?curid=69472594

Figure 2.7: Seimens OBB Cityjet Eco - battery electric train with recharging at stations operating in Austria. https://railcolornews.com/2019/04/16/at-the-battery-powered-cityjet-eco-running-in-austria/

Figure 2.8: TIG/m MRV 3 - hydrogen fuel cell train operational in Doha, Qatar
https://www.tig-m.com/products.html

2.2 LOCAL AND REGIONAL INTEGRATION

Local integration of METRO transit services, other local first and last mile connections, and regional integration of passenger rail services currently under development by the Transportation Agency of Monterrey County (TAMC) will be required to support the ultimate service plans of passenger rail on the SCBRL. Local METRO bus services will need to serve most if not all the rail stations to provide connections to origins and destinations more distant from the SCBRL. In addition, other first and last mile connection services will be needed including walking and bicycle network improvements to stations, bikeshare and other micro-mobility services, ride hailing and taxis, and private or public shuttles (autonomous shuttles potentially). Costs for first and last mile services are not included in the cost estimates presented in this study.

The SCBRL passenger rail will be integrated with expected future TAMC and California State Rail Plan passenger rail services connecting at Pajaro Station to Monterey as well as locations in southern and northern California. TAMC is actively pursuing passenger rail service to Monterey County that provides both local commute and greater regional access to San Francisco, San Jose and Gilroy, utilizing

Union Pacific's Coast Mainline tracks between Gilroy and Salinas. Future phases of the TAMC project include a new station at Pajaro/Watsonville for connection to passenger rail on the SCBRL ROW and a new station in Castroville for connection to the Monterey branch line. Coordination between RTC and TAMC will be necessary as rail projects in both counties continue to develop.

The network integration portion of this study provides Caltrans Division of Rail & Mass Transportation with the information needed to update the California State Rail Plan in 2022 with the vision for Santa Cruz County to develop electric passenger rail for on the SCBRL that will connect to the future statewide rail network.

Figure 2.9: Passenger Rail Station Planned for Pajaro Junction

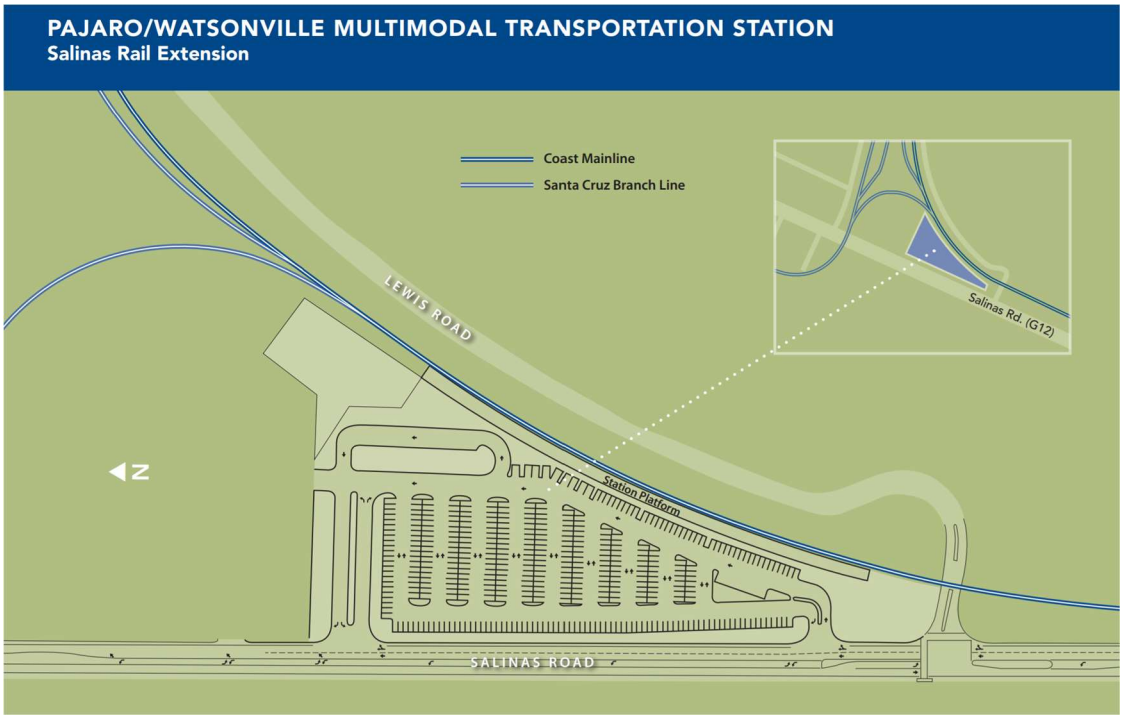


Figure 2.10: California State Rail Plan, Northern California Service – 2040 Vision

3 - GOVERNANCE

This section presents the governance options available to RTC to administer, contract, fund, and operate the electric passenger rail service in Santa Cruz County. Options were identified through a variety of sources, including the Governance and Operations Memo, January 2021, developed by TAMC in support of the Monterey Bay Area Rail Network Integration Study (Monterey Bay Area RNIS) currently under development. While more detailed analysis, communication, and coordination will be required by RTC in combination with its local (METRO), regional (TAMC), and state (Caltrans) agency partners to define the ultimate governance strategy, the information below presents potential options for consideration. Further development of the governance strategy will be conducted as the project proceeds to the preliminary engineering and environmental analysis component.

3.1 POLICIES AND PROGRAMS

Federal, state, and local governments have developed a series of policies and planning documents to achieve a more sustainable transportation system by providing improved multimodal access to jobs, education, healthcare, and other destinations. The planning documents that are the most applicable for assessing the existing policies applicable to passenger rail transit in Santa Cruz County are listed below.

- The California Transportation Plan 2050, just completed in February 2021, provides a policy framework for making transportation decisions statewide. A recommendation of the plan is to "Improve transit, rail and shared mobility options" in order to advance climate, equity, accessibility, quality of life & public health, environment, economy and infrastructure goals.
- The 2018 California State Rail Plan provides a summary of the Federal and California State policies that are applicable to development of passenger rail in Santa Cruz County. This plan outlines the numerous legal and administrative directives that have set policies aimed at 1) reducing greenhouse gas emissions (GHG) to limit the harmful effects of climate change, 2) improving transportation safety through development of complete streets, 3) reducing congestion through greater emphasis on rail and bus transit, 4) establishing environmental justice goals for low income and disadvantaged communities.
- The 2040 Santa Cruz County Regional Transportation Plan provides the existing goals, objectives, and policies applicable to development of passenger rail in Santa Cruz County. These include:
    - Objectives
        - Improve people's ability to meet most of their daily needs without having to drive. Improve access and proximity to employment centers
        - Improve the convenience and quality of trips, especially for walk, bicycle, transit, freight, and carpool/vanpool trips.

        - Enhance healthy, safe access to key destinations for transportation-disadvantaged populations.
    - Policies
        - Transportation Infrastructure: Improve multimodal access to and within key destinations.
        - Transportation Infrastructure: Ensure network connectivity by closing gaps in the bicycle, pedestrian and transit networks.
        - Land Use: Support land use decisions that locate new facilities close to existing services, particularly those that service transportation disadvantaged populations.
        - Emergency Services: Support projects that provide access to emergency services.
        - Equity: Demonstrate that planned investments will reduce disparities in safety and access for transportation disadvantaged populations.

At the Federal level, numerous policies and programs are under development with the new Biden-Harris Administration. Legislation that embraces a climate resiliency approach to improving transportation infrastructure including alternative modes of transportation is being developed. Pete Buttigieg has been confirmed as the new Secretary of Transportation. His agenda includes “investing in robust transit and transportation infrastructure” in both urban and rural communities.

The existing policies and programs at the federal, state, and local level will be the basis for development of policies that may be needed as the governance strategy is established in a future component of the project.

3.2 ROLE OF GOVERNING BODY

The governance recommendations from TAMC’s Monterey Bay Area RNIS provide a potential roadmap that is directly relevant to the RTC. The potential future TAMC and RTC passenger rail services have been linked together both in the 2018 California State Rail Plan and the Monterey Bay Area RNIS. Continued collaboration between RTC, TAMC, and the Caltrans Division of Rail and Mass Transportation (Caltrans DRMT) will assist in identifying the optimal governance strategy. Identification and establishment of the governing body would occur near the completion of preliminary design and environmental review.

The key objectives of the governing body are to:

- Develop policy
- Build the system
- Manage and operate an efficient integrated system
- Achieve a regional vision of passenger rail along the Santa Cruz Branch Rail Line with connection to the Monterey and statewide rail network

- Connect to population and employment centers including integration with local transit service
- Develop a system that has a customer focus through competitive travel times and service frequencies, coordinated scheduling and fares.
- Create an effective administration that has sufficient authority to execute the day-to-day operations.

The responsibilities of the governing body will include:

- **Policy.** Goals and policies for implementing, operating and maintaining electric passenger rail on the Santa Cruz Branch Rail Line will be needed to ensure the project meets the needs of the community.
- **Coordination.** Coordination and execution of agreements between RTC, the governing body, TAMC, Caltrans and/or other potential partners to construct and operate passenger rail on the SCBRL.
- **Funding for Construction.** The governing body will coordinate with RTC and other partners to identify, apply and secure funding for construction, which may require phased implementation including a potential initial operating segment (IOS).
- **Procurement.** Identification of needs and procurement of services and equipment to implement passenger rail.
- **Maintenance.** Maintenance of the rail easement on the SCBRL right of way would be the responsibility of the governing body.
- **Service Operations.** Type of service and options to operate the service will be identified and established with consideration for an "Around the Bay" service between Santa Cruz and Monterey (e.g., host railroad, third party operating providers).
- **Budget.** The governing body will be responsible for the budget including operations and maintenance budget, vehicle replacement needs, and setting fares.
- **Schedule and Fare Coordination.** Coordinating timetables and integrating fare structures with statewide rail service, Monterey County rail service and METRO local service.
- **Local Transit Coordination.** Coordinating timetables with METRO bus transfers to and from rail stations.
- **Communications and Marketing**. Communicating all outward-facing messaging to public including service changes, service alerts and disruptions, marketing promotional efforts, and other communications.
- **Insurance.** Mitigating financial risks through the purchase of property, casualty, and liability insurance.
- **Law Enforcement.** Establishing law enforcement policies and structures to ensure public safety and security for riders and the general public, including but not limited to, fare enforcement, parking/traffic enforcement, crisis interventions, and other emergency responses.

- **Safety.** Development and implementation of safety rules and standards as required by federal and/or state requirements.

3.3 DESCRIPTION OF POTENTIAL GOVERNANCE MODELS

The following Governance models that are common in California are provided below:

- Joint Powers Authority (JPA)
- Joint Venture (sometimes referred to as Transit Agency Partnerships)
- Special Purpose Regional Transit Authority/District
- County Agency or Municipal Transit Agency
- State Transit Agency

Joint Powers Authority

A Joint Powers Authority (JPA) is a separate organization created by member agencies (for example RTC and TAMC could be member agencies), that is legally independent from them. A JPA shares powers common to each member agency and documented in a joint power's agreement. These powers may include eminent domain authority and ability to hold or dispose of property. JPAs provide maximum flexibility in their formation and responsibilities as a governing body, save time and money by sharing resources and combining services, but may result in potential overlap in responsibilities among representative agencies.

JPAs do not require legislative authority, have no taxing authority, and rely on funding through constituent members (agencies). Each participating entity secures its own funding source(s) through annual appropriations and other financing mechanisms including tax measures. JPAs have become a popular governance model for corridor and commuter rail services in California (primarily intercity passenger operators), including Caltrain (Peninsula Corridor Joint Powers Board); Capitol Corridor (Capitol Corridor Joint Powers Authority); Pacific Surfliner (LOSSAN Rail Corridor Agency); and others. Characteristics of LOSSAN's Governance model include:

- Established/formed in 1989 by transportation agencies along the Pacific Surfliner passenger rail route
- Governed by a 11-member Board composed of elected officials representing the owners, operators, and planning agencies along the corridor
- It is managed and operated by the Orange County Transportation Authority (OCTA) through an administrative agreement
- The host railroad (AMTRAK runs and operates passenger trains and cars) is responsible for implementing capital improvements while LOSSAN leads all funding and legislative pursuits to support these improvements
- Receives all operating funds from the State, with member agency's volunteering some operational funding

Joint Venture

Joint Ventures are not commonly deployed but are relatively easy to create, like a JPA. Unlike a special district, there is no need for legislative action by the State, with agreements required between the joint venture partners to establish and fund the entity. A joint venture has authority to execute contracts and secure/disburse capital and operating funds but has no direct ability to levy taxes (although individual partners will have this ability).

Joint ventures do not have the ability to exercise eminent domain, but partner agencies may have this right. Joint ventures typically include relationships between State and Federal partners to be leveraged, while the joint venture would need to build new relationships from the ground up. There are examples of joint venture models in Texas and Virginia. Characteristics of the Trinity Railway Express (Fort Worth, Dallas, Texas) are presented below for this type of governance model:

- A Joint Venture between the cities of Fort Worth and Dallas providing regional commuter rail services
- Each city owns 50% interest in the ROW
- Each city transferred ownership, development, and service planning responsibilities of the rail property to their public transportation providers (Trinity Metro and Dallas Area Rapid Transit (DART) respectively)
- Dallas's Metropolitan Planning Organization (North Central Texas Council of Governments – NCTCOG) and its Regional Transportation Commission is the policy-making body of the commuter rail service, while DART manages contracting and vendor services
- Regional sales taxes and federal funding from the Federal Transit Administration (FTA) are used to support capital improvements and operations/maintenance, while DART manages vendors and contracting services
- The host railroad (Burlington Northern Santa Fe Railroad – BNSF) and a third party vendor operate the service

Special Purpose Regional Transit Authorities or Districts

Special Purpose Regional Transit Authorities or Districts are typically created by a special act of a State legislature, involving agreements to transfer assets and liabilities to a regional transit authority or district, and funding agreements. The resulting authority typically only has jurisdiction in a specific area or region, with a specific designated function, such as construction and operation of a new transit service. This singular focus may ensure success by minimizing competition for resources. A special district anticipates streamlined budget approval processes with a single authority (governing board), in contrast with a JPA or joint venture structures. All funding partners would be equally represented from the outset. Eminent domain and property ownership rights would reside with the special district as well.

Potential issues with the creation of special districts include, additional layers of governance that complicate project execution; higher costs and longer start-up times; and need for close coordination with partner agencies to ensure an integrated regional transit system. Examples of special districts in California include North County Transit District (COASTER and SPRINTER), Tri-Valley–San Joaquin Valley Regional Rail Authority (Valley Link), and Sonoma-Marin Area Rail Transit District (SMART). Characteristics of the SMART's Governance model includes:

- Operates as a Special District providing passenger rail services between Sonoma and Marin Counties in the San Francisco Bay Area
- Formed in 2002, it is funded by Measure Q 2008's two-county sales tax
- This Special District required passing a sales tax on the ballot and provides the agency with autonomy and longevity
- The SMART Board and its General Manager are responsible for the development of all operations and policies, with the 12-member Board consisting of representatives of the route's cities and county jurisdictions
- Operations are primarily funded by District voter approved sales tax and fare revenue, while capital projects are mostly by Federal and State funds
- All systems operations, vehicles, track, maintenance, among others are managed by SMART staff, while SMART also has the ability to contract out these functions as needed.

County Agency or Municipal Transit Agency

In this model, transit services are assumed by an existing local government, such as METRO or RTC, as part of its existing functions without the need for special state legislation. This is a common governance model with transit operations in midsized urban areas, including the powers of county government's authority to develop, operate, and contract for transit services, own property, exercise the powers of eminent domain, and address regional needs and coordination. Expanding financing methods and authority for new services under existing agencies often involves a cumbersome political process that may create equity issues. While the transit agency would have access to funding, such as using county excise taxes (with voter approval), the ability to levy taxes are limited to the city or county's jurisdiction only.

The Redlands Passenger Rail Project (Arrow) is an example of a County/Municipal Transit Agency Governance model. Characteristics of Arrows Governance components include:

- The San Bernardino County Transportation Authority (SBCTA) operates this recently implemented nine-mile service from San Bernardino to Redlands
- In 2016, Senate Bill 1305 was passed to consolidate county and local transportation services (County Transportation Commission, Local Transportation Authority) to form the SBCTA with responsibilities for countywide regional planning and development of multimodal transportation systems

- Working with the SBCTA, Arrow service is being constructed and will be operated by Metrolink, southern California passenger rail service provider linking six counties.

State Transit Agency

State transit agency models are common in small states typically with one dominant metro area. This model offers direct state oversight and funding and includes powers delegated by the State in enabling legislation, which may include the authority to own property and exercise the powers of eminent domain. There are no current examples of this model used in California thus Caltrans is unlikely to take on operation of new rail service on the SCBRL.

3.4 PUBLIC PRIVATE PARTNERSHIPS

A public private partnership (PPP or P3) is a collaborative arrangement between a public agency and a private partner to deliver a public service or facility and can be a form of governance and/or project delivery method. The skills and assets of each sector are shared as are the potential risks and rewards. A P3 can take many forms and may involve the participation of the private partner in all or some of the components of a project – environmental review, design, construction, finance, operation, and maintenance of a project.

A P3 is typically a long-term contractual agreement involving payments between the public agency and the private partner. A P3 can allow a public agency to accelerate a project, improve performance and minimize costs by utilizing private sector expertise in building and operating a project. P3's are usually not formed until near the completion of the environmental document, so the local governing body can maintain control over the project definition and can more effectively negotiate key aspects of the P3 relationship that are necessary to maintain public support, such as determining ticket prices and service patterns.

One example of a P3 that is under development is a project to connect the Caltrain corridor at Redwood City to the East Bay over the Dumbarton Bridge. San Mateo County Transit District has been meeting with Facebook and Plenary Americas to advance this P3 with efforts still underway. RTC will evaluate P3 as a possibility for implementation of passenger rail transit on the SCBRL.

3.5 RTC GOVERNANCE STRATEGY

More detailed analysis of the legal requirements for governance, as well as communication, and coordination between RTC, TAMC, METRO, and Caltrans is needed to define the governance strategy to support electric passenger rail on the SCBRL.

4 - COST ESTIMATES

Considering both Commuter Rail Transit (CRT) and Light Rail Transit (LRT), the capital and operations & maintenance (O&M) costs for the Business Plan were determined in the development of the TCAA/RNIS report and are used in the cash flow model for project implementation presented in Section 7. These cost estimates were informed by the costs developed for the 2015 Santa Cruz Branch Rail Transit Feasibility Study, the Unified Corridor Investment Study (UCS), recent bridge and track inspection reports, and comparable rail systems.

The costs were estimated based on best practices for regional, state, and national planning studies. No engineering design was performed to support the estimated costs. A contingency of 50% was included in the cost estimates to account for the unknowns at this early stage of project development. Cost estimates will be refined as the project moves through project development, including undergoing increased levels of design to reflect the market conditions (i.e., cost of labor, equipment, and materials) in the year the project is expected to be implemented.

Tables 4.1 and 4.2 show the detailed capital cost estimates for LRT and CRT respectively, while **Tables 4.3** and **4.4** show the operations and maintenance (O&M) cost estimates for LRT and CRT respectively. The LRT cost estimates assume that the trainsets are not FRA-compliant, and that Positive Train Control is not needed. Costs for infrastructure improvements for CRT and LRT assume that freight rail will continue, and freight requirements need to be met. Project costs represent 2020 dollars.

Passenger rail transit is estimated to cost between $465 million and $478 million for LRT and CRT respectively, based on existing 2020 conditions and the assumptions made regarding the number and location stations and frequency of service. This total cost is generally comprised of:

1. Pre-Construction Costs of approximately $50 to $51 million, including
    a. Preliminary Engineering and Environmental Analysis/Documentation
    b. Final Design and Permitting
2. Construction costs of approximately $225-$233 million
3. Contingency costs of approximately $127-$131 million
4. Vehicles costs of approximately $64 million
5. Right-of-Way costs assumed $0 at this time

Operations and maintenance (O&M) activities are expected to cost $25 million per year, based on the estimates developed during this TCAA/RNIS. Detail related to cost estimates of

commuter rail and light rail are presented in **Tables 4.1 to 4.4**. Over time, design information will be developed to better inform these capital and O&M costs.

Table 4.1: Light Rail Transit Capital Cost Estimates

Light Rail Transit - Pajaro to Westside Santa Cruz				
LRT stub-end terminal at Depot Park. RC&BT operates on separate track from wye to Boardwalk.				
Total Route Miles	21.9 Miles			
Item	**U/M**	**Qty**	**Unit Cost**	**Ext. Cost (Rounded)**
Infrastructure				
Track				
Tie Replacement (75% of ties)	Ea	40,150	$ 150	$ 6,100,000
Rail Replacement (100% replacement)	TF	91,453	$ 120	$ 11,000,000
Ballast for Surfacing	Ton	20,000	$ 60	$ 1,200,000
Out of Face Surfacing	TF	115,872	$ 8	$ 1,000,000
New Track Construction	TF	16,234	$ 425	$ 6,900,000
Grade Crossing Track - Concrete Panels	TF	7,085	$ 1,800	$ 12,800,000
Grade Crossing Track - HMA Paved	TF	1,100	$ 1,000	$ 1,100,000
Private Crossing	Ea	8	$ 1,500	$ 100,000
Ditching/Drainage Improvements	Day	90	$ 10,000	$ 900,000
Hirail Vacuum Truck Ballast Cleaning	Day	60	$ 5,000	$ 300,000
Tree Trimming	Day	60	$ 7,000	$ 500,000
Misc. Grading to Support New Track Construction	LF	25,000	$ 80	$ 2,000,000
Power Turnouts	Ea	10	$ 250,000	$ 2,500,000
Hand Throw Turnouts	Ea	9	$ 135,000	$ 1,300,000
Trackwork for 400' Long Gauntlet Tracks at Stations	Ea	16	$ 200,000	$ 3,200,000
Trackwork Between Siding Turnouts	TF	4000	$ 425	$ 1,700,000
Main Track Construction to Allow for Siding	TF	4000	$ 425	$ 1,700,000
Separate RC&BT Track, Xing Signals to Boardwalk	Ea	1	$ 2,900,000	$ 2,900,000
LRT Stub Connection to Depot Park	Ea	1	$ 2,500,000	$ 2,500,000
Curve Lubricator	Ea	20	$ 25,000	$ 500,000
Utility Relocation Allowance	AL	1	$ 2,000,000	$ 2,000,000
Fencing	AL	1	$ 5,000,000	$ 5,000,000
				$ 67,200,000
Crossing Signal				
Grade Crossing Equipment: Bells, Flashers, Gates	Ea	43	$ 400,000	$ 17,200,000
Quiet Zones	Ea. Xing	43	$ 125,000	$ 5,400,000
				$ 22,600,000
Train Control				
Centralized Traffic Control System (Wayside Signals)	Mile	21.9	$ 1,000,000	$ 22,000,000
Centralized Dispatching Center, Systems, & Communications Equ	LS	1	$ 4,000,000	$ 4,000,000
				$ 26,000,000
Structures				
Bridge Rehabilitation	LS	1	$ 32,000,000	$ 32,000,000
Retaining Wall Allowance	SF	42000	$ 200	$ 8,400,000
				$ 40,400,000
Stations/Maintenance Facility				
Rail Station ("Small")	Ea	6	$ 1,500,000	$ 9,000,000
Rail Station ("Medium")	Ea	7	$ 2,250,000	$ 15,800,000
Rail Station ("Large")	Ea	3	$ 2,750,000	$ 8,300,000
Maintenance Facility & Operations Center	Ea	1	$ 9,000,000	$ 9,000,000
				$ 42,100,000
Construction Total (*Without* Contingency)				**$ 198,300,000**
Rail Vehicles				
Vehicles - Light Rail (Off-Wire)	Ea	8	$ 7,000,000	$ 56,000,000
Charging Infrastructure	Ea	7	$ 1,000,000	$ 7,000,000
				$ 63,000,000
Contingency			50%	$ 127,200,000
Soft Costs (Documentation, Permitting, Bid Document Preparation, Project Administratio			30%	$ 76,300,000
Grand Total (Rounded)				**$ 465,000,000**

Table 4.2: Commuter Rail Transit Capital Cost Estimates

Commuter Rail Transit - Pajaro to Westside Santa Cruz				
Total Route Miles	21.9 Miles			
Item	**U/M**	**Qty**	**Unit Cost**	**Ext. Cost (Rounded)**
Infrastructure				
Track				
Tie Replacement (75% of ties)	Ea	40,150	$ 150	$ 6,100,000
Rail Replacement (100% replacement)	TF	91,453	$ 120	$ 11,000,000
Ballast for Surfacing	Ton	20,000	$ 60	$ 1,200,000
Out of Face Surfacing	TF	115,872	$ 8	$ 1,000,000
New Track Construction	TF	16,234	$ 425	$ 6,900,000
Grade Crossing Track - Concrete Panels	TF	7,085	$ 1,800	$ 12,800,000
Grade Crossing Track - HMA Paved	TF	1,100	$ 1,000	$ 1,100,000
Private Crossing	Ea	8	$ 1,500	$ 100,000
Ditching/Drainage Improvements	Day	90	$ 10,000	$ 900,000
Hirail Vacuum Truck Ballast Cleaning	Day	60	$ 5,000	$ 300,000
Tree Trimming	Day	60	$ 7,000	$ 500,000
Misc. Grading to Support New Track Construction	LF	23,000	$ 80	$ 1,900,000
Power Turnouts	Ea	8	$ 250,000	$ 2,000,000
Hand Throw Turnouts	Ea	9	$ 135,000	$ 1,300,000
Trackwork for 400' Long Gauntlet Tracks at Stations	Ea	11	$ 200,000	$ 2,200,000
Trackwork Between Siding Turnouts	TF	3000	$ 425	$ 1,300,000
Main Track Construction to Allow for Siding	TF	3000	$ 425	$ 1,300,000
Separate RC&BT Track, Xing Signals to Boardwalk	Ea	1	$ 2,900,000	$ 2,900,000
Curve Lubricator	Ea	20	$ 25,000	$ 500,000
Utility Relocation Allowance	AL	1	$ 2,000,000	$ 2,000,000
Fencing	AL	1	$ 5,000,000	$ 5,000,000
				$ 62,300,000
Crossing Signal				
Grade Crossing Equipment: Bells, Flashers, Gates	Ea	43	$ 400,000	$ 17,200,000
Quiet Zones	Ea. Xing	43	$ 125,000	$ 5,400,000
				$ 22,600,000
Train Control				
Positive Train Control	Mile	21.9	$ 1,000,000	$ 22,000,000
Centralized Traffic Control System (Wayside Signals)	Mile	21.9	$ 1,000,000	$ 22,000,000
Centralized Dispatching Center, Systems, & Communications Equip.	LS	1	$ 4,000,000	$ 4,000,000
				$ 48,000,000
Structures				
Bridge Rehabilitation	LS	1	$ 32,000,000	$ 32,000,000
Retaining Wall Allowance	SF	42000	$ 200	$ 8,400,000
				$ 40,400,000
Stations/Maintenance Facility				
Rail Station ("Small")	Ea	4	$ 1,500,000	$ 6,000,000
Rail Station ("Medium")	Ea	5	$ 2,250,000	$ 11,300,000
Rail Station ("Large")	Ea	2	$ 2,750,000	$ 5,500,000
Maintenance Facility & Operations Center	Ea	1	$ 9,000,000	$ 9,000,000
				$ 31,800,000
Construction Total (*Without* Contingency)				**$ 205,100,000**
Rail Vehicles				
Vehicles - Commuter Rail Trainset	Ea	6	$ 10,000,000	$ 60,000,000
Charging Infrastructure	Ea	3	$ 1,000,000	$ 3,000,000
Positive Train Control Equipment for Vehicles	Ea	6	$ 75,000	$ 500,000
				$ 63,500,000
Contingency			50%	$ 130,800,000
Soft Costs (Documentation, Permitting, Bid Document Preparation, Project Administration and Construc			30%	$ 78,500,000
Grand Total (Rounded)				**$ 478,000,000**

Table 4.3: Light Rail Operation & Maintenance Costs

LIGHT RAIL TRANSIT - OPERATION & MAINTENANCE COSTS			
		Operations & Maintenance Cost per Vehicle Revenue Hour	Annual Operating Cost
Number of vehicles operating/day	6		
Operating Hours Per Day	15		
Operating Days per Year	365		
Annual Vehicle Revenue Hours	32,850	$ 710	$ 23,300,000
Additional Maintenance of rail right-of-way (not included in Cost per Vehicle Revenue Hour)			$ 1,440,000
TOTAL COST			**$ 24,700,000**

Table 4.4: Commuter Rail Operation & Maintenance Costs

COMMUTER RAIL TRANSIT - OPERATION & MAINTENANCE COSTS			
		Operations & Maintenance Cost per Vehicle Revenue Hour	Annual Operating Cost
Number of vehicles operating/day	5		
Operating Hours Per Day	15		
Operating Days per Year	365		
Annual Vehicle Revenue Hours	27,375	$ 845	$ 23,100,000
Additional Maintenance of rail right-of-way (not included in Cost per Vehicle Revenue Hour)			$ 1,440,000
TOTAL COST			**$ 24,500,000**

5 - IMPLEMENTATION PLAN

This section presents the plan to implement electric passenger rail on the SCBRL that was presented above in Section 2. The process of developing the project's ultimate implementation plan will be iterative and need to evolve. The following two factors are expected to be dynamic and impact implementation.

- **Funding Schedules.** As presented in the TCAA/RNIS Final Report and below in Section 6, a variety of currently available funding sources were identified across all types of local, state, and federal sources to support electric passenger rail implementation. The funding sources and amounts reflect current policy and are expected to evolve and change over time. Funding sources will need to be monitored to evaluate how changes in funding policy may provide opportunities and/or limitations in seeking and securing actual funding. Implementation of passenger rail will require an ongoing commitment to secure funds for all components of the project.

- **Infrastructure Needs.** The TCAA/RNIS provided the RTC and its partners with planning level analysis that did not include detailed engineering design, environmental analysis, and other issues related to implementing electric passenger rail. A variety of infrastructure, environmental, right-of-way and other assumptions will become better understood after more advanced engineering. This knowledge may alter assumptions and result in changes to the project definition and implementation plan

Based on these factors, the implementation plan presented below represents the initial strategy for the project and will be updated by RTC periodically over time as these factors change and evolve.

5.1 PROJECT DELIVERY METHOD

There are numerous project delivery methods that could be utilized to implement passenger rail on the SCBRL. The more common project delivery methods that are used to construct transportation projects are described below.

Design-bid-build is the more traditional method for project delivery in which the agency contracts for the design and construction of the project separately and often with separate contractors. Design-bid-build provides more agency control of the contracting, schedule, cost and financing but the agency also assumes the risk.

Design-build is a method where the design and construction services are contracted by a single entity known as the design-build contractor. This method can reduce the delivery schedule by overlapping the design and construction component of the project. The agency generally has less control of the project but there is greater accountability, efficiency and therefore greater cost control, and some of the risk is transferred to the contractor.

Construction manager/general contractor (CMGC) delivery method allows the agency to engage a construction manager to provide input during the design process. The construction manager than becomes the general contractor. The benefits of CMGC include greater cost control, fewer change orders, an optimized schedule, improved constructability and transfer of some of the risk to the contractor.

A public private partnership (PPP or P3) can be a form of governance as well as a project delivery method. As discussed in **Section 3. Governance**, P3 is a collaborative arrangement between a public agency and a private partner to deliver a public service or facility. The skills and assets of each sector are shared as are the potential risks and rewards. A P3 can take many forms and may involve the participation of the private partner in all or some of the components of a project – environmental review, design, construction, finance, operation, and maintenance of a project. A P3 can allow a public agency to accelerate a project, improve performance and minimize costs by utilizing private sector expertise in building and operating a project. P3's are usually not formed until near the completion of the environmental document.

Regardless of the ultimate project delivery method, all methods require preliminary engineering and an environmental document to be completed as the next step. Although the below implementation components are based on the traditional design-bid-build approach to project delivery, future policy decisions can dictate whether the project should consider an alternative delivery method, such as design-build, construction manager/general contractor (CMGC), or a public private partnership. Although all components of the traditional design-bid-build approach are shown in the subsequent sections, more breakdown is provided for the initial preliminary engineering and environmental documentation component. This detail is provided to understand what is more immediate and to provide potential options to implement in one step at a time, considering the limitations on funding to complete this initial component of work. An outline of the various project components is provided in Table 5-1 at the end of this section.

5.2 TRADITIONAL DESIGN–BID-BUILD APPROACH TO IMPLEMENTATION

The following section presents the different components required to implement electric passenger rail on the SCBRL.

Component 1 – Preliminary Engineering and Environmental Documentation

The preliminary engineering and environmental documentation will be the first component of implementation for the project. RTC will need to procure one or more consultants to complete the work outlined in the steps below. Some of the steps may be done in parallel to implement the project more quickly.

Component 1, Step 1.1 – Initial Conceptual Design and Operating Plan. This step will be used to develop the initial conceptual design and operating plan for the electric passenger rail alternative. The steps of component 1 were developed to account for the fact that many design parameters are dependent upon other parameters. For example, station locations, train speeds, vehicle types, travel times, infrastructure improvements, and ridership are all variables, that affect each other. As the project develops, each design parameter may shift as the design becomes more refined. The results of the TCAA/RNIS will be used to guide the development of the conceptual design and operating plan. This step includes:

a. *Track alignment in CAD.* Accurate information will be developed about the existing alignment and right-of-way. This will include preparing a CAD file representing the existing alignment to include high-resolution aerial imagery with vertical information provided either by aerial photogrammetry or LiDAR.
b. *Track vertical and horizontal curvature.* Identify the existing curvature, both horizontal and vertical to assess need to modify the track alignment at locations along the SCBRL ROW for improved vehicle speeds and optimum use of the ROW. Based on a visual inspection of the SCRBL ROW, there may be areas of the ROW where the distance between curves is short enough that curve realignments may be recommended to improve the operational speeds of the train. A preliminary assessment of potential realignments will be prepared at this time in the analysis.
c. *STOPS Ridership Forecast.* Develop/refine ridership results using the Federal Transit Administration's (FTA's) Simplified Trips-On-Project Software (STOPS) modeling. The ridership analysis for the TCAA/RNIS provided total ridership results for the rail alternatives, although ridership by station and ridership from station-to-station across the length of service was not determined. The STOPS ridership forecast will be developed to determine the ridership by station and from station to station to help refine station locations and connectivity needs to other modes for first and last mile connections to support the conceptual design and operating plans. Ridership forecasts using the STOPS model will ensure that RTC adheres to FTA requirements for demand modeling if the agency seeks federal funds as the STOPS ridership forecast is required for FTA and other federal grant programs. It is recommended that the Santa Cruz County Travel Demand Model used for the TCAA/RNIS be utilized in the STOPS modeling system.
d. *Initial Conceptual Design.* Initial concepts of the station locations and configurations, siding locations, right-of-way needs, infrastructure needs including bridge structures, and maintenance facility location will be built into this design for both commuter rail and light rail. The station types will be evaluated to assess the roadway connections and feasibility to

provide parking and other first and last mile solutions to provide passenger rail users the ability to get to their origin and/or destinations. As siding locations are determined, detailed ground surveys and ROW delineations will be collected to refine the design. ROW acquisition may be required to meet the needs of new station locations, a maintenance facility, and siding locations. Any critical issues that are determined in this initial conceptual design will be evaluated in the Step 1.2.

e. *Initial Operating Plan.* The Initial Operating Plan will include an analysis on the headways, schedules, span of service, vehicle type and integration with both the local METRO services and the regional rail service. This will involve identifying the performance characteristics of various vehicle types based on the development and analysis of an operating simulation of the passenger rail services represented on the SCBRL ROW that will identify what travel times are possible based on the existing alignment. This effort will be developed to quantify the types of constraints encountered and, at an early stage in the design process, be used to rule-out vehicle types and technologies that cannot provide a reasonable running time on the corridor. The Initial Operating Plan will identify the operating schedule and any time delays for trains in full operations, including times when trains meet and pass at siding locations. Any constraints to achieving a reasonable operating speed, typically related to curvature issues, will be identified with potential mitigations investigated. Mitigations could include curve realignments or increasing operating speed in other areas to compensate for the slower speed sections.
f. *Cost Estimates.* While planning level costs were identified in the TCAA/RNIS and documented above in Section 4, capital and operations and maintenance costs will be updated each time the design is refined to a greater level. Cost estimates based on the initial conceptual design and operating plan will be determined including estimates for METRO connector services. The potential farebox recovery can also be determined based on STOPS ridership forecasts.

Component 1, Step 1.2 – Identify Critical Design Issues and Prepare Governance Strategy.

a. *Identify Critical Design Issues.* The information prepared in Step 1.1 will be used to identify any critical design issues for implementing passenger rail on the SCBRL. The engineering alignment and profile (vertical alignment) of the track will identify the potential range of service running times and service frequencies and help identify which infrastructure investments will yield the most benefits to implementing electric passenger rail service on the ROW. The location of stations (where trains must slow to stop and accelerate) will typically affect the need to make infrastructure investments that will allow an increase in train speeds. Any design elements that are excessively expensive (e.g. specific bridge structures) or which offer insufficient flexibility to meet the RTC's implementation goals will be determined. The engineering design strategy will be refined to consider infrastructure issues that are identified in this step. This approach also will provide the RTC with a series of milestones in which decision makers will be able to review the information developed, understand the potential risks, and make informed decisions about project implementation.

b. *Determine Governance Strategy*. This Step includes the development of a governance strategy that provides a recommendation to be approved by the RTC and its partners. The recommended governance model will include the requisite state (Caltrans), regional (TAMC, Others), and local (METRO, RTC) agency communication, coordination, and analysis required to create the most appropriate model for implementation of electric passenger rail. Preliminary information on governance models is discussed in Section 3.

Component 1, Step 1.3 – Final Conceptual Design and Operating Plan. Building on the initial conceptual design and plan developed in Step 1.1 and critical design issues identified in Step 1.2, the final conceptual design and operating plans for the electric passenger rail alternatives will be prepared. The elements of Step 1.1 will be revised in this step as needed based on the critical issues identified in Step 1.2. Rather than repeating all of the detail provided in Step 1.1, the steps are summarized in less detail below. This step will include the following:

a. *Refine STOPS ridership projections.* As conceptual design and operations is refined, the STOPS ridership projections should also be refined as needed to assess impacts on ridership and potential station locations.
b. *Final Conceptual Design.* Use the passenger rail operating plan from Step 1.1 and revise based on the Step 1.2 analysis of critical design issues and mitigation strategies including updating station locations and configurations, siding locations, infrastructure needs including bridges and roadway crossings, maintenance and operations facility location(s) and any project right-of-way requirements. Detailed information about the existing ROW conditions will be used to identify improvements for further design refinements for electric passenger rail.
c. *Final Conceptual Operating Plan.* This step will be used to refine the operating plan in conjunction with the refinement of the conceptual design above including headways, schedules, vehicle type and integration with local METRO services and regional rail service. With sufficient design information for new infrastructure to be refined in this step, the required permits will also be determined.
d. *Refine Cost Estimates.* Capital and operational and maintenance costs will be refined based on the Final Conceptual Design and Operating Plan.
e. *Identify alternative to be carried forward into an environmental analysis.* There will be sufficient information in the Final Conceptual Design and Operating Plan to select alternatives to move forward into the environmental documentation process.

Component 1, Step 1.4 – Environmental Review, Documentation, and 30% Preliminary Design. In this last Step of Component 1, the information prepared in the previous Steps above will be used to prepare the full environmental review, documentation, and 30% preliminary design to meet federal and/or state requirements.

a. *Prepare environmental document.* A CEQA Environmental Impact Report (EIR) and NEPA Environmental Impact Study will be required based on the intended reuse of the SCBRL ROW and the assumption that federal funds may be available for the project. Given the

nature of the project, it is assumed that a lesser level of documentation (e.g., Mitigated Negative Declaration or Environmental Assessment) will not be sufficient for this project, although this will need to be determined using the preliminary engineering and design work conducted in the previous steps.

b. *30% Preliminary Design*. The final conceptual design, operating plan, and associated materials from Step 1.3 will used as input to prepare the 30% preliminary design plans in support of the environmental documentation.
c. *Define vehicle technology*. There will be a range of possible vehicle technologies available to the RTC and its partners, ranging from battery power, battery with wayside charging, to hydrogen fuel cell. Although several of these technologies are emerging and promising, not all have been proven in-service with this type of passenger rail system. The Governing body will be able to make a more informed decision of the project's defined vehicle as information on the emerging technologies become more available. While the vehicle technology will be evaluated in detail and initially selected in this step, the vehicle type selection and procurement will be finalized in the Component 2 Final Design (see below).
d. *Determine project delivery approach*. There are a few different project delivery methods that can be used to contract construction services as discussed above. The actual method of project delivery for design and construction will be evaluated and selected as the project nears completion of the preliminary engineering and environmental documentation and more information on funding is available.
e. *Determine potential for project phasing, including developing an initial operating segment (IOS), which may be required due to funding limitations.* If funding limitations may prevent the project from being completed in one operational segment between Pajaro and Santa Cruz, the governing body should identify operations segments that can be completed in phases. It is typical for a project of this magnitude to have an initial operating segment (IOS); however, any segment or phase must have independent utility and logical termini. An analysis of this type of potential phasing should be first considered during the environmental component.
f. *Refine the Cost estimate* based on 30% design, including any right-of-way needs.
g. *Refine STOP Ridership Projections* based on 30% design.

Component 2 – Final Design and Permitting

Upon completion and clearance of the Component 1 Preliminary Engineering and Environmental Documentation and assuming this project will continue with the design-bid-build delivery method, the governing body will need to procure a consultant to prepare a final design of the selected alternative for construction. The 30% preliminary engineering design developed in Component 1 will be further refined and finalized to 100% plans, specifications, and estimates during this component of the work. Final design will include designing track reconstruction, and station and roadway crossing plans. The final operations plan including the fare policy, final service plan with schedule coordination and integration with local METRO and

regional services will also be completed. The final design will be sufficiently advanced that formal value engineering and construction cost risk analysis will be undertaken. During the Final Design component, a final decision on whether to construct the project in phases will be made given the likelihood of funding limitations to construct the entire project at one time. The vehicle selection process started in Component 1, Step 1.4 will be finalized. See Component 4 – Construction for additional information on how the project could be phased. Construction documents and final cost estimates, including the estimated cost of any potential right-of-way needs, will be completed in Final Design.

In traditional design-bid-build contracts, the design team coordinates obtaining regulatory permits as outlined below:

a. *Develop a Regulatory Compliance Analysis*. This analysis will describe all permits that will be needed prior to construction. The purpose of this analysis will be to facilitate early coordination regarding the concepts and approaches to be considered by RTC. The analysis will include identifying permits and approvals required for implementing the project and developing a comprehensive and coordinated approach to obtaining the necessary permits and approvals to meet the project's schedule. Permits and approvals that may be needed for the project include the following federal, state, and local permits. The below list is not all-encompassing and will be refined and finalized during final design.
   - Federal
     - Federal Endangered Species Act - Section 7 Consultation with the National Marine Fisheries Service and/or U.S. Fish and Wildlife Service
     - U.S. Army Corps of Engineers – Section 404 of the Clean Water Act
     - State Historic Preservation Office and the Advisory Council on Historic Preservation - Section 106 compliance
   - State
     - California Regional Water Quality Control Board (Central Coast Region) – Section 401 Water Quality Certification
     - Section 402 National Pollutant Discharge Elimination System General Permit for Stormwater Discharges associated with Construction and Land Disturbance Activity
     - California Endangered Species Act – Section 2081 Incidental take permit through California Department of Fish and Wildlife (CDFW)
     - CDFW Section 1602 and 1603 – Notification of streambed alterations and obtaining a streambed alteration agreement.
     - State Lands Commission – land use lease
   - Local
     - Monterey Bay Air Resources District – compliance with various regulations, including Federal Clean Air Act.

- Santa Cruz County and Cities of Santa Cruz, Watsonville, and Capitola– various ordinances and municipal codes

Component 3 – Right-of-Way Acquisition

If right-of-way needs are identified in final design, the governing body will need to procure a right-of-way consultant to perform right-of-way services as outlined below:

a. *Identify ROW acquisitions for purchase*. As with the above permitting discussion, the potential ROW acquisition needs will be identified in Final Design, and if needed, will be acquired in this component of the work. Services will include performing appraisals and negotiating offers to purchase real property.
b. *Utility Relocations*. Utilities impacted by the project will be investigated and arrangements will be made to relocate any utilities that conflict with the project.
c. *Environmental Mitigation*. Any environmental impacts requiring off-site mitigation will be determined and off-site mitigation will be procured as part of the right-of-way component of the project.

Component 4 – Construction

Assuming the project continues with design-bid-build delivery method, the governing agency will procure construction and construction management contractor(s). The construction contract would be awarded to the lowest responsible bidder based on the plans, specifications and estimates prepared during the final design component of the project. There could be a separate procurements of contractors for reconstruction of the track infrastructure, station construction, bridge repair or replacement, and/or roadway crossing infrastructure replacement.

As mentioned under Final Design, the construction of the project will likely be phased given the amount of funds needed to construct the entire project. Rail projects of this size will often identify an initial operating segment (IOS). A logical IOS may be one that provides the greatest potential ridership, such as a segment between the Boardwalk/Downtown Santa Cruz Station and Aptos Station, and subsequent phases could connect the Aptos Station to the Pajaro Station and the Boardwalk/Downtown Santa Cruz Station to the Natural Bridges Station. Each phase would have to have independent utility and logical termini. A final decision for how the project will be phased will likely be determined during Final Design, based on the availability of funding.

Component 5 – Vehicle Procurement

Rail vehicle procurement is typically completed separate from the construction contract but in parallel with start of construction. Caltrans Division of Rail and Mass Transportation (DRMT) provides rail vehicle procurement support for local agencies. Coordination between the governing body and DRMT may be instrumental in streamlining this process. There could also

be an option in the future for the rail vehicles to be leased from Caltrans which would shift the cost from capital to operations & maintenance and could provide a cost savings.

Component 6 – Testing, Commissioning, Operations and Maintenance

A separate procurement will be needed for a consultant to performing testing and commissioning of the constructed railway and then operate and maintain the system. Testing and commissioning of the system requires a series of activities to meet regulatory requirements prior to opening of a rail service. Details of the requirements for testing and commissioning will be based on the type of service implemented. Types of testing and inspections will include rail car, crossing gate and train control system testing and various types of inspections.

Depending on the governance strategy, a vendor may be needed to operate and maintain the system. Operations includes the day to day operations of the transit system including operating the train control system and coordination with freight rail activities. Maintenance includes right of way maintenance, all required track maintenance and vehicle maintenance and repair.

Marketing of the passenger rail service would also be planned and begin prior to opening of service. Marketing strategies can target specific markets to develop ridership by raising awareness of destinations, transit connections, and amenities. Opportunities to develop ridership through seasonal campaigns can be planned as well as coordination with local partners on promotions, outreach, and shared marketing collateral.

Table 5.1: Summary of Components of Passenger Rail Project Delivery

Component 1 – Preliminary Engineering and Environmental Documentation

Step 1.1- Initial Conceptual Design and Operating Plan

- Track alignment in CAD
- Track vertical and horizontal curvature determined
- STOPS ridership projections
- Initial Conceptual Design and Operating Plan
  - Initial Conceptual Design
    - Station locations and configurations
    - Siding locations
    - Infrastructure needs (bridges, roadway crossings etc.)
    - Maintenance facility location
  - Initial Conceptual Operating Plan
    - Headways
    - Schedules
    - Stringline charts
    - Span of service
    - Vehicle type
    - Integration with METRO services and regional rail service
- Refined Cost Estimates

Step 1.2 - Identify Critical Design Issues and Determine Governance Strategy

- Identify and assess critical design issues
- Determine governance strategy

Step 1.3 –Final Conceptual Design and Operating Plan

- Refine STOPS Ridership Projections
- Final Conceptual Design
  - Station locations and configurations
  - Siding locations
  - Infrastructure Needs (bridges, roadway crossings etc.)
  - Maintenance facility location
- Final Conceptual Operating Plan
  - Headways
  - Schedules
  - Stringline charts
  - Span of service
  - Vehicle type
  - Integration with METRO services and Regional Service
- Refined Cost Estimates

Step 1.4 – Environmental Review, Documentation, and 30% Preliminary Design

Component 2 - Final Design and Permitting

Component 3 - Right-of-Way Acquisition

Component 4 - Construction

Component 5 – Vehicle Procurement

Component 6 – Testing, Commissioning, Operations and Maintenance

6 - PROJECT FINANCING

In order to implement electric passenger rail on the Santa Cruz Branch Rail Line, numerous funding sources will be needed to move this project through the project delivery components of environmental review, design, construction and operation. Funding is expected to be available from local, state, and federal sources. This section summarizes the project cost; lists the existing funding programs that could be accessed, based on existing conditions; summarizes funding assumptions from each program; and discusses potential strategies for funding the remaining cost of the project.

As is typical for transportation projects, including this type of passenger rail project, the mix of potential sources and funding levels are expected to change over time. Funding sources will need to be re-evaluated regularly during the project's implementation to ensure that funding source options are well understood, as passenger rail development continues to evolve. This section presents the present day snapshot of available funding programs with a high likelihood that the mix and amount of accessible funding sources required to support the project will change over time.

6.1 PROJECT COSTS

Electric passenger rail is estimated to cost between $465 million and $478 million based on the cost estimates for CRT and LRT respectively developed in the TCAA/RNIS. Given the small difference between the two cost estimates for CRT and LRT, cost estimates used in the cash flow model for electric passenger rail will assume the higher cost of $478 million. The total cost for the cash flow analysis is divided into the costs for each component below.

6. Components 1-3: Pre-Construction Costs, ~ $51 million, including
    a. Component 1: Preliminary Engineering & Environmental Documentation, ~$17.1 million
        i. Initial Conceptual Design and Operating Plan ($2 million)
        ii. Identification of Critical Design Issues and Preparation of Governance Strategy ($600,000)
        iii. Final Conceptual Design and Operating Plan, including cost estimation and STOP ridership projections ($3.1 million)
        iv. Preparation of Environmental Document for Review, 30% Design ($11.4 million)
    b. Component 2: Final Design and Permitting, ~ $34 million
    c. Component 3: Right-of-Way Acquisition if needed, no costs anticipated at this time
7. Component 4: Construction, ~ $364 million including construction management (~28 million) and contingency costs of (~ $131 million).
8. Component 5: Vehicle Procurement, ~ $64 million

Operations and maintenance (O&M) activities are expected to cost $25 million per year, based on the estimates developed during this TCAA/RNIS. Detailed cost estimates are presented in Section 4 of this report. Over time, design information will be developed for both alternatives to better inform these capital and O&M costs.

6.2 POTENTIAL FUNDING SOURCES

In the TCAA/RNIS, a variety of local, state and federal funding sources were identified that may be available to implement passenger rail. Some of these sources are competitively awarded, which means that there is no guarantee that these sources will be available to fund passenger rail on the SCBRL. The majority of the funding sources are focused on capital expenditures. A more limited number of funding sources are available for operations and maintenance (O&M). The information presented below describes the various potential funding sources and estimated amounts to support the capital and operations and maintenance costs of the project. A summary of this information is provided in Table 1 at the end of this section.

Additional federal, state, local, and/or private sources of funds will be needed to fund the shortfall from what is reasonably expected from existing fund sources. A discussion on these potential additional sources is also presented towards the end of this section.

Potential Funding Sources for Capital

Federal Funding Sources

The following are the existing federal grant programs and funding sources that could be utilized for passenger rail:

- Capital Investment Grant 5309 (CIG 5309) (Small Starts or New Starts)
- Better Utilizing Investments to Leverage Development (BUILD) Transportation Grants
- Surface Transportation Block Grant (STBG)/RSTPx
- Consolidated Rail Infrastructure and Safety Improvements (CRISI)
- Advanced Transportation and Congestion Management Technologies Deployment
- Railway Highway Crossing (Section 130)

Capital Investment Grant (CIG) 5309[1] (Small Starts or New Starts)

A significant amount of funding is available through this Federal Transit Administration (FTA) program, also known as the Small Starts or New Starts programs. Funding can be used for final design and construction. It is important to note, however, that it is a reimbursement program. In addition, it requires a local funding match that can come from a variety of different sources.

[1] https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/5309_Capital_Investment_Grant_Fact_Sheet.pdf

If this funding is pursued by RTC, all non-CIG funds (the required local match) will need to meet FTA "Committed" requirements before the grant can be executed. In 2020 guidelines, "New Starts" projects are defined as projects with a total estimated capital cost of $300 million or more, or as projects that are seeking at least $100 million in Section 5309 CIG program funds. Fixing America's Surface Transportation (FAST) Act limits the maximum Section 5309 CIG program share of a New Starts project to 60 percent. The maximum federal contribution from all federal sources to a New Starts project is 80 percent. It should be noted that the FAST Act will expire at the end of September 2021 and will be replaced with a new act that could change these limits.

FTA's requirements include all legislative approvals and actions to be complete (i.e., the funds are available to be used on the project without any additional action from the Board, City Council, or County Commission). CIG grant agreements are not executed until after the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) environmental documentation are completed and enough preliminary engineering is completed (typically at least 30%) to provide a high level of confidence about the project's cost estimate. Depending on the ultimate contract sponsor and governance strategy developed by RTC for passenger rail transit, the project sponsor will need to cover these costs until the grant is executed. This typically considers a two- to four-year window for preliminary to final engineering.

Once FTA approves a project into the Project Development Process, final design and construction activities are eligible expenses that can be reimbursed with 5309 funds. The agency will have to pay for these costs initially (using non-5309 funds), but the implementing agency could be reimbursed at the agreed upon 5309 share of total project costs, once the grant agreement is executed. The amount of funds from this source that is assumed in the cash flow model is $100 million.

Better Utilizing Investments to Leverage Development (BUILD) Transportation Grants

The Better Utilizing Investments to Leverage Development (BUILD) transportation discretionary grant program supports investments in road, passenger and freight rail, transit, and port projects that are expected to achieve national objectives. Funding can only be used for construction. It is a highly competitive program and may or may be modified in 2021 to more closely resemble the program formerly referred to as TIGER. Previous rounds have required a minimum 20 percent non-federal funding match. The amount of funds from this source that is assumed in the cash flow model is $15 million.

Surface Transportation Block Grant (STBG)/RSTPx[2]

This funding program supports capital projects for a variety of modes, including transit. Funding can be used for pre-construction, construction, and vehicle procurement. The FAST Act directs the Federal Highway Administration (FHWA) to apportion funding as a lump sum for each State and then divide that total among apportioned programs, with each state's apportionment calculated based on a percentage specified in law. In turn, the state assigns a portion of the funds to regional transportation agencies such as the RTC. In California, smaller regions like RTC typically exchange the federal STBG for more flexible state Regional Surface Transportation Program Exchange (RSTPX) funds. For federal funds, an 11.47% non-federal match is required. RTC has provided STBG/RSTPx funds on a competitive basis as well as by formula to the local jurisdictions and other transportation providers in Santa Cruz County. The amount of funds assumed to be available for Passenger Rail through this program is 25% of the estimated total for Santa Cruz County which equates to $9 million over a 25 year timeframe.

Consolidated Rail Infrastructure and Safety Improvements (CRISI)[3]

The CRISI grant program provides funding for projects that improve the safety, efficiency, and reliability of passenger and freight rail, including projects that improve highway-rail grade crossings, upgrade short-line railroad infrastructure, improve intercity passenger rail capital assets, address rail congestion challenges, and deploy railroad safety technology. In addition to typical capital projects, CRISI funds can also be used to support pre-construction activities (such as designing, engineering, location surveying, mapping, acquiring rights-of-way) and related relocation costs, as well as environmental studies, and all work necessary for the Federal Railroad Administration (FRA) to approve the project under NEPA. There are no minimum or maximum awards, but applicants have been required to provide a 20% funding match in recent years. It is worth noting that FRA will provide selection preference to applications where the proposed federal share is 50 percent or less. There is a low likelihood that these funds would be available for implementation of a new transit project. The cash flow model currently assumes no funding from this program, but RTC will continue to monitor this program.

Advanced Transportation and Congestion Management Technologies Deployment[4]

This program is a competitive grant program. Funds can be used to deploy advanced transportation and congestion management technologies, including:

- advanced traveler information systems and advanced transportation management technologies
- infrastructure maintenance, monitoring, and condition assessment
- public transportation systems with advanced technologies

[2] https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm
[3] https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/consolidated-rail-infrastructure-and-safety-2
[4] https://www.fhwa.dot.gov/fastact/factsheets/advtranscongmgmtfs.cfm

- transportation system performance data collection, analysis, and dissemination systems
- advanced safety systems, including vehicle-to-vehicle and vehicle-to-infrastructure communications
- technologies associated with autonomous vehicles, and other collision avoidance technologies, including systems using cellular technology
- integration of intelligent transportation systems with the Smart Grid and other energy distribution and charging systems
- electronic pricing and payment systems
- advanced mobility and access technologies, such as dynamic ridesharing and information systems to support human services for elderly and disabled individuals. [23.U.S.C. 503(c)(4)(E)]

The federal share can be no more than 50 percent. There is a low likelihood that these funds would be available for the implementation of a new transit project. The cash flow model currently assumes no funding from this program, but RTC will continue to monitor this program.

Railway Highway Crossing (Section 130)[5]

These funds support the elimination of hazards at railway-highway crossings. The funds are apportioned to the states by formula, and Section 130 projects are funded at a 90 percent federal share. In California the CPUC identifies and prioritizes project locations. Funds can only be used for construction component of project. There is a low likelihood that these funds would be available for the implementation of a new transit project. The cash flow model currently assumes no funding from this program, but RTC will continue to monitor this program.

State Funding Sources

In addition to the federal funding sources described above, state sources available for rail transit include:

- SB1 Solutions for Congested Corridors Program (SCCP)
- Transit and Intercity Rail Capital Program (TIRCP)
- SB1 Local Partnership Program (LPP) - Competitive
- SB1 Local Partnership Program (LPP) – RTC Formula
- SB1 State Rail Assistance (SRA)
- State Transportation Improvement Program (STIP)
- Affordable Housing and Sustainable Communities (AHSC)
- STEP – Implementation

[5] https://safety.fhwa.dot.gov/hsip/xings/; https://dot.ca.gov/programs/rail-and-mass-transportation/railroad-highway-at-grade-crossings-section-130-guidelines

SB1 - Solutions for Congested Corridors Program (SCCP)[6]

The purpose of the SCCP grant program is to provide funding to achieve a balanced set of transportation, environmental, and community access improvements to reduce congestion throughout California. This SB1-funded statewide, competitive program makes $250 million available annually for projects that implement specific transportation performance improvements and are part of a comprehensive corridor plan by providing more transportation choices while preserving the character of local communities and creating opportunities for neighborhood enhancement. Regional transportation planning agencies such as RTC and Caltrans are eligible to apply for program funds through the nomination of projects. In 2020, the California Transportation Commission (CTC) scored projects based on criteria that included safety, congestion, accessibility, economic, pollution benefits, as well as deliverability and matching fund levels. Funds from SCCP can only be used for construction and vehicle procurement unless project delivery is design-build and then they can be used for final design as well. The amount of funds from this source that is assumed in the cash flow model over 25 years is $52 million.

Transit and Intercity Rail Capital Program (TIRCP)

TIRCP funds transformative capital improvements that modernize California's intercity, commuter and urban rail, bus and ferry transit systems. The focus of the program is on projects that reduce greenhouse gases, expand and improve transit service and increase transit ridership, integrate the rail service of various operations, and improve transit safety, especially for those serving disadvantaged communities. Funding is available for the construction and vehicle procurement components of the project. The amount of funds from this source that is assumed in the cash flow model over 25 years is $30 million.

SB1 Local Partnership Program (LPP) - Formula and SB-1 Local Partnership Program - Competitive[7]

This program provides funding to counties, cities, districts, and regional transportation agencies in which voters have approved fees or taxes dedicated solely to transportation improvements or that have imposed fees, including uniform developer fees, dedicated solely to transportation improvements. Due to Measure D and METRO local sales taxes (approved by voters in 2016 and 1978 respectively), SCCRTC and METRO are eligible applicants. Funds for a new local tax would provide additional eligibility. In 2020, the Local Partnership Program funds were distributed through a 40 percent statewide competitive component and a 60 percent formulaic component. The California Transportation Commission (CTC) updates guidelines and selects projects for the competitive program. In 2020, projects funded from the Local Partnership program required at least a one-to-one match of non-LPP funds. Funds from LPP formula can be used for all components of the project. Funds from LPP competitive can be used only for

[6] https://catc.ca.gov/programs/sb1/solutions-for-congested-corridors-program
[7] https://catc.ca.gov/programs/sb1/local-partnership-program

construction and vehicle procurement unless project delivery is design-build and then they can be used for final design as well. The amount of funds from the competitive source that is assumed in the cash flow model over 25 years is $25 million and 50% of the formula funds (RTC discretionary funding) at $150,000/year once final design begins for a total of $3 million.

SB1 State Rail Assistance (SRA)[8]

Provides operating and capital assistance for commuter and intercity rail agencies. Eligible activities cover a full range of transportation planning and mass transportation purposes, with the direction that rail agencies spend these funds in a cost-effective manner to provide operations and capital improvements for the benefit of the public. SB1 created the SRA by directing a portion of new revenue specifically to intercity rail and commuter rail.

- SB1 directs a 0.5 percent portion of new diesel sales tax revenue for allocation: half to the 5 commuter rail providers and half to intercity rail corridors
- Half of revenue was allocated in equal shares to commuter operators through FY 2019-2020, and will be allocated via guidelines thereafter
- Half of revenue is allocated to intercity rail corridors such that each of the existing three corridors receives at least 25 percent of the intercity rail share
- Funding is available for all components of the project from environmental review through operations and maintenance.
- The majority of program funding is directed by statutory formula to rail operators, with guidelines defining process and timeline for agencies to obtain funding.

The amount of funds assumed in the cash flow model over 25 years is $17.1 million for Preliminary Engineering and Environmental Documentation based on conversations with Caltrans Division of Rail and Mass Transportation. Funds from SRA for operations and maintenance at $500,000/year are also assumed in the cash flow model as discussed below under operations and maintenance funding sources.

State Transportation Improvement Program (STIP)

The STIP can be used to fund all components of a construction project. Funded primarily by state resources, including SB 1 gasoline tax revenues, the STIP consists of two broad programs, the Regional Improvement Program (RIP) funded from 75 percent of new STIP funding and the Interregional Transportation Improvement Program (ITIP) funded from 25 percent of new STIP funding. The RTC is responsible for selecting projects to receive Santa Cruz County's formula share of RIP funds every two years. The State selects projects to be funded from the ITIP every two years. The STIP is not considered a competitive grant funding program. The amount of funds assumed in the cash flow model over 25 years is $10 million. The amount of funds assumed to be available for passenger rail through this program is 20-25% of the estimated

[8] https://calsta.ca.gov/subject-areas/state-rail-assistance

total for Santa Cruz County (RTC discretionary funds) which equates to $10 million over a 25 year timeframe.

Trade Corridor Enhancement Program (TCEP)

The purpose of the Trade Corridor Enhancement Program is to provide funding for infrastructure improvements on federally designated Trade Corridors of National and Regional Significance, on California's portion of the National Highway Freight Network, as identified in California Freight Mobility Plan, and along other corridors that have a high volume of freight movement. The Trade Corridor Enhancement Program will also support the goals of the National Highway Freight Program, the California Freight Mobility Plan, and the guiding principles in the California Sustainable Freight Action Plan. This statewide, competitive program administered by the CTC provides approximately $300 million per year in state funding and approximately $515 million in National Highway Freight Program funds, if the federal program continues under the next federal transportation act. In 2020, the CTC required 30% in matching funds. Funds from TCEP can only be used for construction. There is a low likelihood of these funds being available for implementation of a commuter rail project. The cash flow model currently assumes no funding from this program, but RTC will continue to monitor the program.

Affordable Housing and Sustainable Communities (AHSC)

Administered by the Strategic Growth Council and implemented by the California Department of Housing and Community Development, the AHSC Program funds land-use, housing, transportation, and land preservation projects to support infill and compact development that reduce greenhouse gas ("GHG") emissions. It provides grants and/or loans to projects that achieve GHG emission reductions and benefit Disadvantaged Communities, Low-Income Communities, and Low-Income Households through increasing accessibility of affordable housing, employment centers and Key Destinations via low-carbon transportation resulting in fewer vehicle miles traveled (VMT) through shortened or reduced vehicle trip length or mode shift to transit, bicycling or walking. Three Project Area types have been identified to implement this strategy: 1) Transit Oriented Development (TOD) Project Areas, 2) Integrated Connectivity Project (ICP) Project Areas, or 3) Rural Innovation Project Areas (RIPA). In addition to affordable housing, eligible projects include sustainable transportation infrastructure, transportation-related amenities, as well as active transportation, transit ridership, and workforce development partnerships programs. Funding is available for the construction component of the project. The amount of funds from this source that is assumed in the cash flow model over 25 years is $10 million.

Sustainable Transportation Equity Project (STEP) – Implementation

Provides funding to address transportation needs, increase access to key destinations, and reduce greenhouse gas emissions by funding planning, clean transportation, and supporting projects in cities and unincorporated areas. STEP's overarching purpose is to increase transportation equity in disadvantaged and low-income communities throughout California.

Funds are available for construction and vehicle procurement component of project. The amount of funds from this source that is assumed in the cash flow model over 25 years is $7 million.

Potential Funding sources for OperatIons & Maintenance (O&M)

For operations and maintenance, the primary funding programs identified as available for O&M are:

- *Federal* – State of Good Repair Grants Program (49 U.S.C. 5337)
- *Federal* –Restoration and Enhancement Grants
- *State* - State Transit Assistance (STA) and State of Good Repair (SGR) - New Service/Revenue-based (99314)
- *State* – LPP - Formula
- *State*- State Rail Assistance (SRA)
- *Local* - Measure D: 2016 Transportation Sales Tax - Rail Corridor system preservation and analysis
- *Local* - Rail Line Lease, Concession Revenue and Advertising
- *Local* – Fare Revenues

FEDERAL

State of Good Repair Grants Program (49 U.S.C. 5337) [9]

The State of Good Repair Grants Program (49 U.S.C. 5337) provides capital assistance for maintenance, replacement, and rehabilitation projects of high-intensity fixed guideway systems including track, signal systems, bridges, vehicles, and stations. Its goal is to help transit agencies maintain their assets in a state of good repair. Funds are apportioned by statutory formulas and the federal share of eligible capital costs is 80 percent, unless the grant recipient requests less than 80 percent. Funds from this source will be available for maintenance after service is operational for seven years at approximately $2.25 million/year.

Restoration and Enhancement Grants

The Restoration and Enhancements Grants program funds operating assistance for initiating, restoring, or enhancing intercity passenger rail transportation. In recent years, there was no potential award minimum or maximum amount and applicants can apply for up to three years of operating funding assistance on a sliding matching scale. Applicants are required to provide a 20 percent funding match in the first year, 40 percent in the second year, and 60 percent in the third year. There is a low likelihood that these funds would be available for this project. The cash flow model currently assumes no funding from this program, but RTC will continue to monitor the program.

[9] https://www.transit.dot.gov/funding/grants/state-good-repair-grants-5337

STATE

STA and SGR - New Service/Revenue-based (99314)

This program has the specific goal of keeping transit systems in a state of good repair, providing regions and transit operators in California funding for eligible transit maintenance, rehabilitation, and capital projects. This can include the purchase of new transit vehicles and the maintenance and rehabilitation of both existing vehicles and transit facilities. These funds are distributed to eligible agencies using the State Transit Assistance Program formula. The State Controller's Office distributes half of the State of Good Repair funds by formula according to population (99313) and half of the State of Good Repair funds according to transit operator revenues relative to other operators in California (99314). This plan only assumes the new 99314 funds that would be allocated to a new rail transit operator in Santa Cruz County. The cash flow model assumes $220,000/year from STA and $36,000/year from SGR.

SB1 Local Partnership Program (LPP) - Formula

As discussed above under the capital fund sources, this program provides formula funds to counties, cities, districts, and regional transportation agencies in which voters have approved fees or taxes dedicated solely to transportation improvements or that have imposed fees, including uniform developer fees, dedicated solely to transportation improvements. Funds from LPP formula can be used for all components of the project including operations and maintenance. The amount of funds from the formula source that is assumed in the cash flow model is 50% of the formula funds at $150,000/year once final design begins for a total of $3 million.

SB1 State Rail Assistance (SRA)[10]

As discussed above under potential funds for capital expenses, SRA provides both operating and capital assistance for commuter and intercity rail agencies. Eligible activities cover a full range of transportation planning and mass transportation purposes, with the direction that rail agencies spend these funds in a cost-effective manner to provide operations and capital improvements for the benefit of the public. The cash flow model currently assumes $0.5 million/year from SRA for operations and maintenance.

LOCAL

Measure D: 2016 Santa Cruz County Transportation Sales Tax[11]

In November 2016, Santa Cruz County voters passed Measure D, a one-half cent sales tax that funds transportation projects for a 30-year period. A portion (8%) of the Measure D funds is available for the rail corridor infrastructure preservation and analysis of options, including environmental review. These funds are not available for operations of a new passenger rail service. RTC estimates that this funding will be needed to preserve the rail line, while the rail

[10] https://calsta.ca.gov/subject-areas/state-rail-assistance
[11] Measure D: www.sccrtc.org/move

transit project is delivered. This expense is not included in the cost estimate for the TCAA, so this revenue is not applied against the project cost during project development. After the project is delivered, this revenue (approximately $1.6 million/year) is applied against future rail preservation needs and is included in the cash flow model.

Rail Line Lease, Concession Revenue and Advertising

Revenue generated from leases of the rail property, as well as concessions and advertising are potential sources of funds for operations and maintenance. The amounts assumed ($750,000/year) are based on revenues earned by other transit operators of similar systems.

Rail Operator Maintenance Responsibilities Based on Freight Operations

The RTC currently has an administration, coordination, and license agreement with a freight rail operator to conduct common carrier freight rail operations on the Santa Cruz Branch Rail Line. Based on the existing agreement, the operator is required to maintain the ROW for portions that have been repaired up to a Class 1 track classification. Given the challenges with developing freight operations outside of Watsonville, maintenance expenses on the corridor paid by the rail operator are assumed to be $0 in the cash flow model.

Fare Revenue

Passenger fare revenue is also available to support O&M costs. Transit fares can be determined using a target farebox recovery rate, or ratio (percent of O&M cost covered by fare revenue) and/or using an achievable target "market" fare. The variation in recovery rates can be due to many factors, including but not limited to system size, system age, local labor costs, local transit mode share and ridership. Farebox recovery percentages are often low in the early years of a system's operation, particularly for new services. The vast majority of rail systems in the United States experience farebox recovery rates (FRR) of between 20 percent and 40 percent when mature. Ultimately, farebox recovery goals need to consider the impacts of higher fares on ridership and affordability especially for disadvantaged and underserved communities as well as the impact of lower fares on the need for a greater amount of local funds that would likely be needed.

For the cash flow calculations, it is assumed that fares are an average of $4.50 per rider, and ridership is based on consultant estimates of ridership in 2040 (7150 boardings/day weekdays and 2800 boardings/day on weekends). A growth rate of one percent per year is assumed for ridership beyond 2040. Similarly, a reduction in ridership of one percent per year is assumed for years prior to 2040.

6.3 OPTIONS TO ADDRESS ADDITIONAL FUNDING NEEDS

While the listing of funding options above is fairly extensive, given the current assumptions for the amount of funds from each of these federal, state or local sources, there is still a shortfall of funding to construct and operate this service. Additional funds will be needed from federal,

state, local, and/or private sources that are currently unidentified. Funds that could fill this gap include new federal and state programs that would fund transit projects or an increased amount of funds in existing programs. While difficult to predict the potential for future funding sources, funding for transit will likely increase in the future both on the federal and state levels. At the federal level, numerous policies and programs are under development with the new Biden-Harris administration. Legislation that embraces a climate resiliency approach to improving transportation infrastructure including alternative modes of transportation is being developed. This administration's Secretary of Transportation has an agenda that includes "investing in robust transit and transportation infrastructure" in both urban and rural communities. At the state level, Governor Newsom's recent Executive Order (EO N-79-20) directs state agencies to "Build towards an integrated, statewide rail and transit network, consistent with the California State Rail Plan, to provide seamless, affordable multimodal travel options for all."

An additional local source of funds is likely to be needed to match state and federal funds with local match requirements. Additionally, a local source will be needed to fund the remaining shortfall, particularly for operations and maintenance. A local source of funds could be a dedicated sales tax measure, which requires a 2/3 super majority of county voters similar to Measure D that was passed in November 2016 to fund various transportation projects. Other potential sources of local funds include funds from vehicle levy or registration fees, local fuel tax, property tax, income tax, transient occupancy tax, student fees, vehicle miles traveled charges, and parking fees.

The governing agency could also consider the possibility of seeking private financing for the work by forming a public private partnership (P3). As discussed in **Section 3. Governance** and **Section 5. Implementation**, P3 is a collaborative arrangement between a public agency and a private partner to deliver a public service or facility. The skills and assets of each sector are shared as are the potential risks and rewards. A P3 can take many forms and may involve the participation of the private partner in all or some of the components of a project. A P3 can allow a public agency to accelerate a project, improve performance and minimize costs by utilizing private sector expertise in building and operating a project. P3's are usually not formed until near the completion of the environmental document so the local governing body can maintain control over the project definition and can more effectively negotiate key aspects of the P3 relationship that are necessary to maintain public support, such as determining ticket prices and service patterns.

If the Commission is interested in a P3 relationship, RTC could issue a Request for Expressions of Interest to answer key questions about whether a P3 relationship and financing would be appropriate for Santa Cruz. If it is, RTC should complete preliminary engineering and be close to completing environmental review, in order to maintain the appropriate level of local control in defining the scope of the project.

The cash flow analysis shown in **Section 7**. **Funding Strategy - Cash Flow Model** presents one potential mix of sources, but it is quite likely that the mix will change as the project evolves. It is possible that more funding may be available through one funding program, and thus less funding will be needed from another funding program. For example, our cash flow analysis currently assumes that $100 million will be available through Capital Investment Grant 5309 over the next 25 years. That represents less than 25 percent of the total capital costs of the project. Some agencies have received significantly more than that through this funding source. There may be an opportunity to seek as much as 60 percent of the total project cost through the 5309 funds, which would shift the mix of other sources that are needed. These and other funding programs will be identified as the project continues to evolve and will be considered in updates to the cash flow analysis.

Table 6.1: Funding Programs & Amounts Assumed Accessible to Support Capital and Operations & Maintenance Costs over 25 Years

CAPITAL FUNDS	
FEDERAL SOURCES	REVENUE (Millions $)
Capital Investment Grant 5309	$ 100.00
Better Utilizing Investments to Leverage Development (BUILD) Grant	$ 15.00
Surface Transportation Block Grant (STBG)/RSTPX	$ 13.00
Consolidated Rail Infrastructure and Safety Improvements (CRISI)	$ -
Advanced Transportation and Congestion Mgmt Technologies Deployment	$ -
Railway Highway Crossing (Section 130)	$ -
Restoration and Enhancement Grants	$ -
STATE SOURCES	$ -
SB1 - Solutions for Congested Corridors Program (SCCP)	$ 52.00
Transit and Intercity Rail Capital Program (TIRCP)	$ 30.00
SB1 Local Partnership Program (LPP) - Competitive	$ 25.00
SB1 Local Partnership Program (LPP) - Formula	$ 1.35
SB1 State Rail Assistance (SRA)	$ 17.10
State Transportation Improvement Program (STIP)	$ 10.00
Trade Corridor Enhancement Program (TCEP)	$ -
Affordable Housing and Sustainable Communities	$ 10.00
STEP - Implementation	$ 7.00
TOTAL ASSUMED AVAILABLE - CAPITAL REVENUES	**$ 280.45**
TOTAL CAPITAL COSTS	**$ 478.00**
OPERATIONS AND MAINTENANCE FUNDS	
FEDERAL SOURCES	REVENUES (Millions $)
State of Good Repair Grants Program (49 U.S.C. 5337)	$ 9.00
STATE SOURCES	
State Rail Assistance (SRA) Intercity Rail/Commuter Rail-Formula	$ 5.50
SB1 Local Partnership Program (LPP) - Formula	$ 1.65
STA- New Service/Revenue-based (99314)	$ 2.43
SGR- New Service/Revenue-based (99314)	$ 0.40
LOCAL SOURCES	
Measure D: 2016 Sales Tax – Rail corridor system preservation/analysis	$ 17.6
Rail Operator Maintenance Responsibilities based on Freight operations	$ -
Rail Line Lease, Concession Revenue and Advertising	$ 8.25
Passenger Fare Revenue	$ 105.51
TOTAL OPERATIONS AND MAINTENANCE FUNDS	**$ 150.34**
TOTAL OPERATIONS AND MAINTENANCE COST	**$ 275.00**

7 - FUNDING STRATEGY – CASH FLOW MODEL

This section presents a cash flow model for implementing electric passenger rail on the Santa Cruz Branch Rail Line. A cash flow model is a detailed picture of the anticipated revenues and expenditures and can be used as a guide for determining the level of funding per year that is required to implement the project. The cost estimates used in the cash flow model for the various components of the project were presented earlier in Section 4 of this report. The revenues that are assumed available from various funding programs were presented in Section 6. The cash flow model will be maintained and updated regularly as the project develops. The discussion below emphasizes the expenses, assumed available revenue and unidentified revenue for the near-term components of the project. The cash flow presented below is based on 2020 dollars assuming that any escalation in expenses will be offset by growth in the revenues.

The cash flow model covers a 25-year time frame starting in Fiscal Year (FY) 21/22 and ending in FY 45/46. The cash flow model assumes that the first year (FY 21/22) would be used for seeking funding for the first component of the project. As presented in Table 1, Component 1 – Preliminary Engineering and Environmental Documentation is assumed to start in FY 22/23 and be completed in 4 years. Component 2 – Final Design and Permitting is assumed to start in FY 26/27 and be completed after 3 years. Component 4 - Construction is assumed to start in FY 29/30 and be completed after 6 years in FY 35/36.

Table 7.1: Cash Flow Scheduling Assumptions

Project Schedule (to be refined)	Start	End
Component 1, 1.1: Initial Conceptual Design and Operating Plan	FY 22/23	FY 22/23
Component 1, 1.2: Identify Critical Design Issues and Prepare Governance Strategy	FY 22/23	FY 23/24
Component 1, 1.3: Final Conceptual Design and Operating Plan	FY 23/24	FY 23/24
Component 1, 1.4: Environmental Documentation	FY 24/25	FY 25/26
Component 2: Final Design & Permitting	FY 26/27	FY 28/29
Component 3: Right-of-Way Acquisition (if needed)	FY 28/29	FY 28/29
Component 4: Construction	FY 29/30	FY 34/35
Component 5: Rail Vehicle Acquisition	FY 31/32	FY 34/35

Table 2 presents the details of the project expenses and assumed project revenues on a cash flow basis. From the revenue side, there are several different funding sources that may be available to support the project as discussed in Section 6. Many of the funding sources are available only for capital expenditures and most of those funds are only available for the construction and/or the vehicle procurement components of the project. A fewer number of funding sources are available for operations and maintenance. Many funding sources require matching funds typically between 10% and 20% although some funding programs do not require any match.

During the first four years of the project, starting in FY 22/23, all capital costs are focused on Component 1-Preliminary Engineering and Environmental Documentation, at an estimated cost of $17.1 million. The roughly $1.6 million/year generated by Measure D for the rail corridor has been used on various studies, including the Unified Corridor Investment Study (UCS) and the TCAA/RNIS. Funds have also been used to preserve the corridor which has included bridge inspections, a major bridge repair contract, and other infrastructure preservation activities. Measure D-Rail Corridor funds are needed to preserve this infrastructure which has many competing needs and limits the availability of funds for Preliminary Engineering and Environmental Documentation.

RTC is working with Caltrans Division of Rail and Mass Transportation (DRMT) on the possibility of fully funding the project's Preliminary Engineering and Environmental Documentation with a combination of state funding sources including the State Rail Assistance (SRA) program and/or Caltrans planning funding. These funds do not require matching funds. There may be other funding programs that could assist in funding environmental analysis. If one grant cannot be secured to fund the entirety of Component 1, the work could be funded and completed in sequence of iterative steps, as discussed in Section 6. The cash flow model assumes that Component 1 – Preliminary Engineering and Environmental Documentation is fully funded by the SRA program or similar funds available through California State Transportation Agency (CalSTA) and Caltrans.

After completing Component 1, the following 3 years are focused on Components 2 and 3 – Final Design, Permitting, and Right of way to get the project ready to construct. A total of $34 million is estimated for this component, spread over 3 years. Capital Investment Grant (CIG) funding will be sought for these project components along with funds for construction. This federal grant program can provide up to 60% of project costs. The matching funds requirement for the design, permitting and right-of-way components total approximately $13.5 million and could be acquired from a state source or a local source of funds. The cash flow model presents the federal Capital Investment Grant as the primary source of funds for Final Design/Permitting/Right-of-Way and the source of the matching funds as unidentified revenue of $4.35 million/year for 3 years. The total pre-construction cost is estimated to be approximately $51 million.

Construction is divided up over six years as shown in Table 2 with vehicle procurement occurring over the first four years of construction. The amount of construction funds needed for each year is currently divided up evenly, but this could vary as the project is developed. Construction costs are $364 million (including construction management and contingency costs) spread out over these six years and $64 million for vehicle procurement are spread out over the last 4 years of construction. Besides funds from the Capital Investment Grant program, funds would also be sought from both federal and state sources including the BUILD program, California state SB 1 Solutions for Congested Corridors and Local Partnership Program, as well as Transit and Intercity Rail Capital Program (TIRCP). Projects that are identified in the California State Rail Plan and that help to deliver regional and statewide rail network goals compete well for TIRCP funds. Electric passenger rail will help the state not only meet climate emission reduction goals but will also provide an equitable transportation option that serves the disadvantaged communities in Santa Cruz County – both of these benefits will rank this project high on the list for TIRCP funds.

Operations and maintenance funds are less available from federal and state sources and are expected to be funded primarily from local sources. Federal State of Good Repair funds are available as formula funds that can also be used for rehabilitation of rail infrastructure after 7 years of operations. There are three state sources of funds for O&M that are all formula funds, LPP formula (RTC discretionary funds), STA funds, and SGR funds. The local sources of funds that are assumed available for operations and maintenance are Measure D rail corridor preservation funds, rail line lease, concession and advertising income and passenger fare revenue.

The revenue and expense table provides an estimate of the unidentified funds that are still needed beyond the assumed available funds from existing funding programs or sources. Roughly half of the construction funds and half of the O&M funds are currently unidentified. Funds that could fill this gap include new federal and state programs that would fund transit projects or an increased amount of funds in existing programs. While difficult to predict the potential for future funding sources, funding for transit will likely increase in the future both on the federal and state levels. At the federal level, numerous policies and programs are under development with the new Biden-Harris administration. Legislation that embraces a climate resiliency approach to improving transportation infrastructure including alternative modes of transportation is being developed. This administration's Secretary of Transportation has an agenda that includes "investing in robust transit and transportation infrastructure" in both urban and rural communities. At the state level, Governor Newsom's recent Executive Order (EO N-79-20) directs state agencies to "Build towards an integrated, statewide rail and transit network, consistent with the California State Rail Plan, to provide seamless, affordable multimodal travel options for all." An additional local source of funds is likely to be needed to fund a shortfall from what is reasonably expected from existing fund sources, particularly for

operations and maintenance. A local source of funds could be a dedicated sales tax measure, which requires a 2/3 super majority of county voters similar to Measure D that was passed in November 2016 to fund various transportation projects. Other potential sources of local funds include funds from vehicle levy or registration fees, local fuel tax, property tax, income tax, transient occupancy tax, student fees, vehicle miles traveled charges, and parking fees.

Table 7.2: Electric Passenger Rail Transit Cash Flow of Estimated Revenues and Expenses ($Millions 2020)

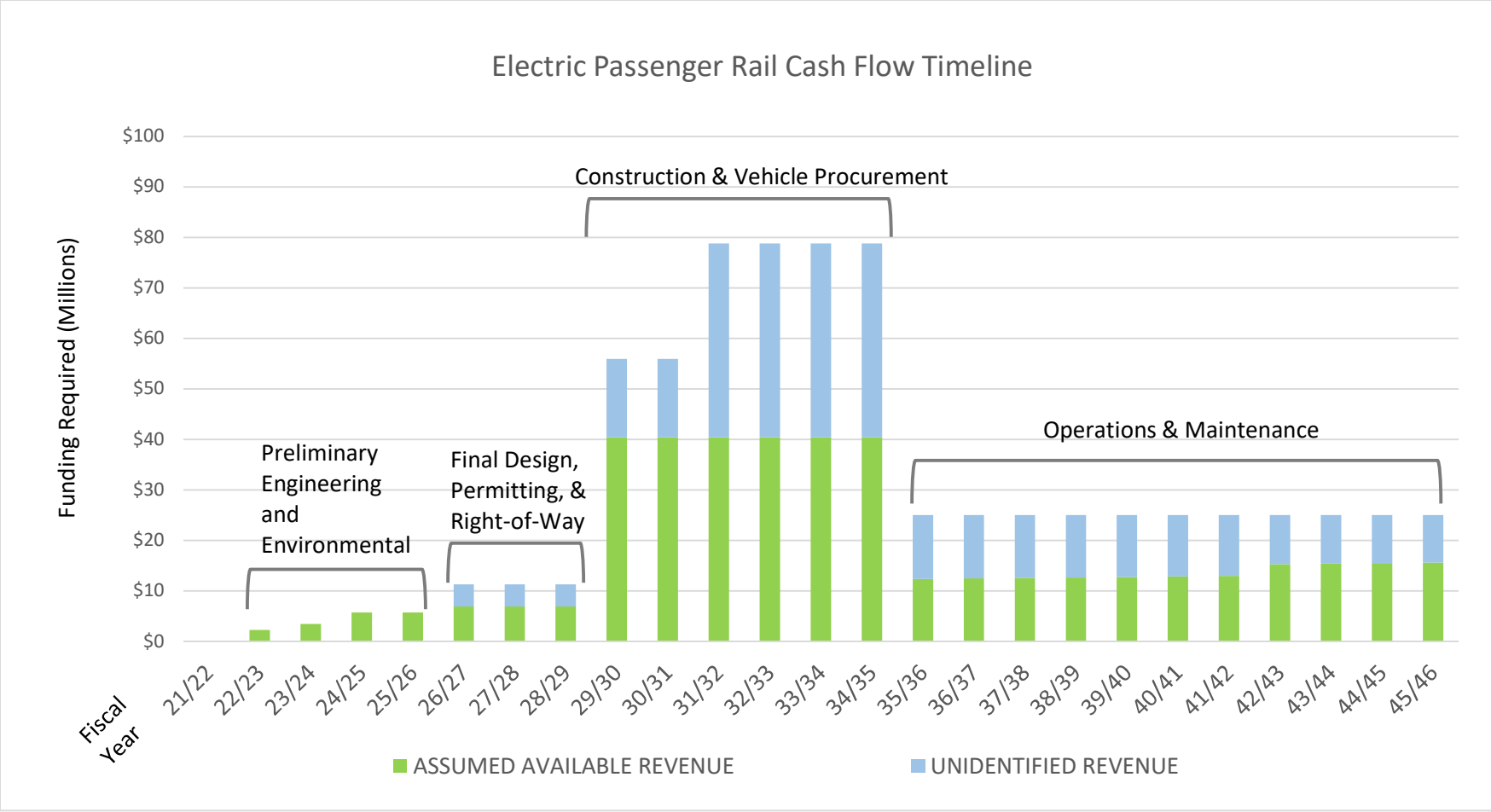
REVENUES	CAPITAL															OPERATIONS & MAINTENANCE										
	FISCAL YEAR	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	FY 33/34	FY 34/35	FY 35/36	FY 36/37	FY 37/38	FY 38/39	FY 39/40	FY 40/41	FY 41/42	FY 42/43	FY 43/44	FY 44/45	FY 45/46
FEDERAL	REVENUE (Millions $)																									
Capital Investment Grant 5309	$ 100.00	$ -	$ -	$ -	$ -	$ -	$ 6.76	$ 6.76	$ 6.76	$ 13.29	$ 13.29	$ 13.29	$ 13.29	$ 13.29	$ 13.29	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Better Utilizing Investments to Leverage Development (BUILD) Grant	$ 15.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surface Transportation Block Grant (STBG)/RSTPX	$ 13.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.17	$ 2.17	$ 2.17	$ 2.17	$ 2.17	$ 2.17	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
State of Good Repair Grants Program (49 U.S.C. 5337)	$ 9.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.25	$ 2.25	$ 2.25	$ 2.25
STATE SOURCES																										
SB1 - Solutions for Congested Corridors Program (SCCP)	$ 52.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.67	$ 8.67	$ 8.67	$ 8.67	$ 8.67	$ 8.67	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transit and Intercity Rail Capital Program (TIRCP)	$ 30.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SB1 Local Partnership Program (LPP) - Competitive	$ 25.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4.17	$ 4.17	$ 4.17	$ 4.17	$ 4.17	$ 4.17	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SB1 Local Partnership Program (LPP) - Formula	$ 3.00	$ -	$ -	$ -	$ -	$ -	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15	$ 0.15
SB1 State Rail Assistance (SRA)	$ 17.10	$ -	$ 2.28	$ 3.42	$ 5.70	$ 5.70	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
State Rail Assistance (SRA) Intercity Rail/Commuter Rail-Formula	$ 5.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50
State Transportation Improvement Program (STIP)	$ 10.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.67	$ 1.67	$ 1.67	$ 1.67	$ 1.67	$ 1.67	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Affordable Housing and Sustainable Communities	$ 10.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.67	$ 1.67	$ 1.67	$ 1.67	$ 1.67	$ 1.67	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
STEP - Implementation	$ 7.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.17	$ 1.17	$ 1.17	$ 1.17	$ 1.17	$ 1.17	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
STA- New Service/Revenue-based (99314)	$ 2.43	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ 0.22
SGR- New Service/Revenue-based (99314)	$ 0.40	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04
LOCAL SOURCES																										
Measure D: 2016 Sales Tax – Rail corridor system preservation/analysis	$ 17.60	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60	$ 1.60
Rail Line Lease, Concession Revenue and Advertising	$ 8.25	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75
Passenger Fare Revenue	$ 105.51	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 9.21	$ 9.30	$ 9.40	$ 9.49	$ 9.59	$ 9.68	$ 9.78	$ 9.88	$ 9.98	$ 10.08
TOTAL ASSUMED AVAILABLE - CAPITAL REVENUES	$ 280.45	$ -	$ 2.28	$ 3.42	$ 5.70	$ 5.70	$ 6.91	$ 6.91	$ 6.91	$ 40.44	$ 40.44	$ 40.44	$ 40.44	$ 40.44	$ 40.44											
TOTAL ASSUMED AVAILABLE - OPERATIONS AND MAINTENANCE REVENUE	$ 150.34															$ 12.38	$ 12.47	$ 12.56	$ 12.65	$ 12.75	$ 12.84	$ 12.94	$ 15.29	$ 15.39	$ 15.48	$ 15.58
TOTAL ASSUMED AVAILABLE REVENUE	$ 430.78	$ -	$ 2.28	$ 3.42	$ 5.70	$ 5.70	$ 6.91	$ 6.91	$ 6.91	$ 40.44	$ 40.44	$ 40.44	$ 40.44	$ 40.44	$ 40.44	$ 12.38	$ 12.47	$ 12.56	$ 12.65	$ 12.75	$ 12.84	$ 12.94	$ 15.29	$ 15.39	$ 15.48	$ 15.58
UNIDENTIFIED REVENUE	$ 322.12	$ -	$ -	$ -	$ -	$ -	$ 4.35	$ 4.35	$ 4.35	$ 15.48	$ 15.48	$ 38.36	$ 38.36	$ 38.36	$ 38.36	$ 12.62	$ 12.53	$ 12.44	$ 12.35	$ 12.25	$ 12.16	$ 12.06	$ 9.71	$ 9.61	$ 9.52	$ 9.42
TOTAL REVENUE	$ 752.90	$ -	$ 2.28	$ 3.42	$ 5.70	$ 5.70	$ 11.26	$ 11.26	$ 11.26	$ 55.91	$ 55.91	$ 78.80	$ 78.80	$ 78.80	$ 78.80	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00

EXPENSES	CAPITAL															OPERATIONS & MAINTENANCE										
Component 1 Preliminary Engineering & Environmental Documentation	$ 17.10	$ -	$ 2.28	$ 3.42	$ 5.70	$ 5.70	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Component 2 Final Design & Permitting	$ 33.78	$ -	$ -	$ -	$ -	$ -	$ 11.26	$ 11.26	$ 11.26	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Component 3 Right-of-Way Acquisition (if needed)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Component 4 Construction + Contingency	$ 363.52	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 55.91	$ 55.91	$ 62.92	$ 62.92	$ 62.92	$ 62.92	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Component 5 Vehicle Procurement (6 trainsets with 3 cars each)	$ 63.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15.88	$ 15.88	$ 15.88	$ 15.88	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Component 6 Testing, Commissioning, Operations and Maintenance	$ 275.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00
TOTAL EXPENSES	$ 752.90	$ -	$ 2.28	$ 3.42	$ 5.70	$ 5.70	$ 11.26	$ 11.26	$ 11.26	$ 55.91	$ 55.91	$ 78.80	$ 78.80	$ 78.80	$ 78.80	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00

Figure 7.1 presents a graph of the annual expenses needed over time as well the assumed available revenues and the amount of unidentified revenues needed to complete the project. The timeline for the various components of the project are presented with preliminary engineering and environmental documentation during FY 22/23 through FY 25/26, final design/permitting/right-of-way during FY 26/27 through FY 28/29 and construction and vehicle procurement during FY 29/30 through FY 34/35.

The most significant financial resources will be needed for the construction component from but there are also a great number of potential revenue sources that could be obtained to fund construction. Once the project is constructed, the funds needed will decrease substantially to the annual operations and maintenance expenses.

Figure 7.1: Anticipated Revenues and Expenses – Annual Increments Over 25 Years



8 - RISK IDENTIFICATION AND MITIGATION

Risk is inherent to any large-scale capital project. Actively managing risk is critical to objectively frame and guide decision making and to achieve the project's strategic objectives. The process of identifying risk is iterative, as is developing adequate risk mitigation strategies and management actions. A summary of the initial risks and mitigations identified to implement electric passenger rail on the SCBRL ROW are summarized below:

8.1 FUNDING

The availability of sufficient funds presents one of the key challenges to the delivery of the Santa Cruz Branch Rail Line (SCBRL) electric passenger rail program. As described in detail in **Section 6: Project Financing**, access to an ongoing, stable funding stream affects the ability to complete and operate the system. An unstable funding stream can impact the cost of the program, including via inflationary escalation, until sufficient funding has been identified for construction, as well as for operations and maintenance.

The early stages of project approval create the initial challenge of delivering an environmental document without a stable and dedicated funding source. Measure D, passed by the voters of Santa Cruz County in 2016 with more than 2/3 of the vote, is a multi-modal transportation program with a Rail Corridor category receiving 8 percent of the revenue. The Rail Corridor category provides funding for infrastructure preservation and analysis of transit options on the SCBRL. The Measure revenues do not include funding for any new train/rail service, but the funding can be used on environmental analysis.

The roughly $1.6 million generated annually by Measure D for the rail corridor has been used on various studies, including the Unified Corridor Investment Study (UCS) and the Transit Corridor Alternatives Analysis and Rail Network Integration Study (TCAA/RNIS). Funds have also been used to fund efforts to preserve the corridor, which have included bridge inspections, a major bridge repair contract, and other infrastructure preservation activities. Measure D Rail Corridor funds are needed to continue the work to preserve this infrastructure, which limits availability to fund an Environmental Impact Report (EIR), estimated at $17.1 million. Therefore, RTC will seek a different funding source to fully fund preliminary engineering and environmental analysis.

Meeting the 2/3 voter threshold for approval of a new dedicated local tax for a project of this magnitude prior to completion of an EIR could be difficult. Work to complete an EIR will include developing plans to 30% completion, provide for more accurate cost estimates, and provide

final analysis of project impacts. This level of detail is generally needed to produce enough understanding necessary for voters to feel properly informed when considering approval of a tax measure. Therefore, RTC will seek state or federal fund sources to prepare an EIR.

There are limited State and Federal funding programs that permits funds to be used on pre-construction activities such as an EIR. Additionally, most funding programs have local match requirements, which has made it historically challenging to identify funding programs to fully fund an EIR. RTC's other discretionary state and federal funding programs, such as the TDA, STIP, LPP formula, and STBG/RSTPX programs are currently committed to Santa Cruz METRO, the Highway 1 program, and local streets and road maintenance. RTC is working with Caltrans on the possibility of fully funding the project's EIR with a combination of state funding sources including the State Rail Assistance (SRA) program, which does permit funds to be used to fully fund an EIR. There may be other future funding programs that could assist in funding an EIR, if the SRA grant is not secured. Fully funding an EIR with grant funds would allow the governing agency to defer the need for a local dedicated funding source for several years, while preliminary engineering and environmental analysis work is completed to more fully define the project.

Funding could remain the biggest risk for the electric passenger rail project, even if an EIR can be funded without a new revenue source. A new dedicated local funding source will be needed for local match requirements for most federal and state grant funding programs and to close the anticipated gap in funding. However, the trend towards more sustainable transportation funding programs provides considerable optimism that more state and federal funds could be made available to fund both capital and O&M activities. Securing grant funding and completing funding plans early is critical to avoid delays to the anticipated schedule. RTC will need to consider strategic planning decisions, such as building the project in stages. Identifying a potential initial operating segment (IOS), is a means of mitigating the risk that enough grant funding may not be available to fund the construction of the full project in one segment.

8.2 COMPATIBILITY WITH FREIGHT RAIL, RECREATIONAL RAIL AND TRAIL ON THE SCBRL ROW

The SCBRL is part of the national freight network, with a private operator owning the freight easement with common-carrier freight obligations. RTC has an administrative, coordination and license (ACL) agreement with the operator to provide freight and recreational rail service. The ACL provides RTC's use of the property to construct public projects of any kind (including but not limited to a trail or rail transit) provided that RTC does not interfere with the rail operator's rights and operations under the ACL or their rights and obligations under federal law or under the freight easement. These limitations create risks for the construction and operations of both the rail transit and trail projects on SCBRL segments where freight traffic exists.

There has been strong community support for an active transportation facility (bicycles and pedestrians) on the SCBRL. In 2013, RTC completed the Monterey Bay Sanctuary Scenic Trail (MBSST) Master Plan and associated programmatic EIR, with the SCBRL serving as its spine. RTC and its local agency partners are developing the spine, or primary alignment, of the MBSST Network as a parallel facility to the existing 20-foot freight rail easement, within the rail right-of-way, to the extent possible.

Coordination of these four uses (freight rail, recreational rail, rail transit, and trail) is necessary to avoid the risk of increased cost and delay to the rail transit project. Maintaining freight and recreational rail service on applicable segments during rehabilitation of the rail infrastructure for the purpose of rail transit could add significant scope, cost and delay to the rail and trail projects.

The SCBRL right-of-way width varies considerably along the 32-mile long branch line. Significant portions of the SCBRL abut private residences and/or are located on or adjacent to challenging geography and land conditions. The location of the existing track is generally close to the center of the right-of-way, which does not always allow for the maximize use of the corridor's limited width. If sufficient width is not available or geographical conditions create the need for unaffordable infrastructure or other undesirable impacts, the trail could need to detour off the SCBRL right-of-way.

RTC and its partners have started preliminary engineering and environmental review on significant portions of the rail trail, as stand-alone projects, where the trail will be located on either side of the existing rail tracks as to not materially interfere with the freight operator's rights and obligations. Significant investment in retaining walls, bridges, drainage structures, vegetation removal and other aspects of trail construction could occur prior to the determination of the optimal horizontal and vertical alignment of track for the electric passenger rail transit project. Additionally, rail transit features, such as stations and passing sidings, may also detour the trail off the SCBRL, due to insufficient right-of-way width. Failure to coordinate all uses of the right-of-way could lead to additional cost for re-work or building around one use to accommodate another use.

To mitigate this risk, RTC will need to work closely with the freight and recreational rail operator to seek opportunities to design, construct and operate the new rail transit system in a manner that does not materially interfere with the service rights granted by the ACL and the freight obligation regulated by the STB. These measures may add time and cost to the project for additional track and infrastructure needed to accommodate the multiple rail services. RTC should also consider advancing and coordinating preliminary engineering of the rail transit project with the trail project in a manner that could allow adjusting the track location to

optimize use of the corridor, such that major infrastructure is minimized, use of the corridor is maximized, and detours of the trail off the SCBRL right-of-way are minimized.

8.3 STAKEHOLDER SUPPORT

There is much support for electric passenger rail in the Santa Cruz County community, but there is also some opposition. Public and/or private opposition to development of passenger rail service on the SCBRL ROW and related facilities required for implementation could have impacts related to communications, scoping, scheduling, and budgeting.

It is imperative that RTC continue to work diligently with the communities and stakeholders along the alignment and countywide to ensure a transparent public process. Maintaining strong public support at all levels through education and outreach is vital to the rail system's success. Clearly articulating the plan for the project as well as the benefits, costs, and impacts, will be vital for maintaining support for the project. Design or other project modifications can be communicated through regular contact with regional partners, stakeholders, and the community.

At the state level, ongoing communication with Caltrans Division of Rail and Mass Transportation and other state agencies ensures that current and factual information is shared. At the county and neighborhood levels, outreach activities could include, webinars, open houses, regular community meetings, community and technical working groups, community and stakeholder outreach specific to each project section, internal and external fact sheets and other information tailored to specific issues areas, digital engagement across social media platforms including video, animations, graphics, and regular one-on-one connections. Regular stakeholder and/or public meetings facilitate communication and build relationships between RTC and public participants and ensure that system designs and plans address community issues and concerns. Considering stakeholder and public input throughout the process and endeavoring to reach community consensus will minimize impacts to the project.

8.4 ORGANIZATIONAL DEVELOPMENT

Addressing the organizational framework of the RTC and any future agency tasked with delivering and/or operating a major rail transit project is necessary to effectively meet the goals of the project. RTC will be actively using an organizational expert to assess itself. RTC will implement recommendations, as needed, to ensure it has the organizational capacity and expertise needed to provide management and oversight of upcoming strategic planning and project delivery functions associated with the rail transit project, as well as its other on-going responsibilities. Broad areas assessed for development include strategic planning, engineering, project delivery management, contract management, construction management, and project controls.

8.5 PROGRAM AND PROJECT DELIVERY RISK

The TCAA/RNIS and the 2015 Rail Transit Feasibility Study have helped define a rail transit project that will advance through environmental review, design, and construction. More advanced scoping and engineering will lead to a more refined project definition, which may result in changes to previous assumptions about the project. Changes in a defined project scope will usually result in impacts to the project cost and schedule, so effective project delivery methods are critical in managing this risk. There are unique risks associated with each specific components of project delivery.

Engineering and Design

It is critical to complete an adequate level of preliminary engineering to create a stable project definition identifying the track alignment, bridge and other structure work, drainage improvements, and the locations and extent of stations, passing sidings and a maintenance and operations facility. Using the existing infrastructure to the greatest extent possible will help control the initial capital cost of the project, however overly relying on infrastructure re-use may lead to greater O&M costs or result in unreliable service.

The existing track infrastructure was constructed and maintained to serve freight rail with occasional recreational use by slow-moving trains. To serve the needs of a modern transit system, there could need to be improvements made to the horizontal and vertical alignment of the track. If existing rail bridges are retained, the track alignment at bridge locations will need to be considered. However, replacing some bridges on a modified alignment allows for potential adjustments in the overall track alignment as part of an overall strategy to maximize the efficient use and compatibility of the corridor with its various planned uses (See section 8.2 above).

Within the limits of the proposed transit project, the SCBRL has 24 railroad bridges. Many of these bridges are near the end of their useful service life. RTC is currently working to identify bridge rehabilitation needs, so that freight and recreational traffic can resume on the line. RTC will need to conduct additional inspection, loading assessments, and perform a life-span analysis of existing bridges to help guide early decisions on the final bridge replacement and retrofit work to include in the project's scope. RTC will need to develop and implement a clear process for making decisions on restoring or replacing certain critical infrastructure. This process will need to include careful consideration of potential environmental, community, cost, performance, and schedule impacts.

Throughout design, RTC will perform value engineering to identify ways to mitigate the cost risk associated with the design of the project. Design teams will seek innovative ways to produce a design that delivers the maximum value, without reducing the project's functionality.

Environmental Analysis

The environmental review process is the main opportunity for the public and government stakeholders to understand and comment on the proposed project, including the potential impacts associated with construction and operations. It is important for RTC to engage all stakeholders early, so that the preliminary engineering can be done in a way that avoids significant impacts, where possible, and adequately identifies mitigation measures that may be required to offset unavoidable impacts. RTC will need to work with a large number of cooperating and responsible federal, state, and local agencies to address concerns potential impacts and mitigation. These include agencies such as the Surface Transportation Board, the U.S. Army Corp of Engineers, the U.S. Fish and Wildlife Service, the Federal Railroad Administration, the Federal Transit Administration, the California Department of Fish and Wildlife, the State Lands Commission, the State Water Resources Control Board, the California Coastal Commission, the California Public Utilities Commission, and the Santa Cruz County Department of Environmental Health. Often, the interests of different agencies are competing, so it is advisable to concurrently engage with all agencies to fully understand, identify and quantify impacts and associated mitigation that may be required.

Right of Way

Although the main alignment of the track is expected to fit within the existing SCBRL right-of-way, there are features of the rail transit project, such as passing sidings, stations, and a maintenance and operations facility, that may require RTC to acquire additional right-of-way. Additional right-of-way needs can be costly and/or controversial and require time to acquire. Initial right-of-way needs will be identified during preliminary engineering, but it is advisable to advance design to at least 60% complete, before beginning the costly process of appraising and making offers on properties, including easements determined necessary for construction and drainage.

Coordinating the disposition of utilities that may conflict with the construction of the rail transit project is considered part of the right of way component of project delivery and should be started early to prevent unnecessary delays to project construction. Determination of easement rights is critical in understanding financial liability for potential utility relocations. RTC will conduct an extensive review and search for all third-party utilities and verify records by performing field surveys. RTC will work with third-party utility owners to relocate all utilities, prior to the start of construction, wherever possible. RTC will include specifications and allowances for remaining utilities as part of the construction contract, in order to avoid delay claims. Strong relationships and frequent communication are needed to avoid potential delays by utility companies.

Depending on the project impacts and required mitigation, the project may need to acquire off-site environmental mitigation. Early work will be done to identify any anticipated off-site

environmental needs and potential sites. It can be difficult to find locations that are acceptable to regulatory agencies. A pro-active approach to identifying, negotiating, and acquiring all off-site mitigation, before the start of construction, will minimize the cost to the project.

Construction

There are inherent risks associated with the construction component of any project. Delays and unanticipated work during the construction phase can lead to increased cost. Construction reviews will be done throughout the design component of the work to identify construction needs, such as access to work locations and identification of staging areas. RTC will coordinate any proposed mitigation measures, including seasonal work windows, with construction experts to understand and mitigate the impacts. Construction review of the contract specifications with respect to permit requirements is critical in ensuring that the construction contractor can properly bid the work.

There are several project delivery methods that the governing body can seek, in order to transfer certain risk to the contractor. Although the business plan is built on an initial assumption of design-bid-build, in order to maximize local control, other delivery methods such as design-build and construction management general contractor (CMGC) are often effective in managing and controlling the risk of expensive claims during the construction component of the work.

8.6 RIDERSHIP REVENUE

Inaccurate ridership forecasts could affect funding assumptions, increasing the reliance on public funding and potentially damaging stakeholder support. Travel demand modelling must incorporate the latest developments in ridership estimating and assessing travel network forecasts. Systematic updates to the Santa Cruz County travel model will allow ridership estimates to be reevaluated periodically. RTC will consider ridership during the design of the station locations and service plans to help mitigate this risk. A strong communications and marketing plan will be employed as the project nears completion and enters operations to help encourage ridership.

8.7 FUTURE RISKS REGARDING NEW TECHNOLOGY

New information and new technology are continually being developed as it relates to the design of track, equipment, and systems for rail transit operations. Potential risk that electric commuter rail equipment appropriate for the SCBRL will not be available to meet the implementation schedule may have specific scheduling and budgeting impacts. The potential mitigation measures will include conducting proactive coordination with equipment manufacturers during contracting and project development to identify and mitigate any potential delays in production, testing, and delivery. Potential opportunities will include lease of

available equipment for use on an interim basis and/or working with Caltrans to procure rolling stock through their rolling stock procurement branch.

8.8 LITIGATION RISKS

Given the magnitude of the project and the broad base of stakeholders, litigation on the project may arise in the future. These include potential litigation related to project funding, environmental clearances, potential property acquisition, and contract disputes. As the program advances, working closely with affected stakeholders to address issues before they become formal lawsuits will be critical. In addition, the practice of using alternative dispute resolution processes, such as mediation or arbitration, can be used where possible.