FRA CRISI 2019
Agreement 69A36521502560CRSCO

Southwest Chief Thru-Car Alternatives Analysis: Alternatives Analysis Report

Prepared by: AECOM Technical Services, Inc.

Prepared for: Colorado Department of Transportation

Date: March 20th, 2025

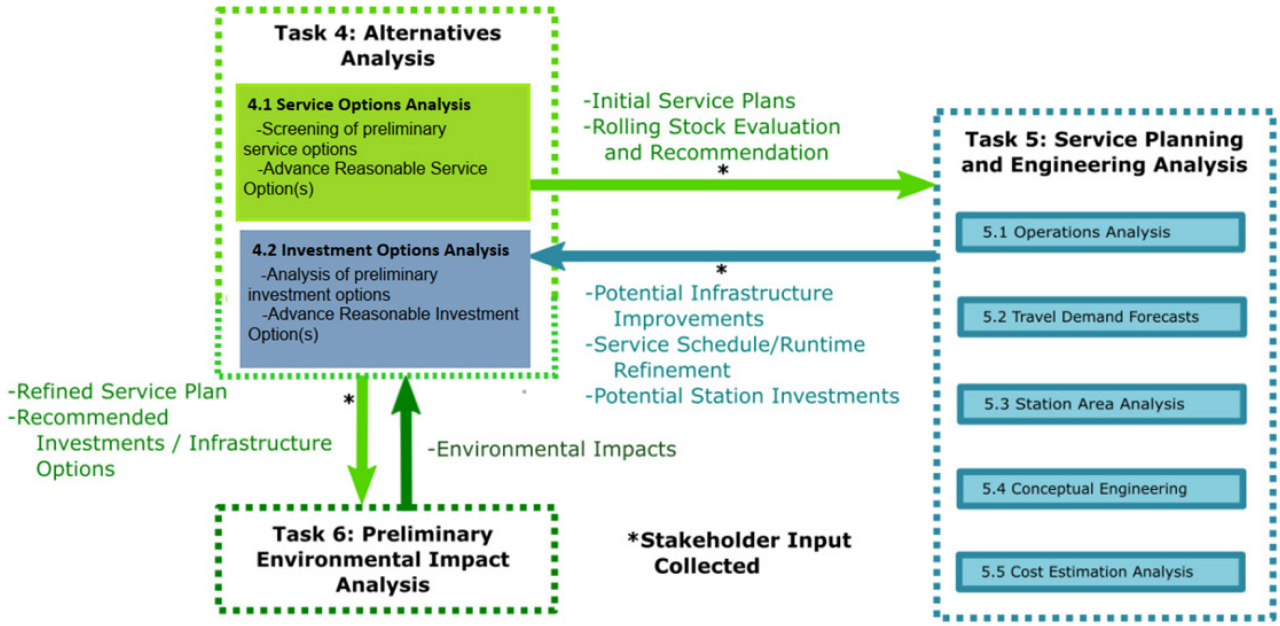
Contents

4.0 Alternatives Analysis

The purpose of this report is to summarize the results of the Task 4: Alternatives Analysis of the Southwest Chief Thru Car Alternatives Analysis Project. Task 4 was undertaken concurrently with and supported by **Task 5 Service Planning and Engineering Analysis** and **Task 6 Preliminary Environmental Impact Analysis**. Stakeholder coordination also informed recommendations for reasonable alternatives. The team worked with Front Range Passenger Rail Service Development Plan project team (FRPR SDP), Front Range Passenger Rail District (FRPRD), Federal Railroad Administration (FRA), BNSF Railway (BNSF), Union Pacific Railroad (UP), Amtrak, and within Colorado Department of Transportation (CDOT) and other organizations to develop reasonable alternative(s) for FRA's approval. The goal of this task is to document the analysis process that led to identification of a reasonable alternative which could be carried forward into future project development phases. This report is based heavily on **Task 5: Service Planning and Engineering Analysis** which detailed the recommended service option and investment option. Additionally, because the rail planning landscape in Southern Colorado has changed since the grant scope development, this report briefly discusses integration with future Front Range Passenger Rail (FRPR) and future connectivity options that could be appropriate given results of this study.

Figure 1 depicts how Tasks 4, 5, and 6 are associated. Screening of preliminary service options was undertaken within the Task 5 Service Planning and Engineering Analysis. Identification of infrastructure investment options to accommodate the advanced service option was completed within Tasks 5 and 6.

Figure 1. SWC Alternatives Analysis Process



4.1 Service Options Analysis

4.1.1 Introduction

Six preliminary service options of varying service levels were identified to connect Colorado Springs and/or Pueblo to the eastbound and/or westbound Amtrak Southwest Chief at La Junta station. The proposed schedule of SWC Connector service would be temporally linked to the scheduled daily Southwest Chief stop(s) at La Junta station. Each service option consists of a service level (number of trains per day, typically expressed in roundtrips), daily

service initiation/overnight layover locations (Colorado Springs, Pueblo or La Junta), and operating plan (dwell pattern and timetable for Connector arrivals and departures at each station stop). The routing for all options is assumed to utilize the existing BNSF Pueblo and Boise City Subdivisions in the Pueblo – La Junta segment and a combination of BNSF Pikes Peak and UP Colorado Springs Subdivisions for the Pueblo-Colorado Springs segment, which are currently operated as a joint facility. Preliminary service option diagrams and timetables can be found on pages 2-4 of **Attachment A.**

4.1.2 Service Options Screening Results and Recommendations

Service Option Analysis involved a two-stage screening process which qualitatively evaluated service options against Purpose & Need and stakeholder input (Stage 1) and remaining service options were screened against FRA-approved evaluation criteria (Stage 2). Stage 1 screening results are below in **Figure 2.**

Figure 2. Stage 1 service option screening matrix

Preliminary Service Options Screening Stage 1 Evaluation and Results

Preliminary Service Options have been scored on how they address the five Project needs, identified during the Purpose & Need phase of the project. Preliminary Service Options advanced from this stage will be subject to more detailed screening based on FRA-Approved Evaluation Criteria.

Project Needs / Preliminary Service Options	Provide transit Service to additional markets	Provide additional safe, reliable, efficient travel choices	Support tourism and economic development	Advance a longer-term passenger rail vision	Provide safety improvements and modifications to the rail corridor	RESULT
SO1 Two daily roundtrips servicing eb and wb SWC (COS-PLO-LAJ)	🟢	🟡	🟢	🟢	🟢	*Advance*
SO2 One daily roundtrip servicing eb SWC (COS-PLO-LAJ)	🟡	🔴 / 🟡	🟡	🟢	🟢	Eliminate
SO3 One daily roundtrip servicing wb SWC (COS-PLO-LAJ)	🟡	🔴 / 🟡	🟡	🟢	🟢	Eliminate
SO4 One train per day servicing wb SWC (Alternating Days: LAJ-PLO-COS, COS-PLO-LAJ)	🔴	🔴	🔴 / 🟡	🟢	🟢	Eliminate
SO5 One train per day servicing eb SWC (Alternating Days: LAJ-PLO-COS, COS-PLO-LAJ)	🔴	🔴	🔴 / 🟡	🟢	🟢	Eliminate
SO6 Two daily roundtrips servicing eb and wb SWC (PLO-LAJ)	🟡	🟡	🟡	🟢	🟡 / 🟢	*Advance*

🔴 = Does not meet project need 🟡 = Somewhat meets project Need/further analysis needed 🟢 = Meets project Need effectively

1

Each service option was evaluated on a Red/Yellow/Green scale according to the primary and secondary needs. The evaluation scale is based on a given option's effectiveness in meeting criteria, as follows:

- Red = Meets project need least effectively
- Yellow = Somewhat meets project need, or further analysis needed
- Green = Meets project need effectively

All Service Options were deemed to advance a long-term vision for passenger rail in Southern Colorado, and all would provide safety improvements to the rail corridor.

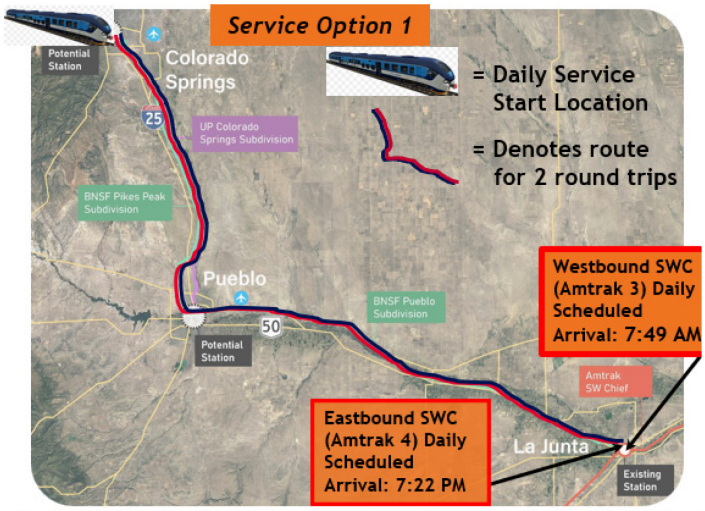
Service Option 1 achieved the highest level of service with two daily round trips and most connectivity of all options. Passengers would be able to connect with both daily eastbound and westbound SWC trains. At that level of service, Service Option 1 would represent a potential viable option for Amtrak riders on the SWC to reach those cities, bringing in visitors and their spending. Compared to Service Option 6, it has the advantage of a single-seat trip to Colorado Springs, extending Amtrak service to two currently unserved markets. The two daily round trips would allow for a hypothetical traveler to reach Colorado Springs and arrive back in La Junta in a single day. Service Option 1 was advanced for further study.

Service Options 2 and 3 ranked lower with a single round trip per day each, but ultimately both would be unreliable for passengers. This would especially be true for Service Option 2 as the eastbound SWC has worse on-time performance than the westbound SWC. They provide new rail service to Colorado Springs and Pueblo, but to a significantly less degree. With each alternative timed with a SWC train in a single direction, these options may only prove attractive for SWC riders from either an eastbound or westbound train, but not both. Fewer trips would mean fewer travelers and less economic development. Both options were eliminated.

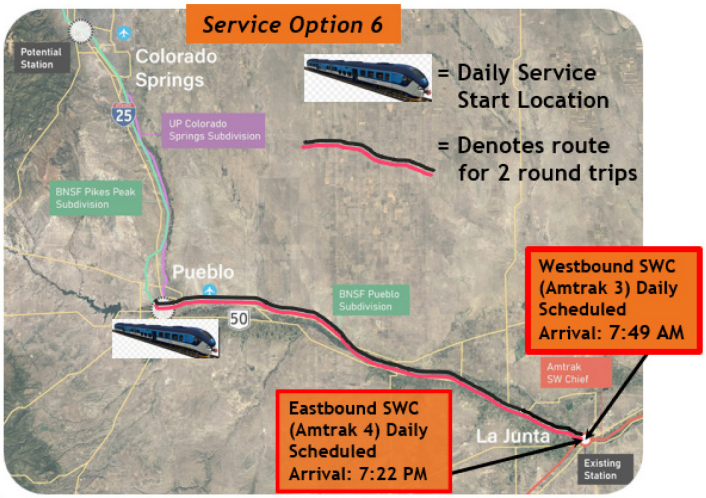
As Service Options 4 and 5 also had the limitation of being timed to a SWC train in either east- or westbound direction but had the added limitation of a single train trip per day, they scored the lowest and were eliminated. This level of service would not be reliable for riders and would have lesser economic and tourism effects.

Service Option 6 was advanced as it represented a potentially practical alternative given the state of rail planning in Southern Colorado and consideration that Colorado Springs – Pueblo rail service was being planned as part of the FRPR SDP. Diagrams for the advanced service options is below in **Figure 3**.

Figure 3. Service Diagrams for Service Options 1 and 6



Conceptual Timetable (assumes on-time SWC)	Through Car (Eastbound)	Through Car (Westbound)	Through Car (Eastbound)	Through Car (Westbound)
	Arrival/ Departure	Departure/ Arrival	Arrival/ Departure	Departure/ Arrival
Colorado Springs	-- 5:25 am	-- 10:34 am	-- 4:58 pm	-- 10:02 pm
Pueblo	6:10 am 6:15 am	9:43 am 9:38 am	5:43 pm 5:48 pm	9:11 pm 9:06 pm
La Junta	7:34 am --	8:19 am --	7:07 pm --	7:47 pm --



Conceptual Timetable (assumes on-time SWC)	SWC Connector (Eastbound)	SWC Connector (Westbound)	SWC Connector (Eastbound)	SWC Connector (Westbound)
	Departure/ Arrival	Arrival/ Departure	Departure/ Arrival	Arrival/ Departure
Pueblo	6:15 am	9:38 am	5:48 pm	9:06 pm
La Junta	7:34 am	8:19 am	7:07 pm	7:47 pm

4.1.2.1 Second Stage Evaluation

The Second Stage Evaluation further refined and narrowed down the feasible alternatives for advancement. The criteria were used to score SO1 and SO6 based on a Meets Criteria/Somewhat Meets Criteria/Does Not Meet

Criteria scale. These criteria address the five project needs and allow the team to rank remaining preliminary service options.

1. **Connectivity:** Qualitative evaluation given the new passenger rail connections and expected level of ridership created by each preliminary alternative.
2. **Service Reliability:** Qualitative evaluation considering potential utility of the Connector service alternative in context of reliability and performance, measured by on-time performance and average time late data of the existing Southwest Chief service.
3. **Effects to Freight Network:** Each alternative may result in adjustments to freight operations and infrastructure considering the number of newly added passenger trains per day to their network, and the time of day which the passenger trains would operate.
4. **Environmental:** Considers potential for alternatives to have adverse impacts on the existing natural and built environment.
5. **Financial and Economic Factors:** Alternatives with higher connectivity and frequency likely create more ridership and economic activity but cost more to implement and operate.
6. **Project Readiness:** Considers the immediate viability of each alternative with consideration for future planned passenger rail within the corridor

As shown in **Figure 4** below, SO6 scores better than SO1 across the six criteria. Although SO1 provides more seamless connectivity, SO6 was a more "Project Ready" option that allowed FRPR SDP and SWC Thru-car efforts to continue without interfering with each other which would introduce major scope and schedule modifications. Additionally, combined with planned FRPR service, SO6 riders would have a similar level of connectivity compared to SO1.

Figure 5. Secondary Screening Matrix

Evaluation Criteria \ Preliminary Service Option	Preliminary Service Option 1 (LAJ-PLO-COS)	**Preliminary Service Option 6 (LAJ-PLO)**
Connectivity	●	○
Service Reliability	○	○
Effects to Freight Network	○	●
Environmental Impacts	●	●
Financial & Economic	○	○
Project Readiness	○	●

○ = Somewhat meets criterion ● = Meets criterion effectively

Ridership projections were developed for the advanced service option and are presented below. More detail on the process and assumptions for ridership forecasting can be found in **Section 5.2 of Task 5 Service Planning and Engineering Report.**

OVERALL RIDERSHIP FORECAST (IN-STATE AND OUT-OF-STATE)

- Assumes percentage of east and westbound Southwest Chief riders would disembark at La Junta to utilize the SWC Connector service, westbound to Pueblo and, ultimately, eastbound back to La Junta.
- 450 annual in-state travelers
- Statewide Transit Assumptions - 10 daily FRPR round trips, 3 daily mountain rail round trips, existing and future Bustang services

% Travelers disembark for SWC Connector	WB SWC Connector (2 daily trains La Junta to Pueblo)	EB SWC Connector (2 daily trains Pueblo to La Junta)	Daily Riders[1]	Yearly Ridership
5%	21	21	42	15,100
10%	41	41	82	29,650
15%	61	61	122	44,250

1. Split between 4 daily trains

During the decision-making process to advance the Pueblo – La Junta service option, the FRPR SDP was moving forward with service options and eventual operations modeling for the entire Fort Collins – Pueblo corridor. CDOT, with stakeholder support and under direction from state leadership, was advancing FRPR service development planning as quickly as possible. Projecting promising benefits, FRPR was earmarked as a major priority for the state.

Related to key milestones and schedules, intertwining FRPR and SWC Thru-car infrastructure planning along the Colorado Springs – Pueblo segment would have delayed results and progress for the priority project, FRPR. The FRPR SDP is a key document to inform a potential ballot measure to help fund for the system, and the state was aiming for a fall 2024 ballot initiative. Considering those realities, in addition to low preliminary ridership forecasting results and a non-committal position from Amtrak, it was decided not to intertwine the planning efforts and have SWC Thru-car focus on the Pueblo – La Junta segment.

Since that decision in 2023, the state has determined the first phase of FRPR would operate between Fort Collins and Denver although the SDP will cover Fort Collins – Pueblo. While timing and project development beyond the SDP for Denver – Pueblo is not clear, there is an opportunity to evaluate, outside of this CRISI grant, whether a SWC Connector service between Colorado Springs – Pueblo – La Junta could be a catalyst and starting point that FRPR could eventually build from. However, considering the realities of rail implementation duration, there are tradeoffs to progressing multiple major intercity service deployments, such as capacity of railroad stakeholder staff to support timely planning.

In closing, the advanced Pueblo – La Junta service option is a reasonable recommendation within the CRISI grant scope, and most closely met purpose and need while considering planning realities. Detail on future connectivity options, which were not within the scope of the CRISI grant, are discussed in Section 4.3 of this report.

4.2 Investment Options Analysis

4.2.1 Introduction

This section details the Investment Options Analysis, which assesses physical investments for the advanced service option identified in Task 4.1. The report identifies investment options that would be carried forward for further analysis under subsequent phases of project development. The effort was completed in coordination with BNSF, UP, Amtrak, and other stakeholders, and appropriate input is incorporated associated with Stakeholder Engagement as part of Task 2. Investment options, related to capacity, safety and operational fluidity, were identified based on modeling consensus with the railroad owner. The infrastructure improvements accommodate the new SWC Connector passenger service without degrading existing and future scenario (2% growth) freight service.

Outside of the infrastructure investment components considered in this grant, there are improvements assumed to be led by the FRPR project. It was assumed that SWC Connector service would be accommodated by FRPR station improvements at Pueblo Union Depot as FRPR is planning a substantial level of service (10 daily roundtrips, Fort Collins – Pueblo). The team coordinated with Pueblo Station Area Plan team early in the study process to include adequate platform capacity for both services, including spatial considerations for a future SWC re-route. See **Task 5 Service Planning and Engineering Report, Section 5.3.4.2** for more detail. If the SWC Connector project were to move into further project development, more analysis would be needed to confirm platform capacity and consider impacts from the SWC Connector service. It was also assumed that SWC Connector trains would share a layover/maintenance facility with FRPR. Again, if SWC Connector project were to move into further project development, more analysis would be needed.

4.2.2 Investment Options Screening Results and Recommendations

This section summarizes the process which led to recommended investment options. Operational, cost and environmental factors were considered when evaluating infrastructure investment options:

• Operational: considers freight delay caused by the introduction of passenger service, and passenger service on-time performance.

• Cost: considers conceptual cost estimates of potential infrastructure improvements.

• Environmental: considers potential impacts that a given infrastructure improvement alternative would cause.

There are improvements needed to launch passenger service, regardless of service level, such as Positive Train Control (PTC) and Centralized Traffic Control (CTC) for safety and operational fluidity. There are also improvements related to capacity, such as length and number of siding tracks and siding track extensions. However, the cost of some ‘passenger service-launch’ improvements is linked to capacity improvements. For example, trackside improvements associated with PTC and CTC must be performed for any new siding track improvements, turnouts, etc.

A no-build plus three proposed infrastructure packages were considered within the investment option analysis process: BO1 (No-build), BO2 (1,000’ siding), BO3 (8,000’ siding), and BO4 (16,000’ siding + siding extensions). Process and description for each package can be found in **Section 5.1.5 of Task 5 Service Planning and Engineering Report.** Resulting from the iterative process of modeling and infrastructure improvement, in addition to evaluation factors of cost and environmental, the team determined Package BO4 would be most appropriate to analyze at a higher detail of conceptual engineering and cost estimating. BO4 didn’t degrade freight service and enabled the SWC Connector to run reliably, as seen in **Figure 5** below and described in **Section 5.1.5 of Task 5 Service Planning and Engineering Report.** As seen in **Figure 6**, the high-level evaluation ranked infrastructure packages against operational, environmental and cost factors.

Figure 5. Average Freight Train Delay for Infrastructure Package Options

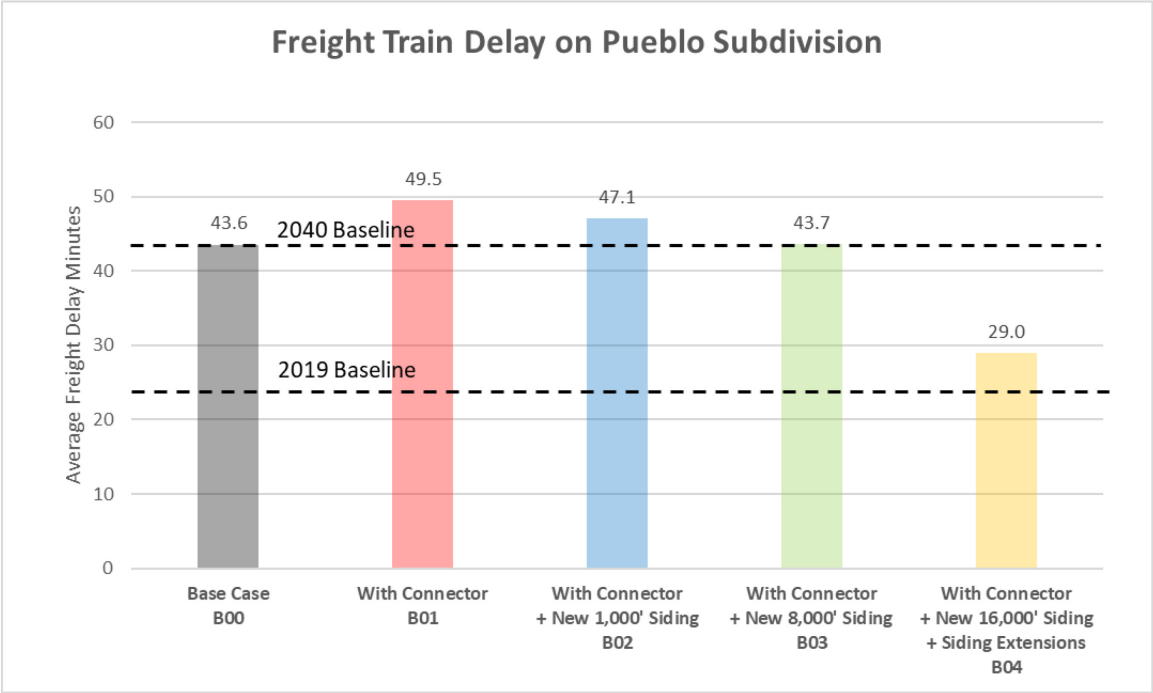


Figure 6. Average Investment option screening

Preliminary Investment Option / Evaluation Factor	Infrastructure Investment Package		
	B02 (1,000 ft siding)	B03 (8,000' siding)	B04 (16,000' siding + extensions)
Operational	🔴	🟡	🟢
Cost	🟢	🟡	🟡/🔴
Environmental	🟡	🟡	🟡

🔴 = Worst 🟡 = Neutral 🟢 = Best

Across all packages, environmental was assumed to be neutral as improvements would generally be contained to existing railroad right-of-way with likely minor impacts at crossings. More detail on the Preliminary Environmental Impact Analysis can be found in the **Task 6 Preliminary Environmental Impact Analysis Report**.

Operationally, B04 performed the best as it did not degrade freight service and would allow for consistently reliable on-time performance for the SWC Connector service.

For cost, all options would require a significant baseline of improvements including signal upgrades (PTC/CTC), at-grade crossing improvements, and an access agreement for time spent on the owner railroad tracks. B04 needed

the most capacity-related improvements such as longer/extended sidings. Consideration of added capacity improvements resulted in a lower cost ranking than the others but relative to the baseline of improvements needed, capacity/track improvements in this instance are not an overtly expensive addition. Operations and maintenance cost is a relatively smaller expense compared to the capital investments and would be somewhat similar across all options because the service option and resulting costs for operation would be the same for all packages. Maintenance-cost sharing for the capacity-specific improvements would be higher for option B04, but not enough to change the recommendation.

To summarize, Investment Option B04 was recommended as a reasonable investment option within this CRISI grant. This option provides the 'best-case' for a reliable SWC Connector service. If future project development were to occur, the analysis could evaluate trade-offs between lesser infrastructure packages and a slower, less reliable SWC Connector service.

A high-level summary of Capital Cost and O&M Cost estimations for Option B04 is provided in Tables X and X respectively, below. The complete itemized list of recommended infrastructure and their conceptual cost estimates begins on **Section 5.5.2, Page 36 of the Task 5 Service Planning and Engineering Report**. Conceptual engineering exhibits can be found in **Appendix C** of that report. For complete detail on the modeling process and assumptions which led to recommendations, see **Task 5 Service Planning and Engineering Report, Section 5.1.**

Table 1. Cost Estimates for All Infrastructure Improvements

Capital Cost Element	Total (2023 $)
Culverts/Rail Bridge	$2,086,000
New Sidings/Turnouts	$29,469,000
PTC Overlay/CTC	$79,472,900
Crossing Safety Improvements	$36,700,000
Trackage Use	$52,000,000
Vehicles	$5,800,000
Subtotal	***$198,027,900***
Indirect Costs (12%)	$23,763,348
Subtotal	***$221,791,248***
Markup (8%)	$17,743,300
Total	**$239,534,548**

Table 2. Cost Estimates for Operations and Maintenance

Capital Cost Element	Yearly Total (2023 $)
Maintenance of way, operating costs, vehicle maintenance	$2,980,000

4.3 Conclusion and Future Connectivity Options

As previously discussed, the study results in a recommendation of a two round-trip service option between Pueblo and La Junta coupled with the B04 investment option including infrastructure for a safe, on-time SWC Connector service. Together, as a recommended alternative, it could result in around 44,250 riders with a capital and O&M cost estimated at $240M and $3M/year, respectively. This alternative could connect *Southwest Chief* passengers to a future FRPR system in Pueblo which is currently planned to operate 10 daily round trips between Fort Collins and Pueblo. At that level of service, SWC Connector passengers would have multiple transfer options to utilize FRPR to points north, and return, on a daily basis.

Additional study could be undertaken to analyze a more cost-effective, operationally simple, and attractive connection between the *Southwest Chief* and future FRPR. As discussed in section Stakeholder Meeting 3 **(Attachment B)** and provided below, several future connectivity options were outlined:

INCORPORATE A FRPR / SWC CONNECTION INTO FUTURE PLANS

- Future SDP updates could include plans for connections between the *Southwest Chief* and Front Range Passenger Rail.
- Note: legislative action would be needed to extend FRPR District Boundary to La Junta.

CORRIDOR IDENTIFICATION AND DEVELOPMENT PROGRAM (CIDP)

- Amtrak, FRPRD and local partners could consider applying for SWC Re-route in 2025 CIDP NOFO to better connect the SWC and future FRPR. CIDP is a comprehensive planning program which evaluates the business case for a proposed passenger service, including phased implementation and economic evaluation.

CDOT BUS STUDY

- The Transit Connections Study is currently evaluating travel needs in Colorado to optimize all Bustang routes and increase connectivity with local/regional transit services, along with identifying any additional transit gaps in the network
- La Junta - Pueblo travel patterns and the impact of the existing Lamar-Colorado Springs route are included in the analysis

AMTRAK

- As the *Southwest Chief* service provider, Amtrak has existing governance mechanisms for any adjustments or additions to its family of services.
- Willing to partner on state-funded thruway bus study / *Southwest Chief* On-board survey / further ridership forecasting.