Bay Area Transit Recovery Vision

Adapting transit to COVID-19 to create a more connected and equitable system

Final Report
November 2020

AECOM Seamless Bay Area

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1. Initiative Overview

1.1. Goals

Publish a compelling and simple vision of an integrated, people-focused, and equitable plan for transit system recovery for the Bay Area.

Forecast the potential impacts of near-, medium-, and long-term funding and policy reform opportunities that could be considered by Metropolitan Transportation Commission's (MTC) Blue Ribbon Transit Recovery Task Force and other groups that support a transformation and rebuilding of the region's transit system.

AECOM + Seamless Bay Area

1.2. Components of a Transit Recovery Vision

While transit recovery depends on several elements, including overall institutional strategy, communications and the rider experience, a focus on safety, and equitable and easy-to-understand fares – the primary focus of this effort is the element of **service provision**.

Intended for forecasting purposes only.

1.3. Scope

This effort:

- Introduces an example of an optimized recovery network to promote dialogue among agencies and decision makers

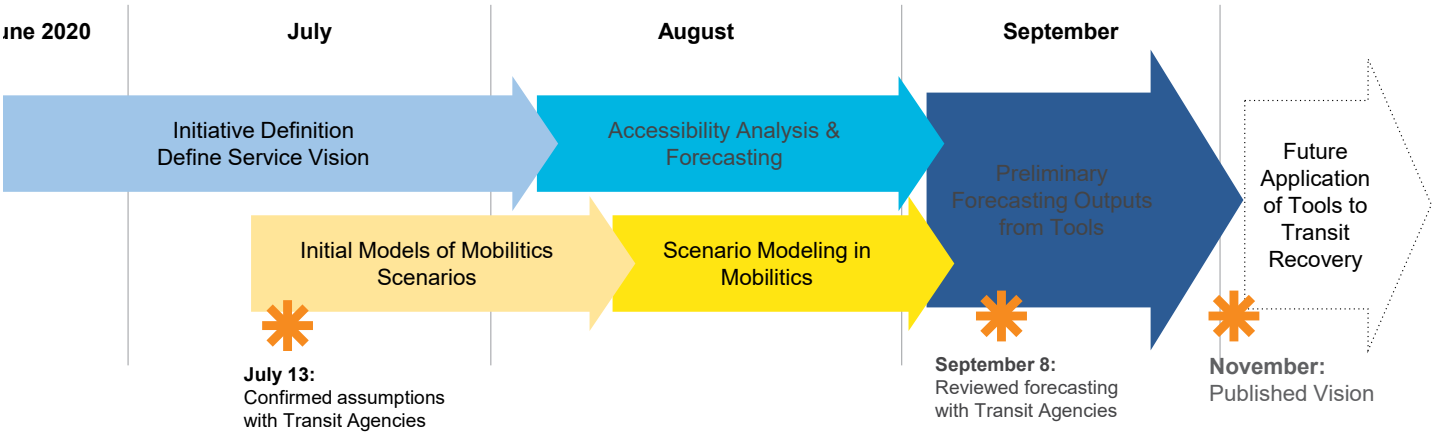
- Demonstrates tools to estimate and forecast possible impacts of the network
  - Accessibility analysis using GIS
  - Scenario planning using Mobilitics™[1]

This effort is not:

- A full proposal for a network redesign, which requires collaboration and engagement among transit agencies and stakeholders at a greater scale

[1] Mobilitics™ is an AECOM Trademark

1.4. Process



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1.5. Summary of Stakeholder Engagement

Virtual Meeting – July 13, 2020

Key Outcomes:

1. Ensured scenarios are distinct and reduced number of scenarios.
2. Acknowledged the challenges that agencies face now, and will likely face into the future (ridership, revenue streams).
3. Centered metrics on equity – looked beyond traditional transit planning metrics to ensure those who rely on the network and essential workers are served.

Blue Ribbon Task Force Transit Caucus – Planning & Operations Subcommittee Virtual Meeting – September 8, 2020

Key Outcomes and Recommendations:

1. The exercise, scenario planning, and dashboard tools could be a helpful approach for transit agencies to consider in future coordination and network planning efforts.
2. Clearly establish how the forecasted scenarios and networks could benefit the Bay Area as a whole and identify those communities that could benefit or might be negatively impacted.
3. Elaborate on details of network optimization.

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SPUR Virtual Meetings – July 7 and October 1, 2020

Key Outcomes and Recommendations:

1. Comparisons between current reduced networks and possible network optimizations can help to identify the core transit network.
2. Forecast where service reductions could be most feasible, and which might offer the least negative impacts. Consider opportunities that could allow us to do more with less.
3. Ensure that the right equity metrics are used, for example, access to jobs (in the current climate) may no longer be the most important metric to measure accessibility.

2. Transit Challenges + Successes in the COVID-19 Era

Known Challenges:

- Reduced ridership
- Reduced service levels
- Lack of funding
- Safety perceptions
- Equity challenges

Successes:

- Unprecedented coordination of operators
- Release of Health and Safety Plan
- Strong focus on equity
- Commitment to transformational reform through the Blue Ribbon Transit Recovery Task Force

Uncertainties:

- Length of the pandemic
- Short-term and long-term ridership levels
- Confidence in transit
- Investment levels

Intended for forecasting purposes only.

3. Initiative Vision Statement

Integrated. Adaptable. Accessible. Efficient. Safe. Equitable.

The Bay Area's transit system emerges more efficient, integrated, and equitable than before, earning the public's trust for increased investment, and supporting the Bay Area's long-term climate, environmental, and quality of life goals.

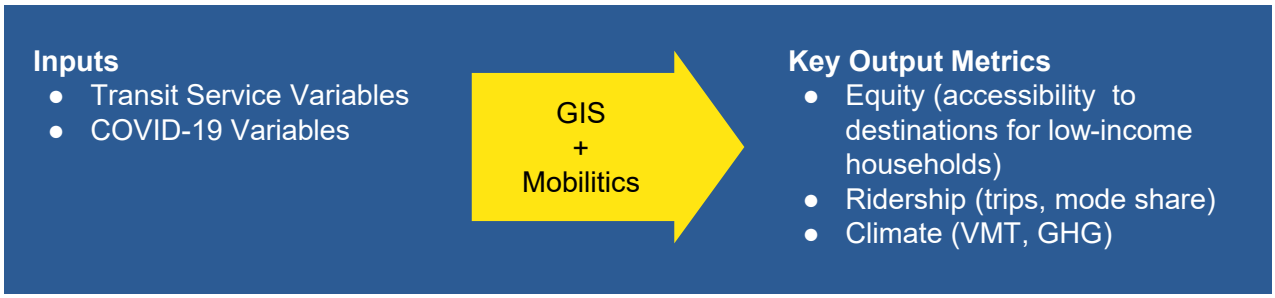
In the wake of COVID-19 and in an environment of limited resources, the Bay Area's transit system quickly:

- Adapts **service** to maximize accessibility, equity, and connectivity;
- Adapts **fares** to maximize accessibility and advance equity; and
- Adapts **safety and customer communications** to minimize the risk of transmission, and to inspire rider confidence.

4. Service Recovery Vision Scenarios + Modeling

4.1. Key Questions

- How does the overall amount of transit service affect ridership / accessibility?
- How could an "optimized" core network impact ridership / access in the near term and long term?
- How does the speed of the COVID-19 recovery affect everything?



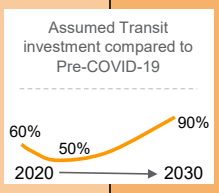
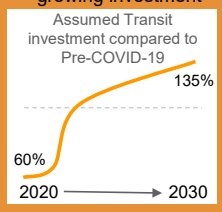
4.2. Transit Scenarios

Three potential "transit scenarios" were defined, based on varying service scenarios and assumed investment levels, and compared to the pre-COVID-19 baseline representing the "status quo". These scenarios, shown on the following slide, were then modeled to forecast possible future conditions, and to help assess the possible effects of network "optimization" and assumed investment. Each scenario was forecast under two economic recovery assumptions: a quick 12-month COVID-19 recovery (Economic Scenario Y), and a more cautious 24-month economic recovery (Economic Scenario Z), resulting in a total of six service vision scenarios.

Scenario A	Scenario B	Scenario C
Current service patterns as of June 2020 and investment decreasing to 50% of the pre-COVID baseline, with continued low investment in transit reaching only 90% of the baseline by the end of the decade.	Investment assumptions as in Future A, but with an "optimized core network" of service that maintains a frequent network of trunk lines and provides greater regularity of service throughout the day.	The "optimized core network" of Future B is enhanced, assuming major new sources of transit investment were approved to reach 135% of the baseline by the end of the decade.

Intended for forecasting purposes only.

4.3. Scenarios

Bay Area transit recovery over the next decade (2020 to 2030)				
Transit Scenarios 2020 → 2030 / **Economic Scenarios**	**Pre-COVID-19 baseline**	**Scenario A** current network + sustained low investment 	**Scenario B** optimized core network + sustained low investment	**Scenario C** optimized core network + growing investment 
Economic Scenario Y: Quick Recovery "Better Normal" within 12-months		**Scenario 1**	**Scenario 3**	**Scenario 5**
Economic Scenario Z: Cautious Recovery "Better Normal" within 24-months		**Scenario 2**	**Scenario 4**	**Scenario 6**

Intended for forecasting purposes only.

4.4. Economic Scenario Y

Economic Scenario Y ("Quick Recovery") is forecasted to reach a "Better Normal" within 12 months, with the following assumptions regarding economic recovery:

	Sept 2020	March 2021	"New Normal" Sept 2021+
Recovery/What's Open	60%	80%	100%
Workplace Safety	50%	75%	100%
Furloughed/Job Loss	15%	7%	3%
Transit Ridership	30%	--*	--*
Transit Safety Perception (Bus)	30%	75%	100%
Transit Safety Perception (Rail)	25%	65%	100%
Transit Service (Bus)**	**60%**	Depends on transit future	
Transit Service (Rail)**	**60%**	Depends on transit future	
Traffic Volumes	60%	--*	--*
Shared Rides	BAU+10%	--*	--*
Telework	60%	40%	15%
School Attendance	20%	40%	95%
E-Commerce	40%	20%	5%

Percentages are compared to pre-COVID-19 levels
need the starting point, then the model will provide the forecast/outputs for the
ing dates
sit service starting point and "New Normal" will change based on transit scenario
ptions

4.5. Economic Scenario Z

Economic Scenario Z ("Cautious Recovery") is forecasted to reach a "Better Normal" within 24 months, with the following assumptions regarding economic recovery:

	Sept 2020	March 2021	Sept 2021	March 2022	"New Normal" Sept 2022+
Recovery/What's Open	25%	50%	75%	95%	100%
Workplace Safety	20%	40%	60%	80%	100%
Furloughed/Job Loss	20%	15%	12%	7%	3%
Transit Ridership	20%	--*	--*	--*	
Transit Safety Perception (Bus)	20%	40%	60%	80%	100%
Transit Safety Perception (Rail)	15%	30%	50%	75%	100%
Transit Service (Bus)**	60%	Depends on transit future			
Transit Service (Rail)**	60%	Depends on transit future			
Traffic Volumes	40%	--*	--*	--*	
Shared Rides	BAU+5%	--*	--*	--*	
Telework	60%	50%	40%	30%	20%
School Attendance	10%	30%	60%	80%	95%
E-Commerce	50%	30%	20%	10%	5%

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4.6. Forecasted Trendlines of Transit Investment

Sustained low investment is assumed for Scenarios A and B, only reaching 90% of the pre-COVID-19 baseline by the end of the decade. Scenario C assumes investment would return to the pre-COVID-19 baseline by 2022, with additional investment in the optimized network starting in 2023 and continuing through 2030.

Forecasted Sustained Low Investment (Transit Scenarios A + B)

	Sept 2020	Sept 2021	Sept 2022	Sept 2023	Sept 2024	Sept 2025	Sept 2026	Sept 2027	Sept 2028	Sept 2029	Sept 2030
Transit Service (Bus)	**60%**	50%	55%	60%	65%	75%	80%	83%	87%	89%	**90%**
Transit Service (Rail)	**60%**	50%	55%	60%	65%	75%	80%	83%	87%	89%	**90%**

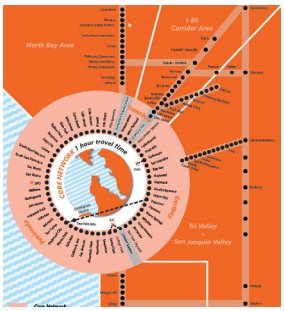
Forecasted Growing Investment (Transit Scenarios C)

	Sept 2020	Sept 2021	Sept 2022	Sept 2023	Sept 2024	Sept 2025	Sept 2026	Sept 2027	Sept 2028	Sept 2029	Sept 2030
Transit Service (Bus)	**60%**	85%	100%	105%	110%	115%	120%	125%	130%	133%	**135%**
Transit Service (Rail)	**60%**	85%	100%	105%	110%	115%	120%	125%	130%	133%	**135%**

Intended for forecasting purposes only.

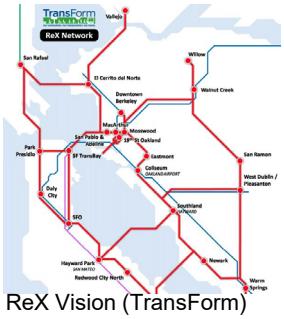
4.7. Guiding Principles + Inputs

- Preserve ridership
- Preserve service to transit-dependent populations and communities
- Maximize accessibility to destinations
- Maintain a frequent network of trunk links
  - 10-minute / 20-minute / 30-minute network
- Provide more even service throughout the day
- Seek to provide service reductions that are fair and equitable
- Maximize connections: buses + trains working together as a network
- Build upon State Rail Plan

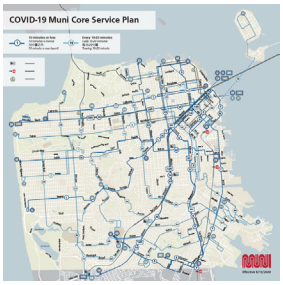


SPUR/AECOM Rail Vision


Seamless Vision Map



ReX Vision (TransForm)



Operator Core Service Plans

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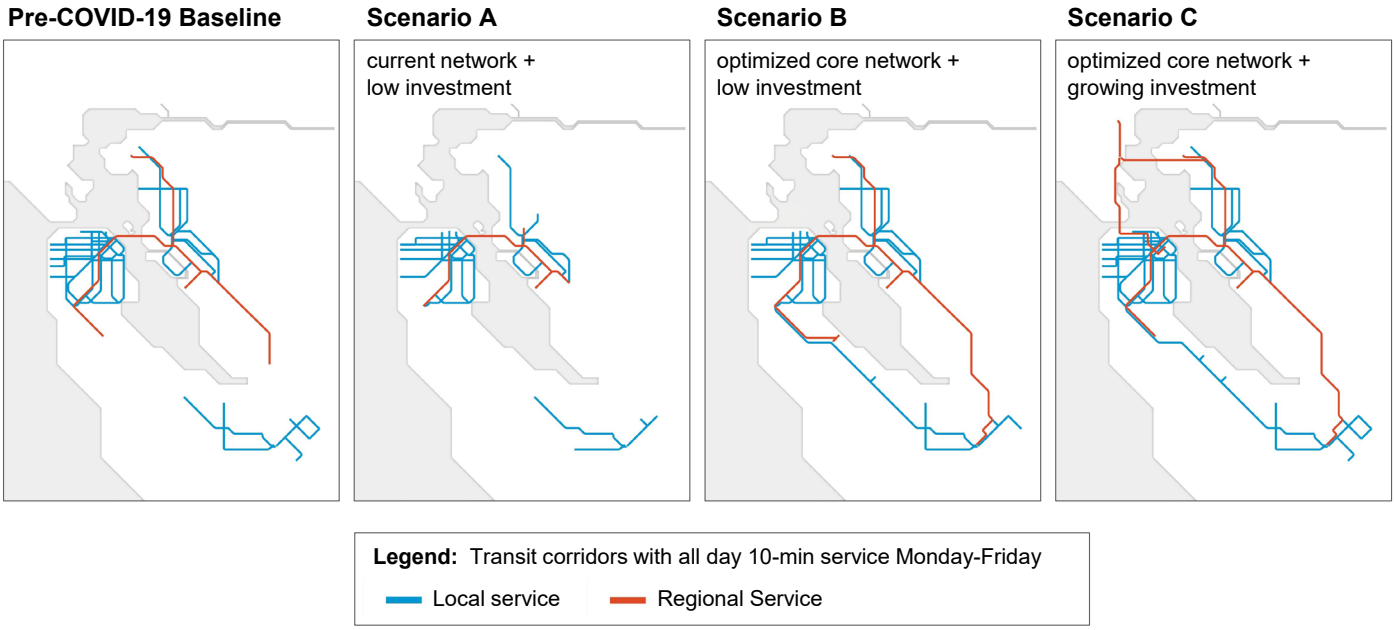
4.8. 2030 Network Scenarios

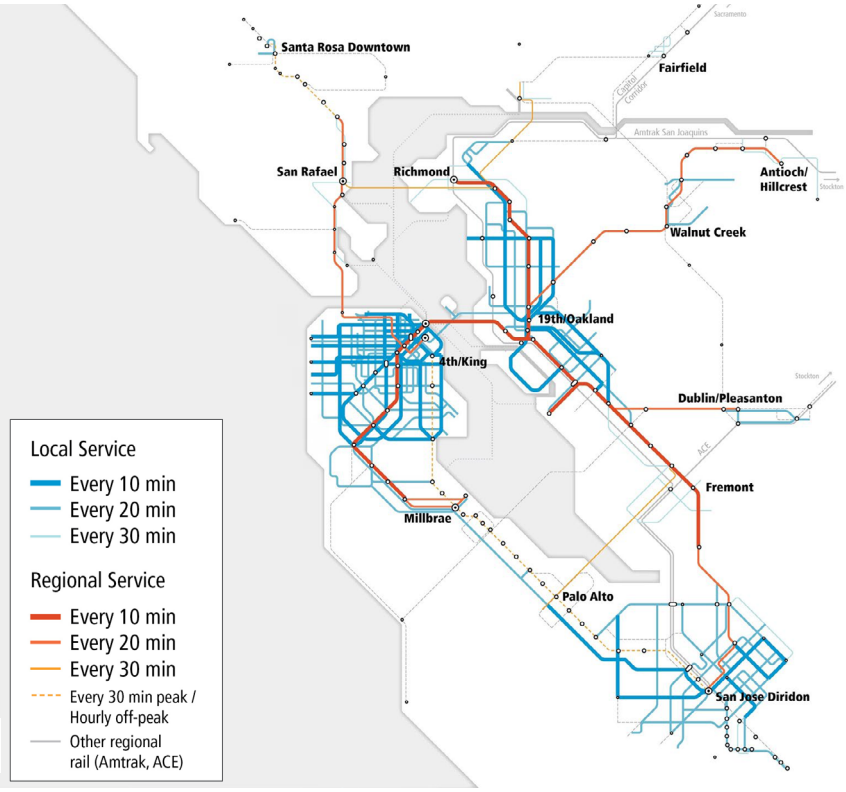


4.9. Pre-COVID-19 Service

This map shows the Bay Area's pre-COVID-19 transit network, differentiating services not by mode (e.g., bus or rail) or operating agency (e.g., BART or VTA), but by local (blue) and regional (orange) services, and by service frequency (thick lines are most frequent, thin lines less frequent).

Key characteristics:

- 15-minute BART headways
- Some gaps in service levels, particularly among regional and local service
- Significant commute-focused service



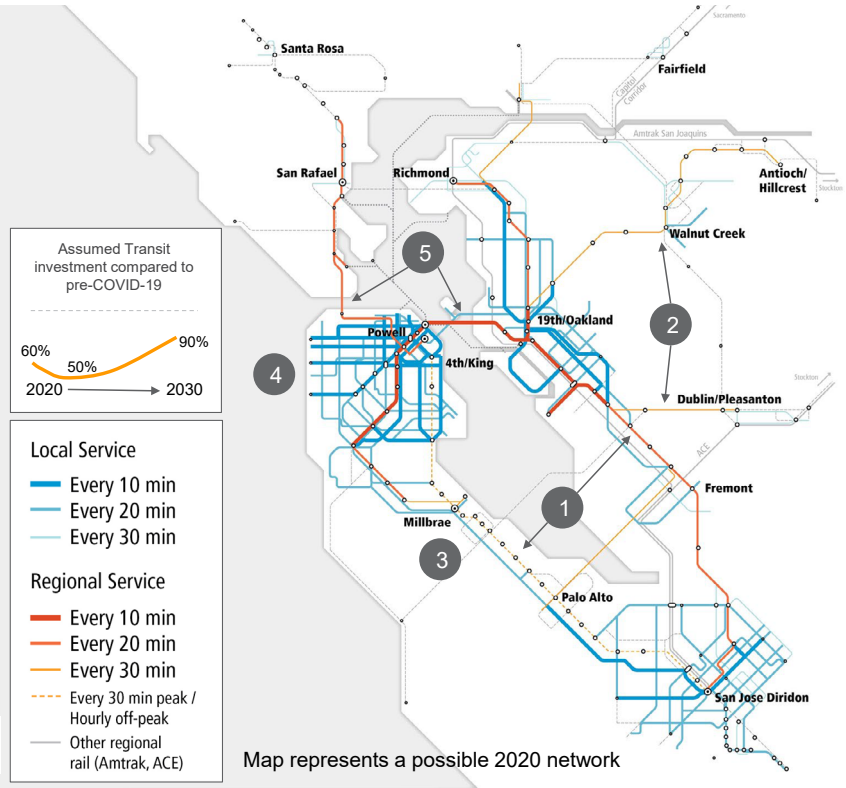
4.10. Transit Scenario A

current network + low investment

Scenario A assumes June 2020 service levels and patterns for the foreseeable future.

Key characteristics:

1. Wider gaps in frequent service network
2. BART 30-minute headways
3. New reduced Caltrain service plan emphasizing connections
4. Significant redesign of San Francisco network, emphasizing frequent core lines
5. Downsizing of express / commuter routes



Map represents a possible 2020 network

Intended for forecasting purposes only.

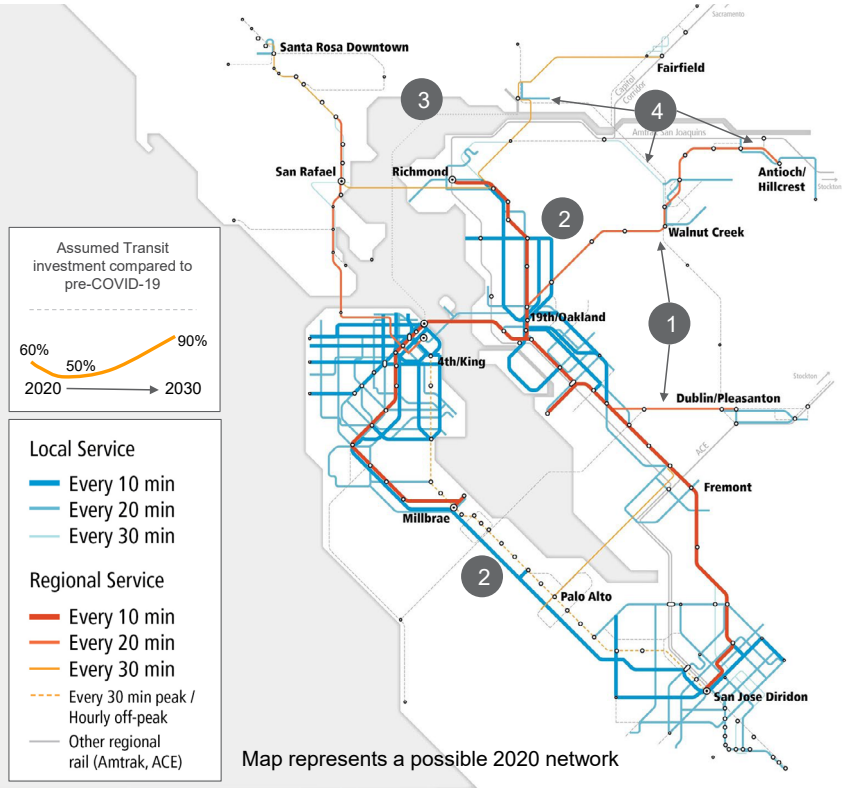
4.11. Transit Scenario B

optimized core network + low investment

Scenario B reorganizes service based on the service vision guiding principles, with service investment levels equal to Future A.

Key characteristics:

1. BART 20-minute headways; expanding 10-minute network to most BART stations
2. 10-minute network expanded to:
   - SamTrans Route ECR
   - Key AC Transit, VTA lines upgraded
3. Reduction of commute-focused bus, train, ferry service; replacement with 30-minute service on key regional corridors
4. Trunk local lines in outlying Communities of Concern emphasized



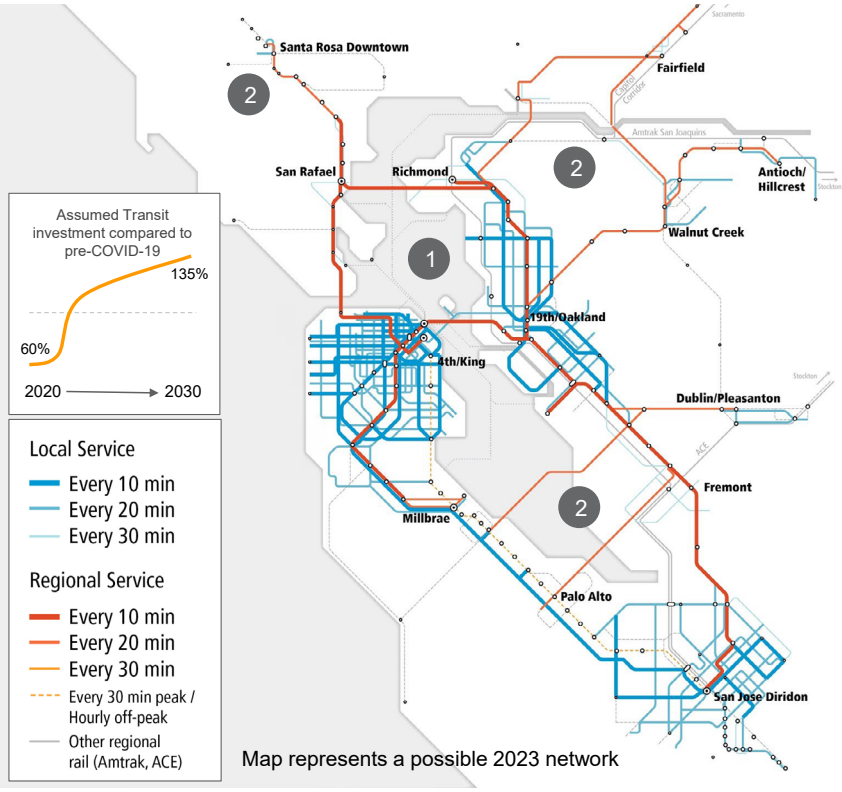
4.12. Transit Scenario C

optimized core network + growing investment

Scenario C builds off Scenario B and forecasts significantly expanded service investment over the next decade.

Key characteristics:

1. Return to pre-COVID-19 service with enhanced regional connections; 10-minute network around the bay
2. Connected 20-minute network across all regional corridors and bridges



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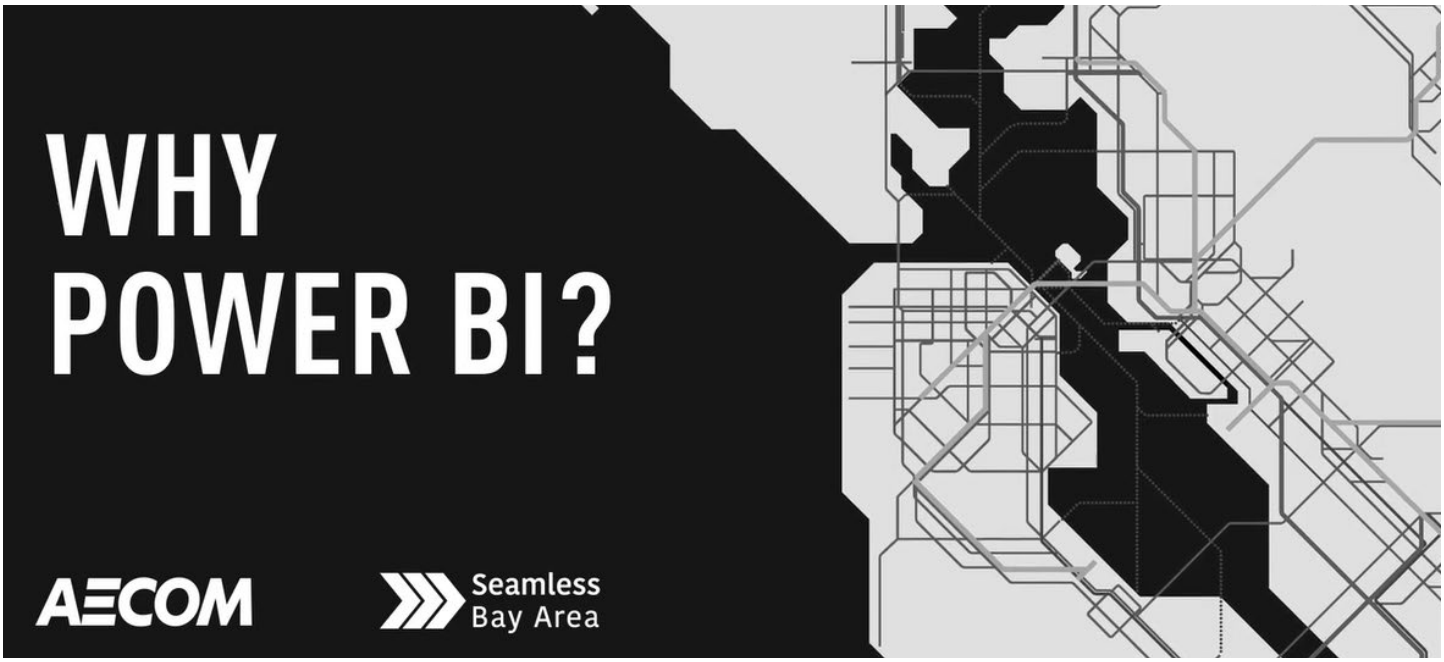
4.13. Equity and Accessibility

When considering network optimization opportunities, AECOM and Seamless Bay Area sought to preserve service and accessibility within Communities of Concern, as identified by MTC, which are communities with concentrations of both minority and low-income residents, or that have a concentration of low-income residents and other disadvantage factors.

To estimate the likely impact of service changes on Communities of Concern, we developed a dashboard tool with intuitive toggling to compare different service scenarios. The tool allows users to review peak versus off-peak trips, isolate counties/districts/and degrees of Communities of Concern and estimate accessibility by employment or household. A demonstration video of the dashboard is available on the following page.

Click below to view our video and see a preview of the PowerBI dashboard:



5. Forecast Outputs and Considerations

5.1. Overview

1. The next two years are critical to regional transit success.

2. Overall accessibility can be expanded – to local and regional destinations – while keeping total service hours the same.

3. Equitable accessibility to local and regional destinations should be a lens for making decisions on how to provide service.

4. To realize the accessibility benefits of an optimized network, reduce disincentives to transfers.

5. Long-term funding sources need to do better than pre-COVID-19.

Intended for forecasting purposes only.

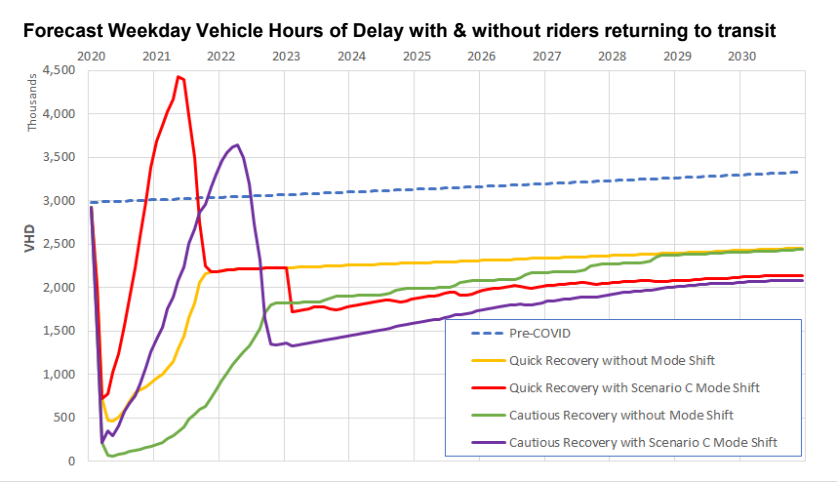
5.2. Forecast Output 1

The next two years are critical to regional transit success.

The Mobilitics tool forecasted that in both quick and cautious recovery scenarios, the pandemic could have a long-term dampening impact on transit ridership.

However, if riders do not come back to transit in pre-pandemic numbers within the next three years, the economic and environmental costs could be significant.

The impact of increased congestion is forecasted to be the most severe in the **next two to three years** if riders shift away from using transit due to insufficient service or perceived lack of safety.



AECOM Mobilitics Output

The combined cost of additional roadway traffic delays and added congestion due to riders' not returning to transit could amount to approximately:

- $860 million – $1 trillion of lost economic productivity
- 155,000 – 170,000 metric tons of additional carbon dioxide equivalent/vehicle/year

These forecasted outcomes based on our assumptions and possible transit futures underscore the importance of incorporating the cost of these impacts into the business case for funding transit service throughout the pandemic to maintain service levels, alongside robust safety and customer communications programs to increase rider trust in transit. Further detailed analysis will be required to fully quantify the impacts of COVID-19 on transit systems in the Bay Area in the near , medium , and long term.

5.3. Forecast Output 2

Overall accessibility can be expanded – to local and regional destinations – while keeping total service hours the same.

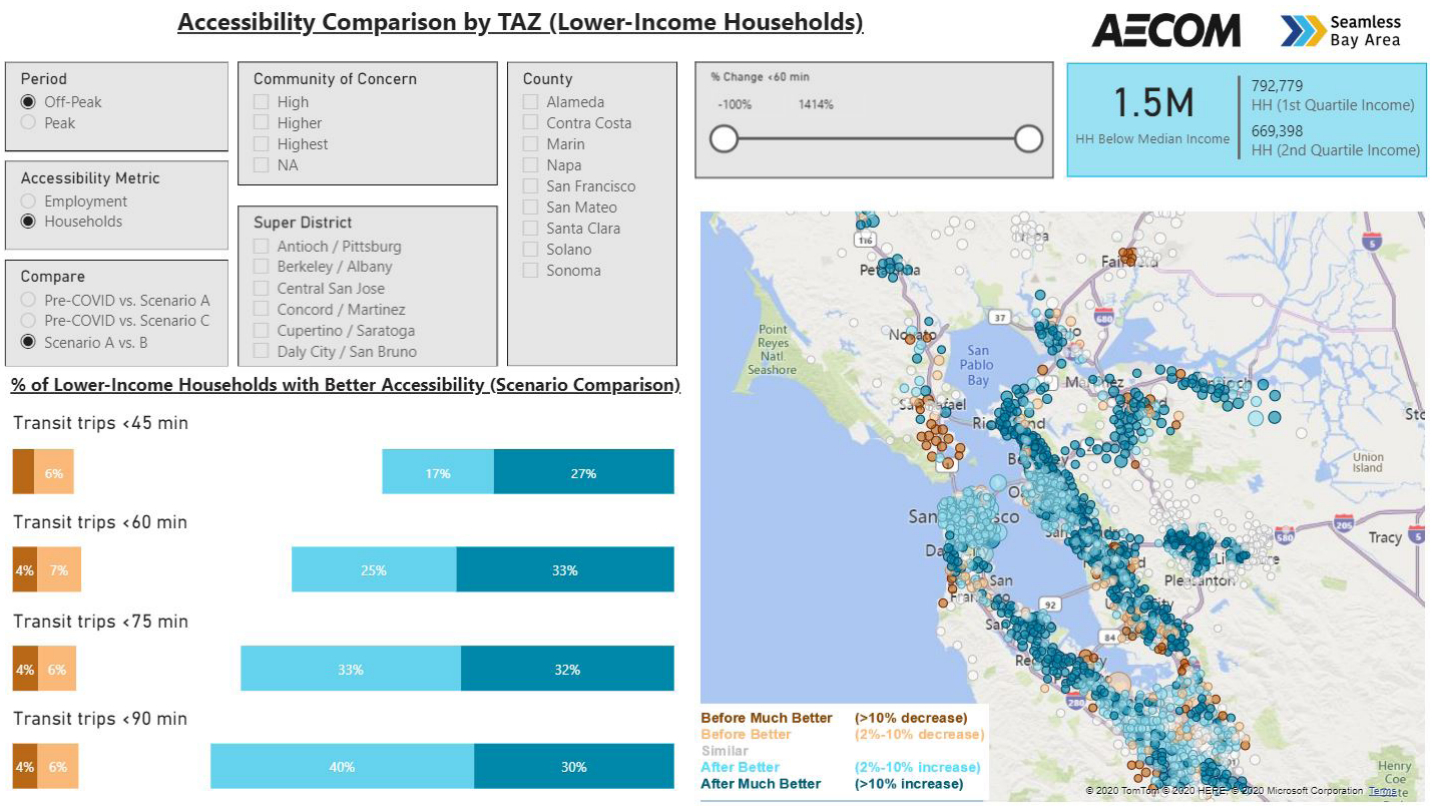
Our approach to network optimization deliberately held the region's total transit operating service hours constant between Transit Scenario A (current network + low investment) and B (optimized core network + low investment) (adjusted based on differences in average hourly costs) to show the potential gains without substantial additional funding for capital improvements or expansions but would require changes in agency coordination and operation cost management.

For Transit Scenario B, the team modified service across the region, without being restricted by existing agency boundaries or modes, to show what a regionwide approach to service optimization driven by regional, rider-focused goals could look like.

Intended for forecasting purposes only.

Forecast Output 2: GIS Outputs (accessibility comparison)

Using the GIS-based accessibility tools, the modeling estimated that under Scenario B (optimized network), approximately 60% of lower-income households could experience improved access to destinations within 60 minutes compared to Scenario A (current network/low investment). By contrast, approximately 10% of lower-income households could have worse access under Scenario B than Scenario A, while approximately 30% could experience no change. Under Scenario C (optimized network + increased investment) approximately 25% of lower-income households are estimated to experience improved access to destinations within 60 minutes compared to the pre-COVID-19 network.



5.4. Forecast Output 3

Equitable accessibility to local and regional destinations should be a lens for making decisions on how to provide service.

The team was specifically interested in how the scenarios could impact Communities of Concern. While Scenario B was estimated to have a net positive impact on access for trips originating in the region's Communities of Concern, some communities were estimated to have worse access due to the network optimization service changes, as shown on the following slide.

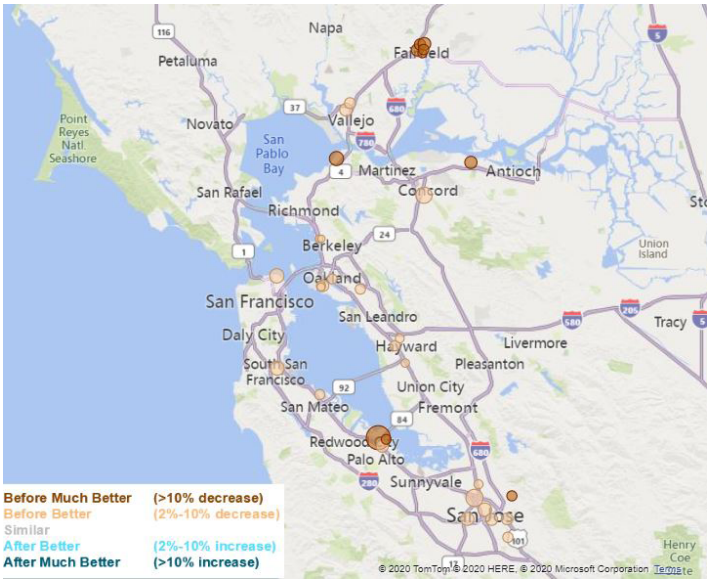
In order to focus service along the transit lines that serve the greatest share of Communities of Concern, service reductions sometimes had to be made along lines with fewer Communities of Concern. As such, higher income areas with isolated pockets of Communities of Concern are those estimated to most likely to have experienced declines in accessibility due to network optimization.

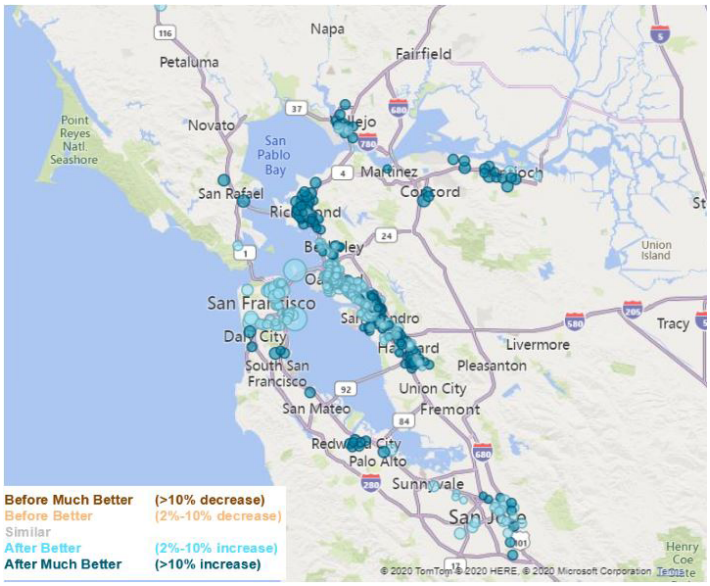
While the forecasts focused on regional impacts, a more detailed analysis of the local impacts of service changes on equity, including additional input from transit agencies and communities served, is recommended before any significant network redesign. Service changes should consider not only accessibility for Communities of Concern, but also destinations to which it is most important to maintain accessibility (e.g., hospitals, schools); and which job types should be prioritized for core network accessibility.

Intended for forecasting purposes only.

Forecast Output 3: GIS Outputs (accessibility comparison)

GIS analysis estimated that approximately **280,000 households or approximately 75% could have accessibility to more destinations within 90 minutes in Scenario B** than in Scenario A (blue zones at right). However, approximately **30,000 households in Communities of Concern or approximately 10% (orange zones at left) were estimated to have accessibility to fewer destinations within 90 minutes** under Transit Scenario B (Optimized Network) compared to Transit Scenario A (June 2020 network). Approximately **370,000 households or approximately 65% could have accessibility to more destinations within 90 minutes in Scenario C** than with pre-COVID-19 service.





5.5. Forecast Output 4

To realize the accessibility benefits of an optimized network, reduce disincentives to transfers.

The GIS estimated outputs and Mobilitics forecast outputs highlight the importance of streamlined transfers between transit services to maximize the accessibility benefits of the overall regional network and to make transit more appealing to elective riders. The current friction inherent in transfers among the 27 transit agencies (some with multiple transit services) could be reduced through the application of multi-agency strategies, such as more frequent service, aligned schedules at transfer points to reduce wait times, stops and stations designed to facilitate rider movement from one transit vehicle to another, and integrated fare policies to eliminate different fare structures and payment points.

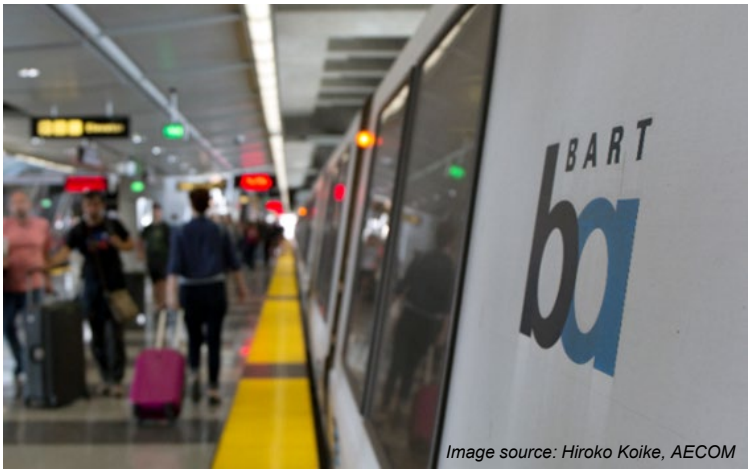


Image source: Hiroko Koike, AECOM

5.6. Forecast Output 5

Long-term funding sources need to do better than pre-COVID-19.

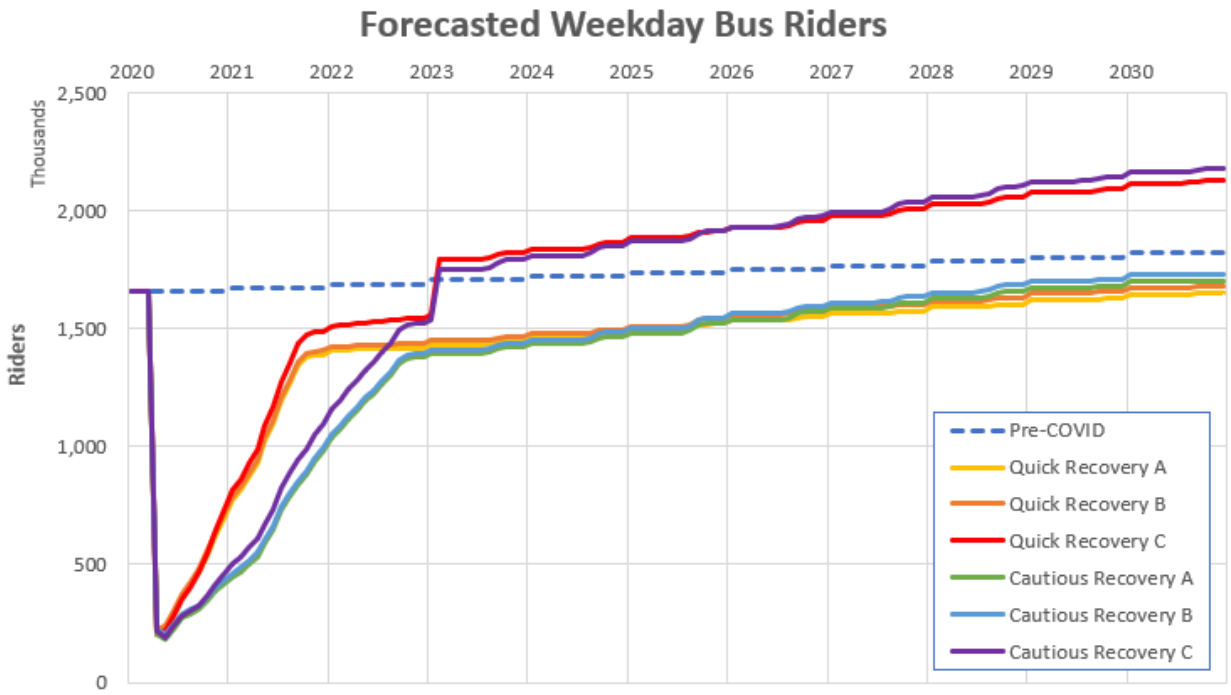
While the GIS estimated outputs showed that an optimized core network could provide near-term access benefits, Mobilitics showed that long-term ridership recovery is forecasted to be strongly associated with overall service levels, underscoring the importance of increased funding – see Quick Recovery (Scenario C) and Cautious Recovery (Scenario C) scenarios, as shown on the following ridership forecast slides for bus, BART, and rail (other than BART).

Transit Scenario C (optimized core network + growing investment) was developed to forecast what a transformational influx of new funding – such as a new Bay Area tax measure – could mean for the Bay Area's transit future. Network optimization on a regional scale could make more efficient use of transit dollars, increasing public support for maintaining existing funding sources and implementing new tax measures.

Forecast Output 5: Mobilitics Outputs

Increased investment + optimized core network grows ridership beyond baseline

Increased investment is likely a primary determinant of increasing ridership above pre-COVID-19 levels. Scenario C, assuming 135% of pre-COVID-19 transit investment levels by 2030, is forecasted to result in significantly higher ridership than Scenarios A or B, whether a quick or cautious economic recovery is assumed.



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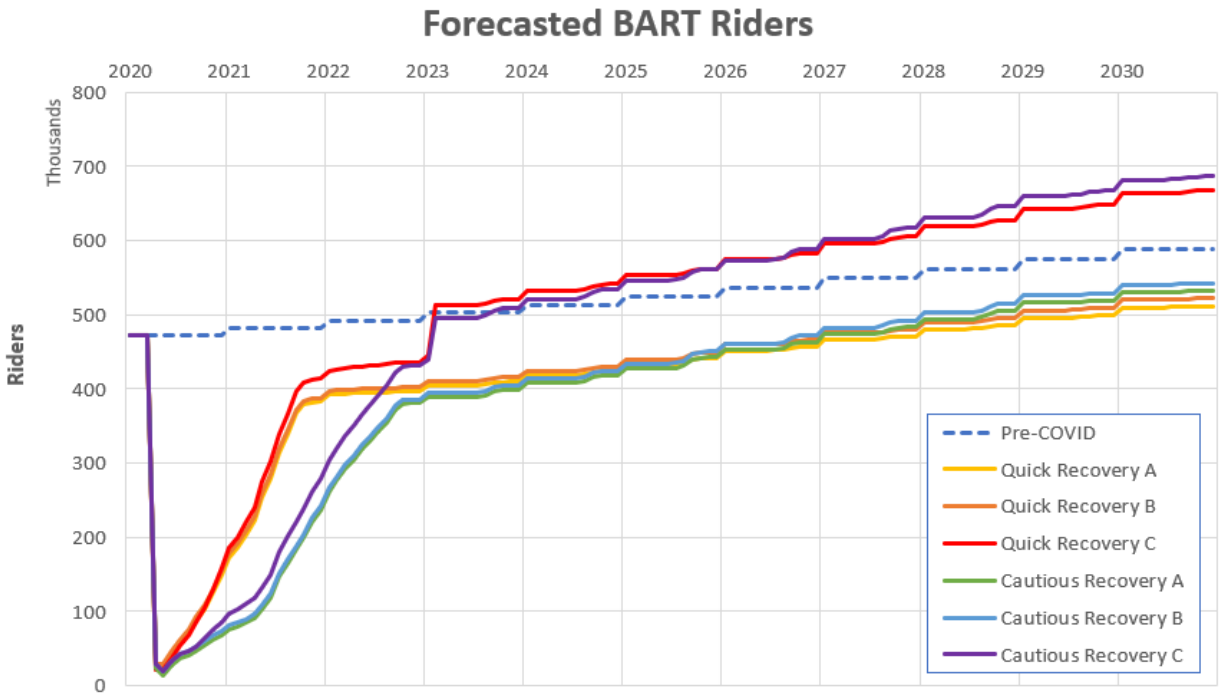

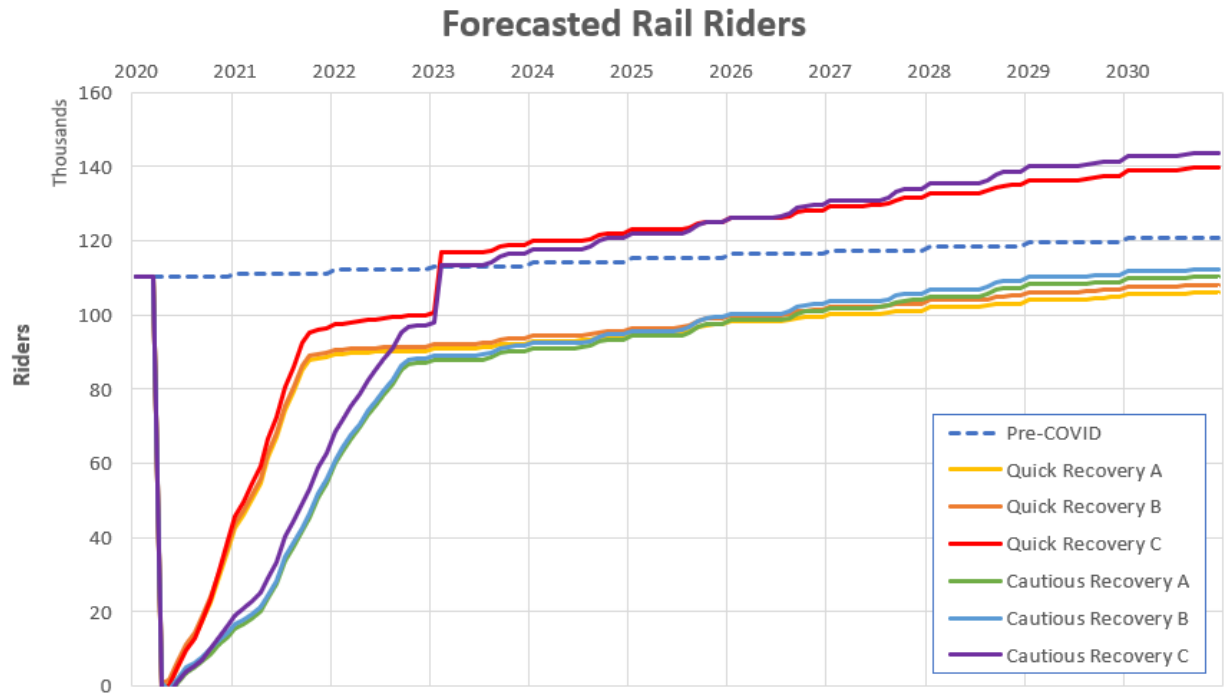

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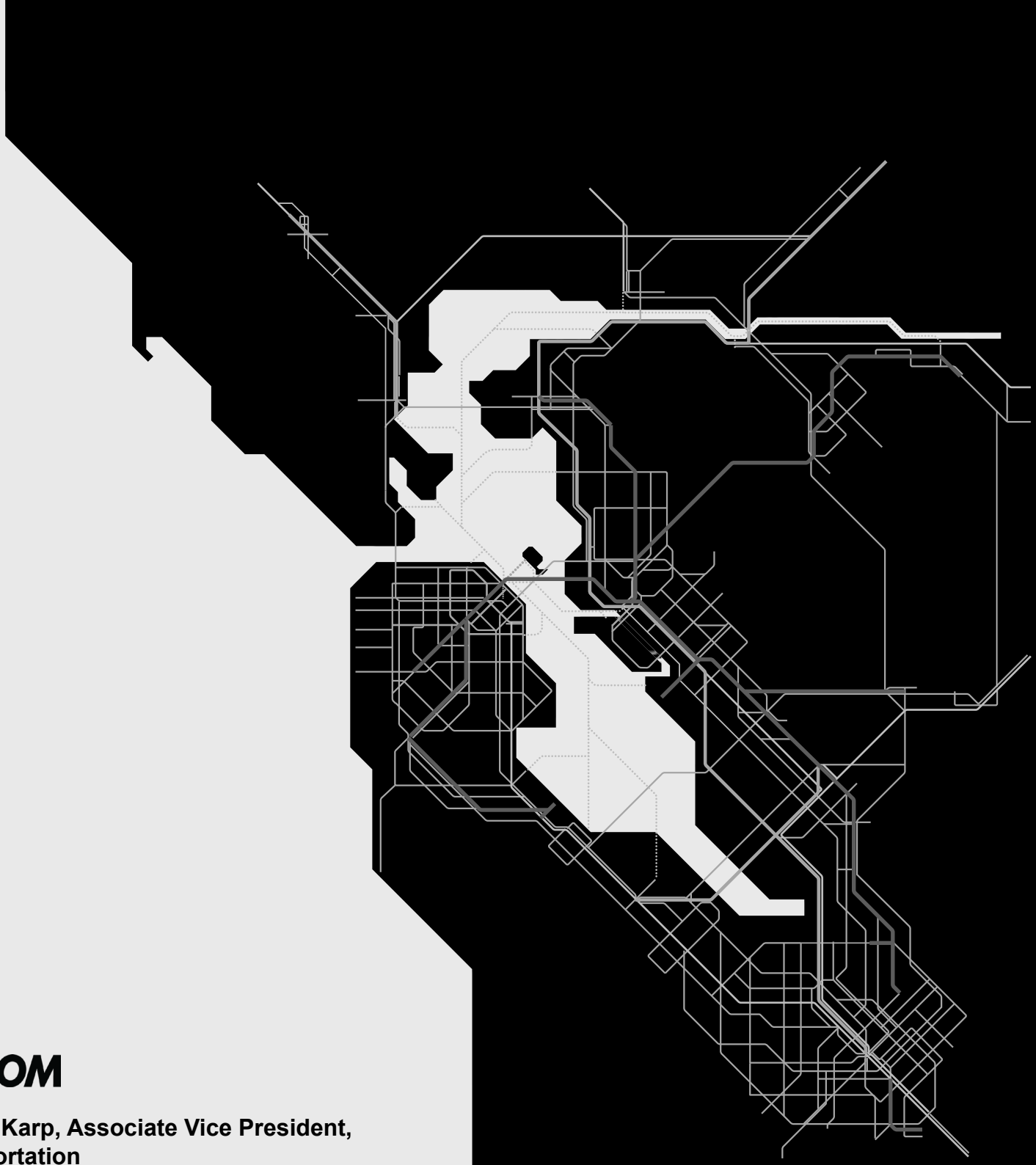
6. Next Steps

The AECOM and Seamless Bay Area Transit Recovery Vision forecasts that a regionwide approach to service optimization and application of data analysis tools can generate forecast outputs that can help transit agencies and stakeholders make the difficult decisions that could guide Bay Area transit to recovery.

On this basis, agencies, stakeholders, and decision makers can forecast possible impacts of additional scenarios and assumptions easily, as part of a comprehensive process, to work out the many details of redeploying service and regaining riders – and ultimately achieve their near-term recovery goals and long-term visions, and to realize the world-class transit system the Bay Area deserves.

7. Disclaimer

The information contained in this document is intended for general guidance and forecasting purposes only to demonstrate potential outcomes of proposed transit scenarios. This information should not be used to make funding decisions.This document is provided with the understanding that AECOM is not herein engaged in rendering professional, legal, or other advice or services. While AECOM has made every attempt to ensure that the information contained in this document has been obtained from reliable sources, AECOM is not responsible for any errors, inaccuracies, omissions, or for any results obtained from the use of or reliance on this information. All information in this document is provided “as is” without any guarantee of completeness, accuracy, timeliness, or the results obtained from the use of or reliance on this information, and without warranty of any kind, whether express or implied, including any warranties of performance, merchantability, or fitness for a particular purpose.



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Jordan Karp, Associate Vice President, Transportation
Jordan.Karp@aecom.com

Seamless Bay Area

Ian Griffiths, Co-founder
ian@seamlessbayarea.org

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