

Evaluating the Success of SamTrans' Route FCX: A Commuter Express Route between Foster City and San Francisco

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Introduction

In response to years of increasing congestion along the US-101 corridor south of San Francisco in San Mateo County, in 2019 the San Mateo County Transit District (SamTrans) reintroduced express bus service into its network. SamTrans launched route FCX, a new commuter express route that operates north-south service on US-101 between downtown San Francisco and Foster City. This route was designed to relieve the extreme congestion in the US-101 corridor while providing an affordable and convenient option for commuters. This report analyzes FCX as an express route from an operational and customer experience standpoint in order to understand how it is performing compared to its intended goals and whether it is satisfying passengers' needs. While the study focuses on a unique origin-destination hub, the methods and findings of this evaluation are useful beyond the San Francisco Bay Area for agencies considering new express route programs in their region.

Express bus service is a type of fixed-route service with limited stops that directly serves commuter destinations during peak morning and afternoon commute periods.¹ The primary goal is to provide a transit option with higher speeds and more comfortable service than traditional fixed-route bus service in order to compete with single-occupancy vehicles. The target market of express bus routes is commuters who would otherwise drive alone on freeways during weekdays.

FCX is a unique express route to evaluate, because it is an express bus intended to serve bi-directional traffic. Traditionally, transit agencies implemented express routes to serve one direction only: from suburban areas with heavy commuter traffic to a central urban location or a central group of employers.¹ In certain metropolitan regions, such as Silicon Valley, reverse commuting has become the new normal as many large employer sites have relocated away from the central urban core and into suburban office parks. As a result of shifting commute patterns, express routes such as FCX no longer only follow the traditional suburban to central business district model: they also serve the opposite commute direction, i.e., travelers departing from urban residences for suburban employment sites.

This study provides the first comprehensive performance analysis of FCX by evaluating performance metrics and standards according to SamTrans' Service Plan of 2013 and SamTrans' Express Bus Feasibility Study of 2018, as well as analyzing service quality from a passenger perspective. The SamTrans Operations Planning department provided data for the following

¹ Robert Cervero et al., Transit Cooperative Research Program Report 55: Guidelines for Enhancing Suburban Mobility Using Public Transportation (Washington, DC: National Academy Press, 1999), 31.

metrics: ridership, boardings per vehicle revenue hour, farebox recovery, cost per passenger, and subsidy per boarding. Once the appropriate metrics and standards were set by SamTrans, they were compared against the actual data for the period of August 2019 to February 2020, FCX's first seven months of operation. To determine service quality from a passenger perspective, this study used public responses gathered from the FCX Rider Survey conducted by the SamTrans Marketing Department from September through December 2019.

Readers should note that this research analyzed seven months of data prior to the shelter-in-place orders introduced as a response to the COVID-19 pandemic. However, the ridership data captured toward the end of the data collection period, in February 2020, coincided with the start of the COVID-19 pandemic in the Bay Area, when commuters began working from home indefinitely.

About SamTrans and Route FCX

Founded in 1976, SamTrans is the principal public transit agency that provides bus and paratransit service in San Mateo County, the county south of San Francisco. The public agency was established to consolidate eleven different municipal bus systems existing in the county at the time. As of the beginning of 2020, SamTrans operated a total of 70 routes, including local lines connecting to Bay Area Rapid Transit (BART) heavy rail and Caltrain commuter rail, community lines serving schools, and the new express Route FCX.

The US-101 corridor, the focus of this study, links San Francisco with suburban residences and office parks along the peninsula. It is a major commuter route and one of the freeway routes connecting San Jose and the Silicon Valley area with San Francisco. During peak commute periods, US-101 frequently has bi-directional congestion.

SamTrans began operating commuter express bus service in the US-101 corridor in 1978 when it inherited routes from Greyhound. At its peak, the district operated six express routes. The express routes were very popular among commuters, and they primarily transported riders from their homes in San Mateo County to workplaces in San Francisco. However, by the end of 2009, SamTrans discontinued all express routes due to budget cuts prompted by the Great Recession.

By 2018, the economy had rebounded and congestion was again a pressing concern in the US-101 corridor. That same year, SamTrans conducted the *US-101 Express Bus Feasibility Study*,² which evaluated the possibility of reintroducing an express bus network in SamTrans' system by launching express routes during peak commute hours on weekdays. The new express network was intended to capture a new market of potential transit users and employees traveling in the corridor who do not have access to private commuter bus services.

Route FCX launched on August 19, 2019, as the first of six express routes planned for SamTrans' new express bus network. The routing for the FCX modeled the former express route FX, which had been the most productive route of SamTrans' original express bus network. Like the FX, FCX operates north-south along US-101 between suburban Foster City and downtown San Francisco (see Figure 1). A key difference between the new FCX and the old FX service is the new bi-directional routing.

² SamTrans, *US-101 Express Bus Feasibility Study* (San Carlos: San Mateo County Transit District, 2018).

The former FX service only operated in the traditional commute pattern with origins in a suburban area and destinations in a central urban location. In the mornings, FX picked up passengers in Foster City and dropped them off to work in the Financial District in downtown San Francisco. In the evenings, the route operated in the reverse direction to pick up passengers in downtown San Francisco before dropping them off in Foster City. With changes in economic and traffic patterns along the US-101 corridor over the last decade, however, FCX intends to be a bi-directional route to serve the commuter markets of both Foster City and downtown San Francisco.

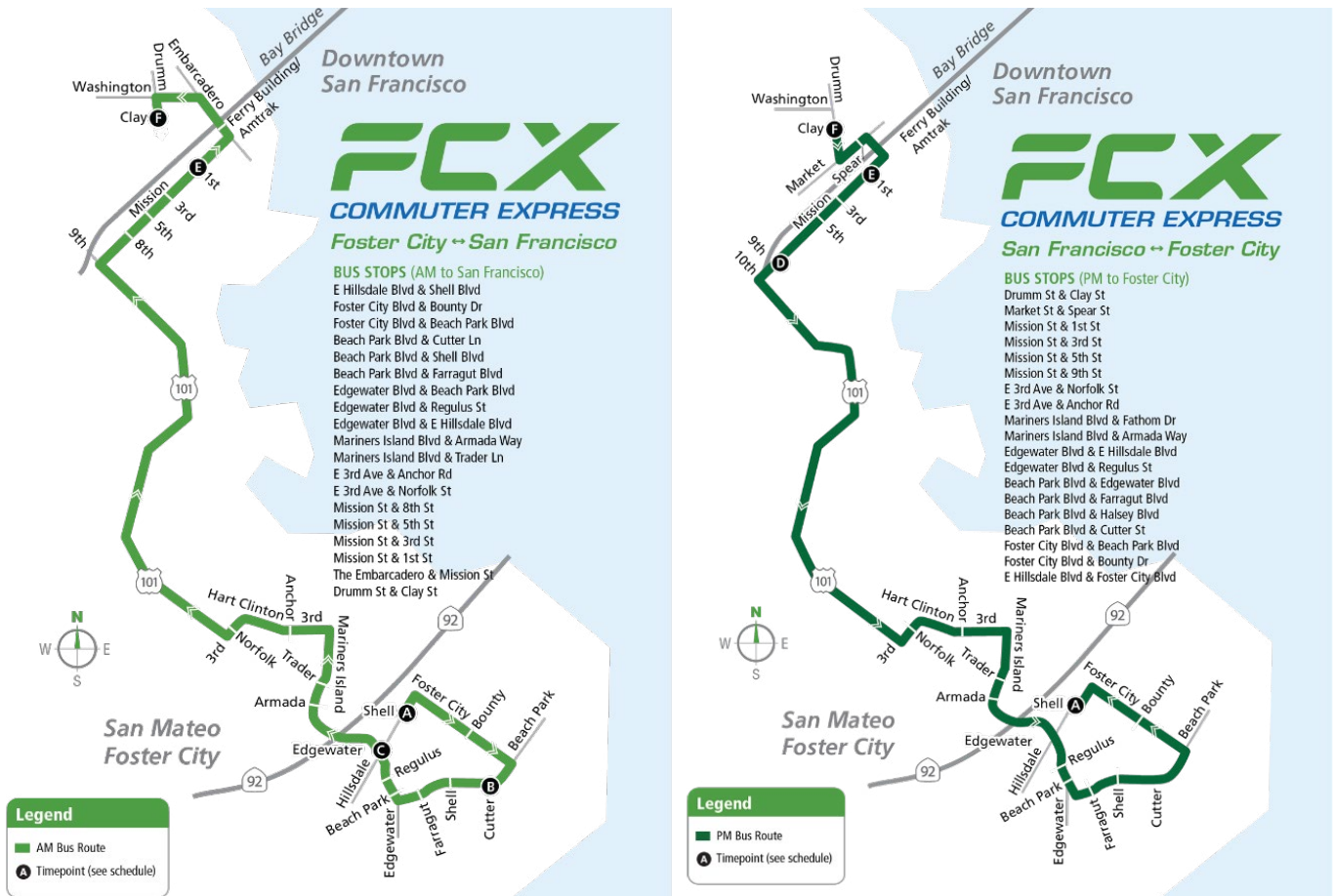


Figure 1. Map of FCX: Traditional Commute Direction in the AM and PM

Source: SamTrans, "Route FCX Timetable," <https://www.samtrans.com/schedulesandmaps/timetables/FCX.html>

Findings: Ridership

Ridership of some form is a significant performance measure because it can convey service reliability, customer satisfaction, farebox revenue, and cost-effectiveness.³ This study analyzed three ridership performance metrics:

³ Kittelson & Associates, Inc., et al., Transit Cooperative Research Program Report 88: A Guidebook for Developing a Transit Performance-Measurement System, (Washington, DC: Transportation Research Board, 2003), 9.

- Total monthly ridership
- Average weekday ridership per vehicle revenue hour
- Average weekday ridership

To assess the performance of FCX, this study compared ridership against set service standards from the *SamTrans Service Plan* of 2013 and the Express Bus Feasibility Study of 2018. The *SamTrans Service Plan* set out a systemwide standard for all routes, while the Express Bus Feasibility Study projected performance metrics and success criteria for future express routes.⁴

The SamTrans Operations Planning department provided ridership data for a nearly seven-month period, from the start of the two-week promotional launch in August 2019 to the full month of February 2020.

Table 1 presents the performance standards and summary data on how FCX performed for each metric. FCX met the total ridership goal, but failed to meet the standards for average weekday passengers per revenue hour and average weekday ridership.

Table 1. Comparison of FCX Ridership to Performance Goals

Metric	SamTrans Service Plan (2013)	Express Bus Study (2018)	FCX Results (September 2019–February 2020)
Total Ridership	Increase	Increase	Increase
Average Weekday Passengers per Revenue Hour	31.3	Estimated 20 for FCX	12*
Average Weekday Ridership	–	Estimated 1,130 for FCX	416*

* Performance goal was not met

Source: SamTrans. *US-101 Express Bus Feasibility Study* (San Carlos: San Mateo County Transit District, 2018).

The total ridership of FCX followed an increasing trend overall, meeting the standards of the *SamTrans Service Plan* and the expectations of the Express Bus Study. Although average weekday ridership also notably increased, FCX results for average weekday passengers per revenue hour and average weekday ridership fell short of expectations—with average weekday ridership at less than half of the projected estimate. From September 2019 to February 2020, the number of boardings per revenue hour averaged 12 passengers. Although this figure increased slightly each month, it still only falls at a little over half of the Express Bus Feasibility Study’s initial estimate of 20 passengers.

Ridership over Time

As shown in Figure 2, FCX’s total monthly ridership grew over the period of study. The two-week promotional launch in August yielded a baseline ridership of about 3,000 passengers. By October,

⁴ SamTrans, *SamTrans Service Plan* (San Carlos: San Mateo County Transit District, 2013).

ridership peaked at over 10,000 passengers. It is standard at SamTrans for systemwide ridership to peak in October, as there are no holidays or school breaks. While the holiday months of November and December showed a dip in ridership, ridership quickly recovered after New Year's Day and returned to stable levels. When comparing the percent change in ridership since the first full month of ridership in September, all months except for December showed a positive change in ridership.

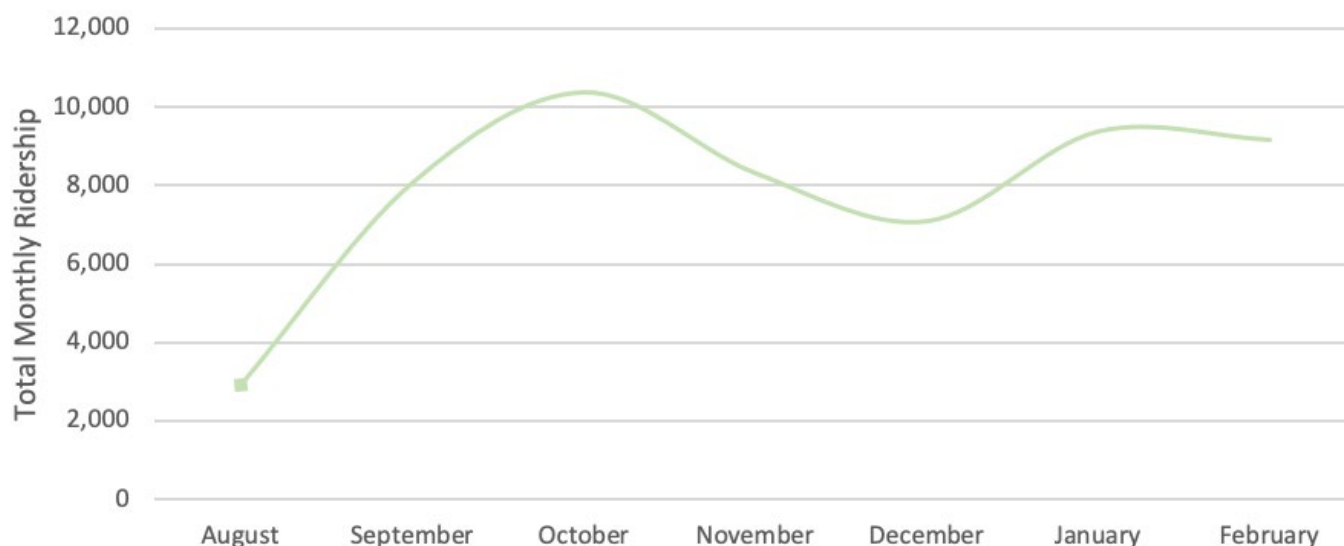


Figure 2. Total Monthly Ridership of FCX, August 2019 to February 2020

Ridership by Direction

While FCX ridership increased each month as a whole, there were significant discrepancies in ridership according to the direction of travel. Ideally, passenger loads would be equal in both directions, but this was not the case for FCX during its promotional launch and first full six months. As Figure 3 shows, ridership was much higher in the traditional commute direction. Figure 3 displays FCX's total monthly ridership by direction from August 2019 to February 2020. For trips heading in the traditional commute direction of San Francisco in the morning and Foster City in the evening, ridership accounted for 91% of the route's total ridership each month.

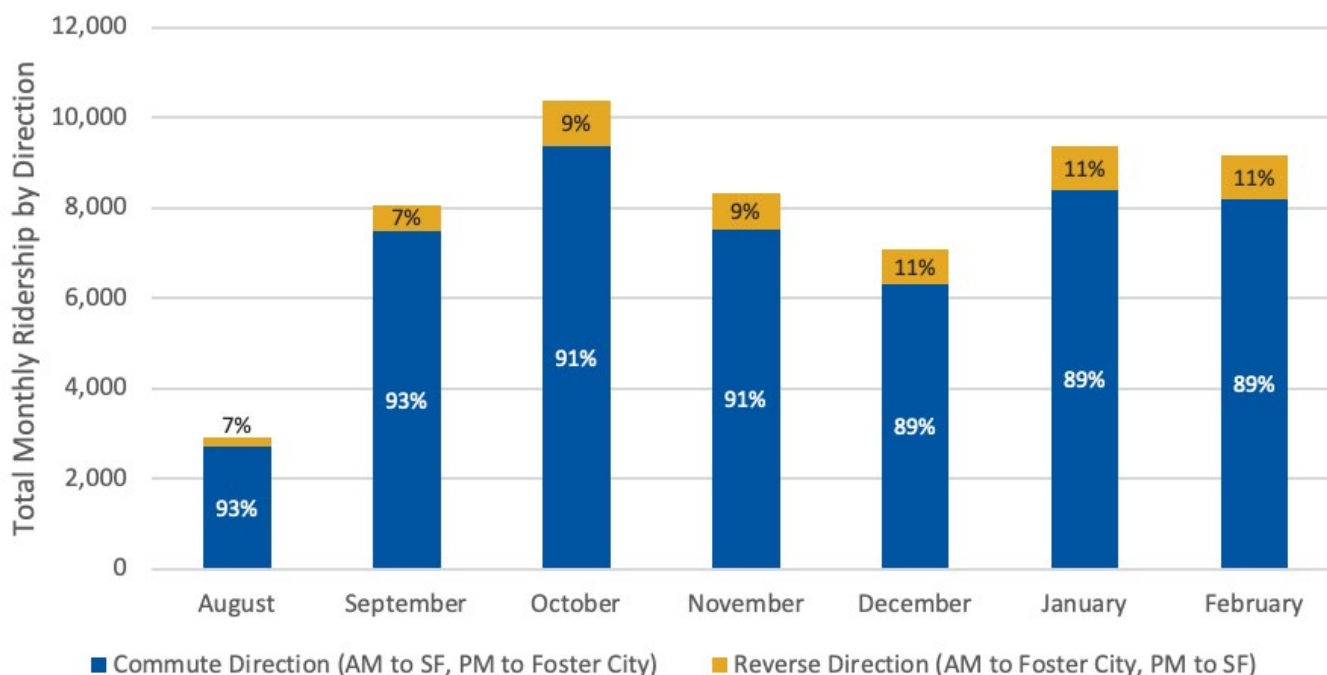


Figure 3. Total FCX Monthly Ridership by Direction, August 2019 to February 2020

There is evidence that purely reverse commuter routes are successful if the suburban job sites served are large enough and peak commute periods align with bus capacity.⁵ However, as Figure 3 shows, FCX’s reverse commute ridership was significantly lower than ridership for the traditional commute direction, averaging only 9% of the total ridership.

The most likely cause of the low numbers of riders traveling in the reverse commute direction, from San Francisco to the large suburban employer campuses that FCX serves in Foster City, is that many private employers offer free commuter shuttles that also travel in the reverse direction. Over the last decade, the number of private commuter shuttle services has increased tremendously in the Bay Area. According to the Metropolitan Transportation Commission (MTC), in 2014 private shuttles accounted for nearly 20,000 to 30,000 commuters daily along the Foster City-San Francisco study corridor.⁶

About the Riders

Having received responses from the FCX Rider Survey, I created a profile of FCX passengers that includes where they commute to and from, as well as what mode they used to commute prior to FCX. Overwhelmingly, 90% of passengers reported living in Foster City or the neighboring city of San Mateo, while only 8% of passengers resided in San Francisco. This breakdown of

⁵ Richard H. Pratt et al., *Transit Cooperative Research Program Report 95: Traveler Response to Transportation System Changes Handbook*, Third Edition: Chapter 10, Bus Routing and Coverage (Washington, DC: The National Academies Press, 2004), 33.

⁶ Metropolitan Transportation Commission, “2016 Bay Area Shuttle Census,” September 9, 2016, <https://mtc.ca.gov/tools-and-resources/digital-library/2016-bay-area-shuttle-census> (accessed May 26, 2020).

passengers' place of residence reinforces the trend of 91% of riders traveling in the traditional commute direction from Foster City to San Francisco.

Most passengers reported that they had previously used mixed commute options, including a combination of driving to a Bay Area Rapid Transit (BART) station or Caltrain station and taking public transit such as BART, Caltrain, SamTrans, and San Francisco Municipal Transit Agency (Muni).

Findings: Service Effectiveness

Productivity refers to the amount of transit output per unit of consumed resources, also known as service effectiveness. This study measures productivity according to three SamTrans service effectiveness metrics that are also common in the transit industry:

- **Farebox recovery:** the proportion of operating expenses that are covered by passenger fares, typically expressed as a percentage
 - *Farebox recovery = total fare revenue / total operating cost*
- **Cost per passenger:** the fiscal cost of providing service to each rider who boards the route
 - *Cost per passenger = total operating cost / number of boardings*
- **Subsidy per passenger:** how much the agency must contribute, after farebox revenue, to make up the cost of a passenger boarding
 - *Subsidy per boarding = (total operating cost – farebox revenue) / number of boardings*

From mid-August 2019 to February 2020, FCX averaged a stunning farebox recovery ratio of 25%. If one excludes the two weeks of free fares during the promotional period in August, the farebox recovery averaged even higher, at 27%. Both rates exceeded the 2013 Service Plan goal, the estimated rate from the 2018 Express Bus Feasibility Study, and the systemwide average for SamTrans buses in 2019 (Table 2).

Table 2. Comparison of Performance Goals to FCX Service Effectiveness Results

Metric	SamTrans Service Plan (2013)	Express Bus Feasibility Study (2018)	Systemwide Average for Bus (FY 2019)	FCX Results (Aug 2019 – Feb 2020)
Farebox Recovery	18.6%	20%	11%	25%
Cost per Passenger	–	\$11	–	\$10.08
Subsidy per Passenger	\$5.23	–	–	\$7.55

FCX also succeeded in providing service without exceeding the goals for the maximum cost per passenger served. The Express Bus Feasibility Study set the goal for all SamTrans express bus routes at no more than \$15 per passenger, and for route FCX in particular at no more than \$11 per passenger. Across the entire period evaluated, the cost per passenger on FCX was comfortably

below that maximum at \$10.08 (Table 3). Furthermore, excluding the free two-week promotional period in August, the cost per passenger drops to \$9.88.

Table 3. Farebox Recovery, Cost per Passenger, and Subsidy per Passenger Boarding of FCX, August 2019 to February 2020

Month	Aug 2019	Sept 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Average	Average w/o Aug ^a
Farebox Recovery	0.0%	23.6%	27.7%	24.1%	19.8%	31.7%	34.7%	25%	26.9%
Cost per Passenger	\$13.48	\$10.30	\$8.77	\$9.98	\$12.27	\$9.83	\$8.90	\$10.08	\$9.88
Subsidy per Passenger Boarding	\$13.48	\$7.87	\$6.34	\$7.58	\$9.84	\$6.72	\$5.81	\$7.55	\$7.22

Source: SamTrans, *FCX Fare Breakdown (Aug 2019 – Mar 2020)* (San Carlos: San Mateo County Transit District, 2020).

^a Excluding the two-week free promotional period in August provides a true estimate of cost per passenger over time.

With respect to the subsidy per passenger boarding, FCX came close but did not meet the average systemwide subsidy per passenger boarding set in 2013. The SamTrans Service Plan set a systemwide subsidy per boarding at \$5.23 per passenger. On average for the seven months evaluated, the subsidy per boarding on FCX was \$7.55. If one excludes the two weeks in August, the average subsidy per boarding drops slightly to \$7.22.

Findings: Passengers' Perspectives

The feedback SamTrans received from FCX passenger surveys offers insight into the service quality of FCX. Two weeks after the promotional launch of FCX in August 2019, the marketing department of SamTrans introduced an online rider survey via SurveyMonkey. The survey ran from September through December 2019 and received 133 responses by the end of the survey period. The purpose of the survey was to discover the typical rider profile, usage, perception, satisfaction, and feedback with respect to the express route during the first few months of service.

Satisfaction with FCX

The large majority of passengers were satisfied with FCX service, as shown in Figure 4. Question 2 of the FCX Rider Survey asked passengers to rate their satisfaction with various service features, including travel time, location of stops, seat availability, frequency (i.e., how often the bus runs), onboard Wi-Fi, and schedule reliability. Three factors received a “satisfied” rating from around 85% of respondents: travel time, stop location, and schedule reliability. Also, 72% of respondents were satisfied with seat availability, 66% were satisfied with onboard Wi-Fi, and only 59% were satisfied with frequency.

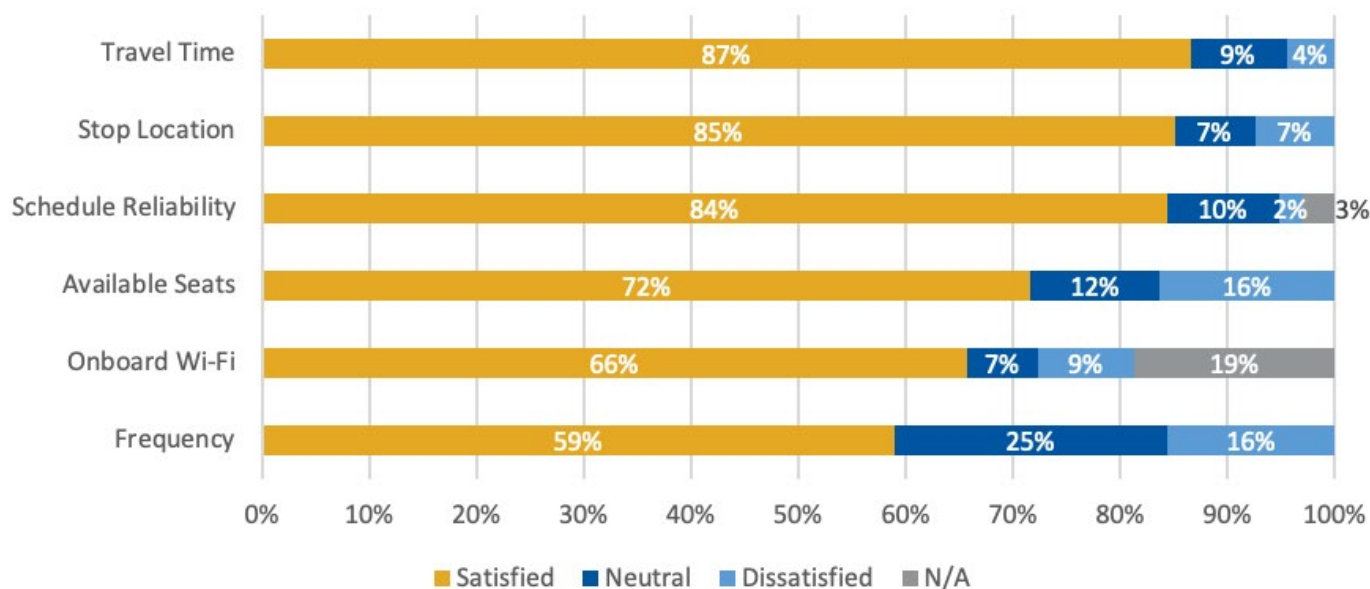


Figure 4. Rider Satisfaction with Route FCX

Source: SamTrans, *Report for Route FCX Survey* (San Carlos: San Mateo County Transit District, 2019).

Intention of Riding FCX Regularly

To gauge passengers' interest in riding FCX for their commute on a long-term basis, the survey asked passengers how many days they intend to ride FCX. The primary purpose was to find out how FCX might effect a shift in passengers' mode of commute. As Figure 5 shows, an overwhelming 88% of respondents stated they intended to ride at least three days a week, with 50% intending to ride all five weekdays a week. Only 1% of respondents stated they did not plan to ride at all after the free promotion, while 2% stated they would ride one to three days a month.

The last question of the survey asked respondents for any comments or suggestions. Most comments received from the FCX Rider Survey were positive: riders mentioned that they were thankful for the new express service and that they hoped it would stay for the long run.⁷ Of the riders contributing positive comments, nearly all of them preferred using the express service to alternative commute options. One participant even mentioned traveling from Menlo Park, a few cities south, to Foster City to take FCX into San Francisco. Such feedback demonstrates that FCX is meeting its intended goal of successfully serving the commuter market.

⁷ SamTrans, *Report for Route FCX Survey* (San Carlos: San Mateo County Transit District, 2019), 13.

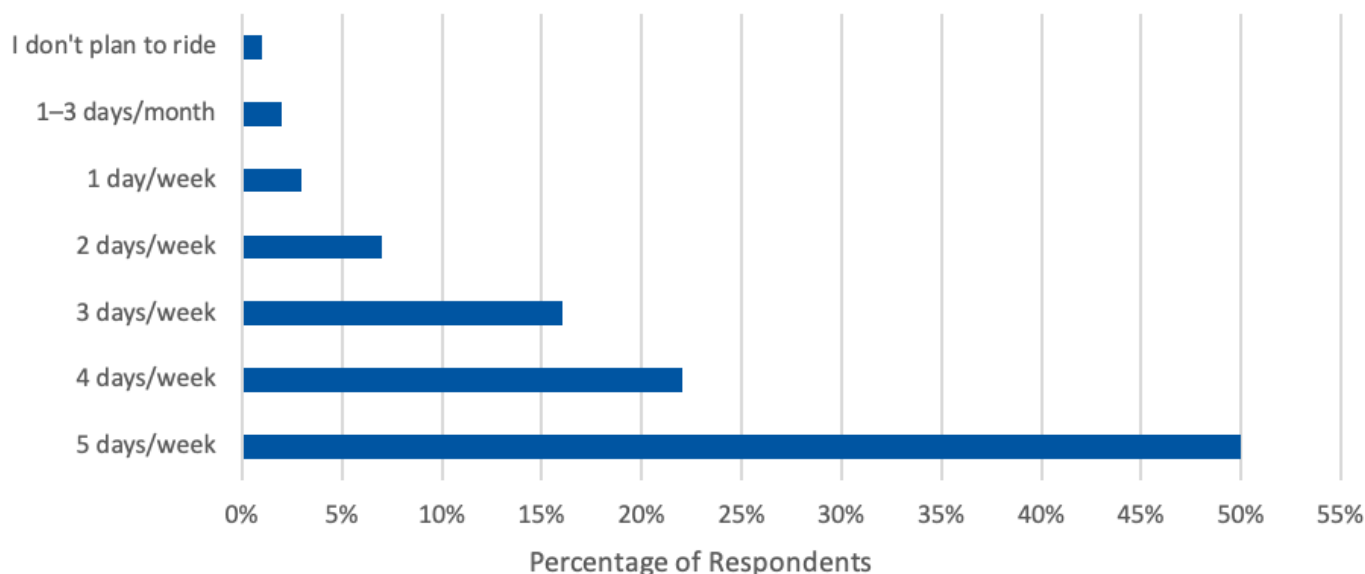


Figure 5. Passengers' Intended Frequency of Use of FCX

Source: SamTrans, *Report for Route FCX Survey*, (San Carlos: San Mateo County Transit District, 2019).

Reasons for Riding FCX

Route FCX appeals not only to new riders looking to shift their commute mode, but also to SamTrans riders who used the former express network over a decade ago. Eight survey participants reported being loyal former FX riders. Many of their comments suggested that they had been waiting for the revival of this express service between Foster City and San Francisco since SamTrans eliminated the FX in 2009. Of these comments, all were thankful that the express service is back in the form of Route FCX.

Perhaps the most surprising feedback from the rider survey is that the FCX express service attracts more riders than commuters. Although FCX targets commuters as its primary user base, the survey responses reveal that FCX appeals to a broad range of users; seniors and other recreational riders took the FCX to San Francisco to shop, eat, and enjoy an outing. For example, a few respondents mentioned taking the last bus in the morning to San Francisco to shop and eat in Chinatown, then taking the first bus in the afternoon back to Foster City. They further mentioned that they planned to continue organizing outings like this on the FCX in the future. Several other respondents requested additional trips in the midday, outside of peak commute hours, which suggests they likely were not riding the FCX for a commute.

Summary & Conclusions

The revival of SamTrans' former express bus network in San Mateo County is a step in the right direction of addressing congestion in the US-101 corridor. Key study findings are as follows.

Route FCX met or exceeded half of its performance measure standards. As shown in Table 4, FCX successfully met the goals for ridership, cost per passenger, and farebox recovery as set out in both the 2013 Express Bus Study and the 2018 SamTrans Service Plan. The three performance goals that FCX failed to meet were average weekday passengers per revenue hour, average weekday ridership, and subsidy per passenger.

Table 4. Summary of Performance Metrics and Standards with FCX Results

Metric	SamTrans Service Plan (2013)	Express Bus Study (2018)	FCX Results (September 2019 – February 2020)
Total Ridership	Increase	Increase	Increase
Average Weekday Passenger per Revenue Hour	31.3	Estimated 20 for FCX	12*
Average Weekday Ridership	–	Estimated 1,130 for FCX	416*
Cost per Passenger	–	Less than \$15 / passenger Estimated \$11 / passenger for FCX	\$9.88
Subsidy per Passenger	\$5.23/passenger	–	\$7.22*
Farebox Recovery	18.6%	20%	25%

*Performance goal was not met

Ridership in the traditional commute direction from Foster City to San Francisco accounted for a large majority of FCX’s total ridership. While overall ridership increased each month, ridership in the traditional commute direction averaged 91% of the route’s total ridership, leaving only 9% of passenger trips in the reverse commute direction. Although large suburban employers are abundant along the US-101 corridor, the low transit ridership to work could be due to the many free commuter shuttles offered by private employers that are traveling in the reverse direction. Private commuter shuttle services offered as part of employer transportation demand management (TDM) programs may be a competitor to express bus services when employees commuting to suburban employer sites.

Almost all passengers who responded to the survey intended to ride the FCX three or more days per week between Foster City and San Francisco. Overwhelmingly 88% of passengers in the rider survey indicated that they would ride FCX at least three days a week, with 50% intending to ride all five weekdays. Only 1% of survey respondents stated they did not plan to ride at all after the free promotion in the first two weeks of the route launch.

FCX strongly appeals to both commuters who used the former SamTrans FX route and recreational riders. Comments from the rider survey revealed that several survey participants were loyal former FX riders on SamTrans’ express network over a decade ago. They had been waiting for the revival of the Foster City to San Francisco express service since it was eliminated in 2009. All of these respondents were thankful to learn that the express service is back in the form of FCX. In addition to former riders, FCX also appeals to new riders who use the service for outings to San

Francisco. Survey feedback showed that FCX appeals to a wider range of users than just commuters, including seniors and recreational riders who take FCX to San Francisco to shop and eat.

In conclusion, Route FCX has met or exceeded nearly all of its projected productivity metrics. As passengers view it, FCX is a welcome replacement to their former commute mode. Yet while this study evaluates almost seven months of complete data and trends in normal circumstances, the COVID-19 pandemic poses an unknown future for FCX. With commuters working from home indefinitely, it is unknown whether the ridership trends noted in this study will continue after the pandemic is over, or whether express bus riders will need to commute daily in the future.

FCX Formulas

The following formulas were used to calculate productivity of route FCX.

1.

$$\text{Passengers per vehicle revenue hour} = \frac{\text{Total monthly ridership}}{\text{Monthly vehicle revenue hour}}$$
2. SamTrans' average operating cost of one revenue hour = \$123
3.

$$\text{Total operating cost} = \text{Cost of one revenue hour} * \text{Monthly vehicle revenue hour}$$
4.

$$\text{Farebox recovery} = \frac{\text{Total fare revenue}}{\text{Total operating cost}}$$
5.

$$\text{Cost per passenger} = \frac{\text{Total operating cost}}{\text{Number of boardings}}$$
6.

$$\text{Subsidy per boarding} = \frac{(\text{Total operating cost} - \text{Farebox revenue})}{\text{Number of boardings}}$$

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About the Author

Michelle Louie is a transit service planner in bus operations planning at the San Mateo County Transit District (SamTrans). Her transportation interests include equitable transit access, transportation demand management (TDM), and diversity and inclusion in transportation planning. Prior to SamTrans, she worked in TDM within the private and public sectors to help others optimize their multi-modal travel options. Michelle received her M.S. in Transportation Management from the Mineta Transportation Institute in June 2020 and has a B.A. in Urban Studies and Planning from the University of California, San Diego.

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