Inner East Bay Comprehensive Operational Analysis
Existing Conditions Phase II

Existing Conditions – Phase II

The Inner East Bay Comprehensive Operational Analysis (IEB COA) Existing Conditions Report includes extensive findings on transit markets and current bus and rail transit services as well as system performance. Staff at MTC, AC Transit, and BART asked that additional route level analysis be undertaken to identify route and corridor level findings for the:

- Urban Core network
- Urban Trunk corridors
- Transbay routes

Urban Core Overview

The AC Transit Urban Core is that part of the service area where both development densities and travel patterns support high levels of transit investment with strong ridership throughout the day and week. The market and service analysis undertaken earlier in the COA identified the area from San Leandro and Bay Fair to Richmond and San Pablo as the Urban Core. This part of the Inner East Bay (IEB) is currently served by both BART and AC Transit. The BART IEB network is comprised of five lines with two from the north and two from the south operating to San Francisco with a fifth line serving the IEB between Richmond and Fremont south of Bay Fair. The vast majority of AC Transit's high ridership, high productivity service is found in the Urban Core including its two existing Rapid Bus lines (one of which is transitioning to Bus Rapid Transit).

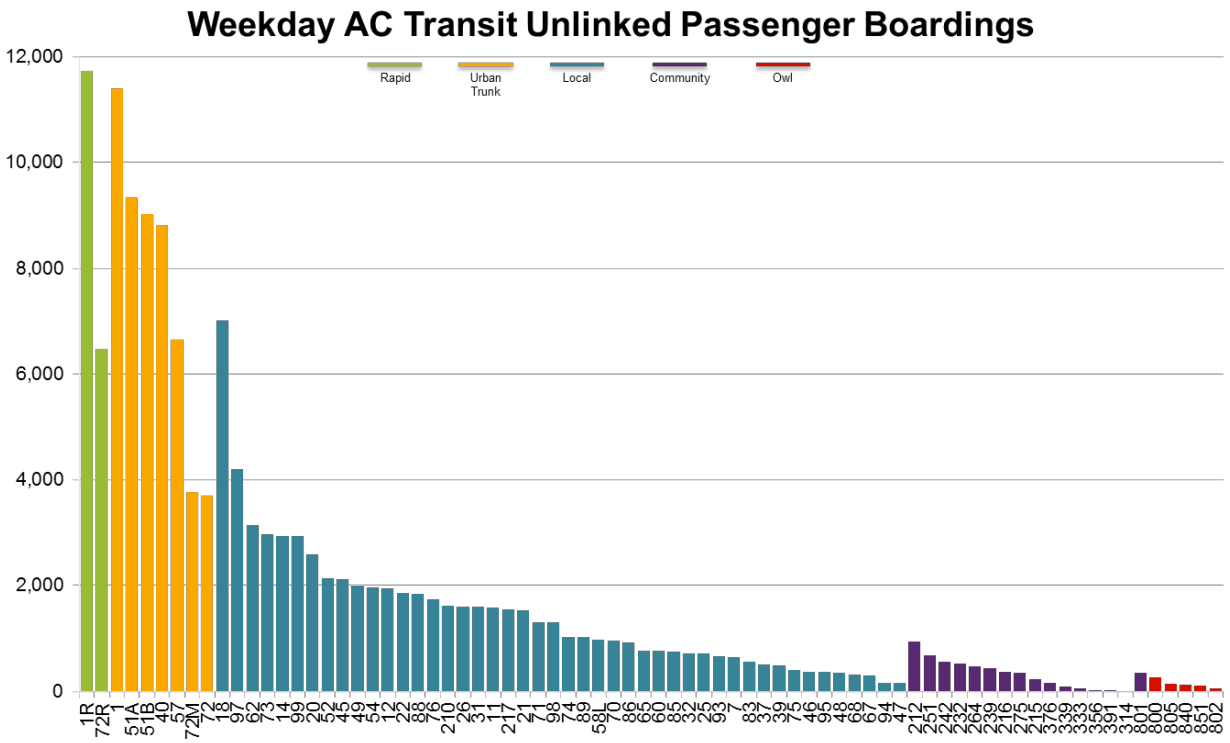
Key findings from the Existing Conditions report included:

- Service Frequencies Most AC Transit routes in the Urban Core operate at frequencies less than the every 10-15 minutes that are necessary to attract the large "show and go" customer market. The existing low frequency of service exacerbates delay further when transfers are required, which is how a high functioning urban transit network should be used. Lastly, the poor on-time performance further degrades the customer experience by making the planned frequencies highly unreliable with impacts doubled for transferring customers.
- Service Tiers There is a significant performance differential between the various service tiers; urban trunk services are much stronger than local, and local services are generally stronger than community routes in terms of overall boardings, passengers per revenue hour, and financial productivity.

- Coverage Service The focus on coverage services, particularly during the recent service reductions, decreases the opportunity to provide "spontaneous use" frequencies on major core corridors. The quality of the core network directly drives the performance of coverage services.
- Operating Speed Slow operating speeds plague bus service throughout the service area, but are worst on the most important high ridership urban trunk lines. Focusing speed improvements on the key corridors first will have the greatest impact and benefit the largest amount of riders.

Service Ridership

The following table presents weekday ridership by route.



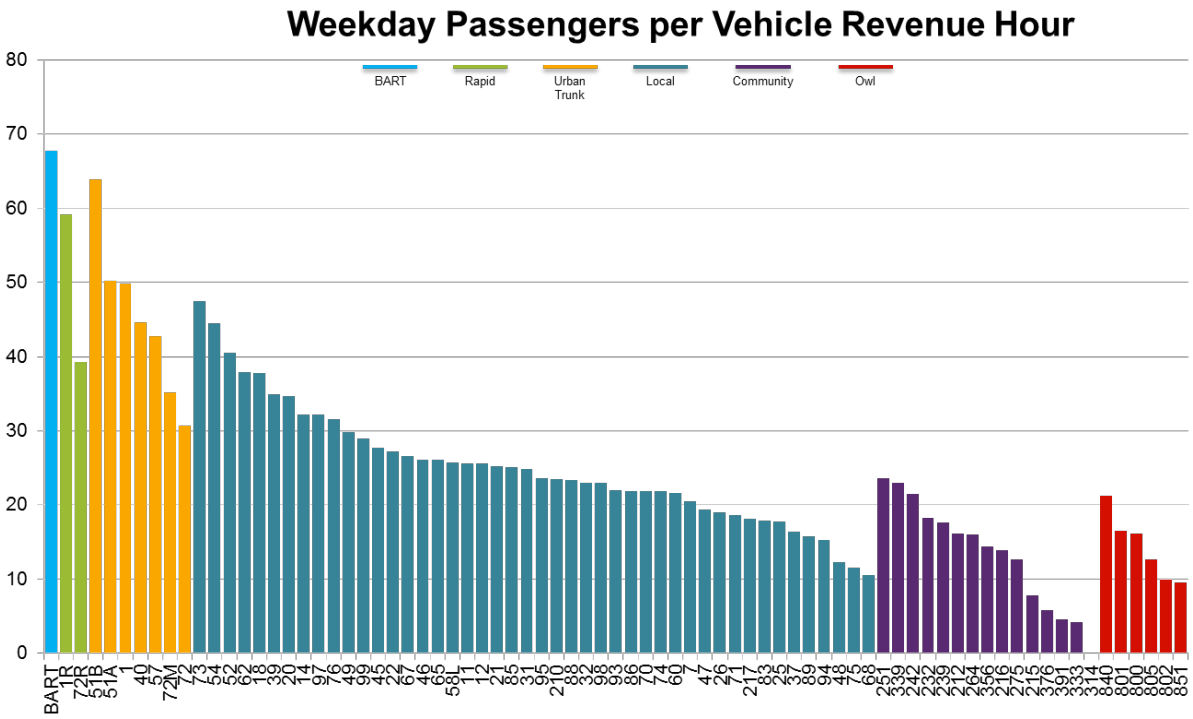
The top five routes (1R, 1, 51A, 51B, 40) account for nearly 1/3 of all AC Transit weekday ridership.

50% of weekday system-wide boardings are generated by the top 12 of 169 weekday routes.

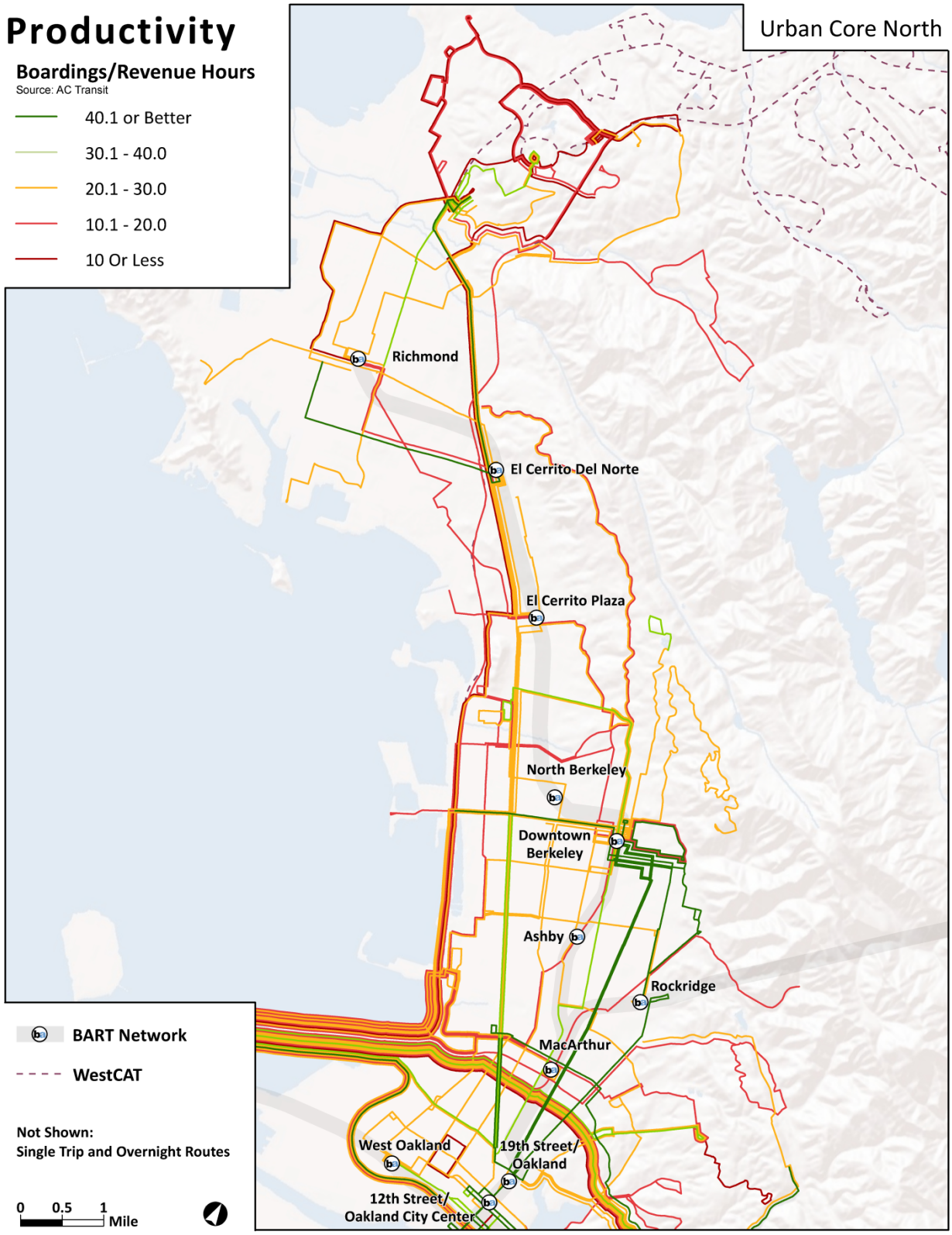
Improvements in just these 12 routes will affect well over half of AC Transit's customers since many customers will use one of these lines for part of their trip (transfer).

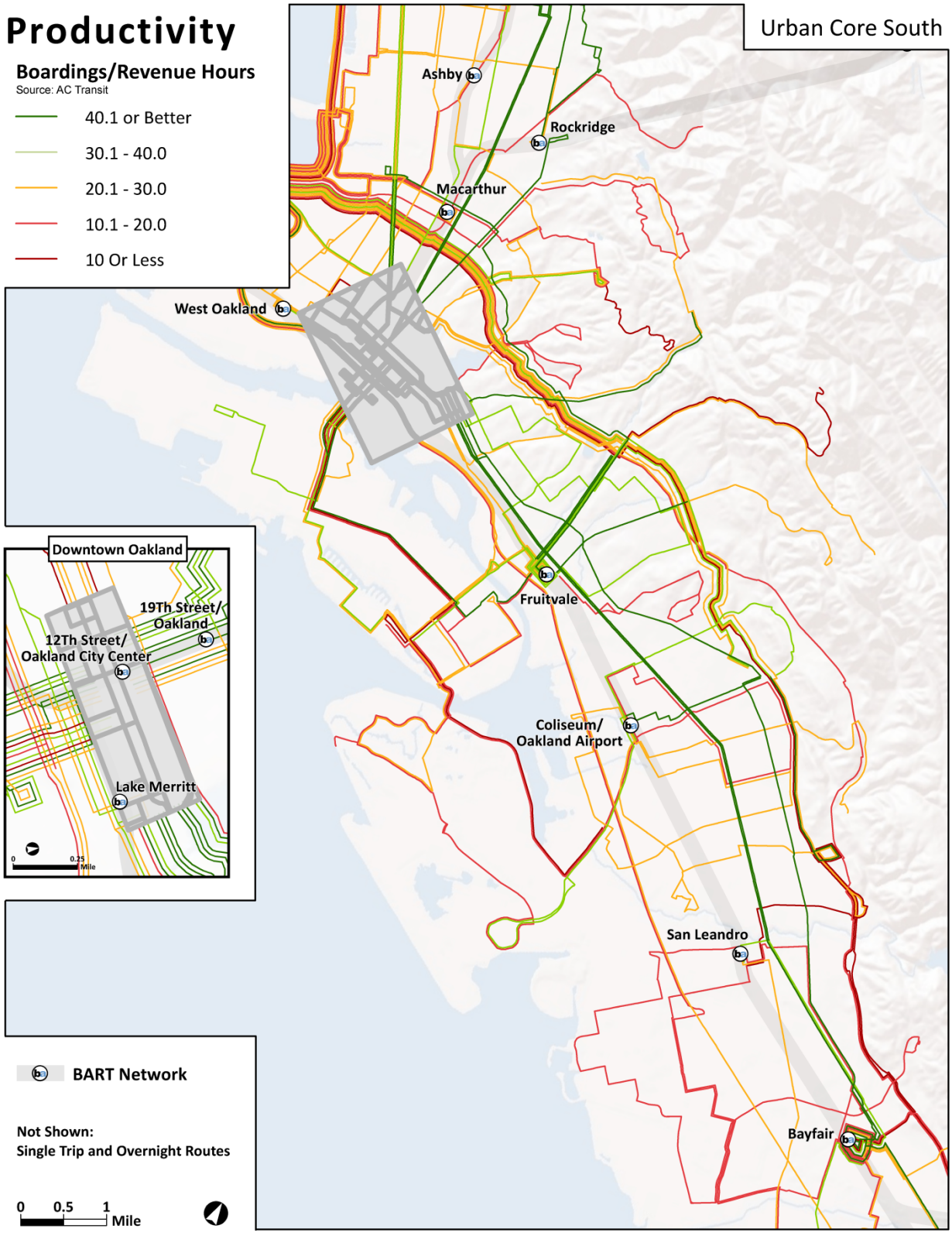
Service Productivity

The following tables present productivity for individual routes, service tiers, and service frequency groups with the following maps depicting service productivity by route segment (the Core Area is broken into two maps for clarity – north and south core).



Individual route performance varies significantly even within service tiers (e.g., Rapid, Urban Trunk, Local, Community) ranging from a high of 60-70 passenger boardings per revenue hour for the 1 Rapid, 51B (College-University), which are comparable to BART's per-car productivity to lows of 10 or fewer passengers per hour for some local and community routes. The high performance is the result of fortuitous market conditions (reasonably dense linear corridors) and not as high as they could be due to slow operating conditions. The low performers comprise the "coverage" part of the system where market conditions do not support frequent transit service.


Productivity
Boardings/Revenue Hours
Source: AC Transit
40.1 or Better
30.1 - 40.0
20.1 - 30.0
10.1 - 20.0
10 Or Less
Urban Core North
Richmond
El Cerrito Del Norte
El Cerrito Plaza
North Berkeley
Downtown Berkeley
Ashby
Rockridge
MacArthur
West Oakland
19th Street/ Oakland
12th Street/ Oakland City Center
BART Network
WestCAT
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile


Productivity
Boardings/Revenue Hours
Source: AC Transit
40.1 or Better
30.1 - 40.0
20.1 - 30.0
10.1 - 20.0
10 Or Less
Urban Core South
Ashby
Rockridge
Macarthur
West Oakland
Downtown Oakland
19Th Street/ Oakland
12Th Street/ Oakland City Center
Lake Merritt
Fruitvale
Coliseum/ Oakland Airport
San Leandro
Bayfair
BART Network
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile

Bus Network Frequency

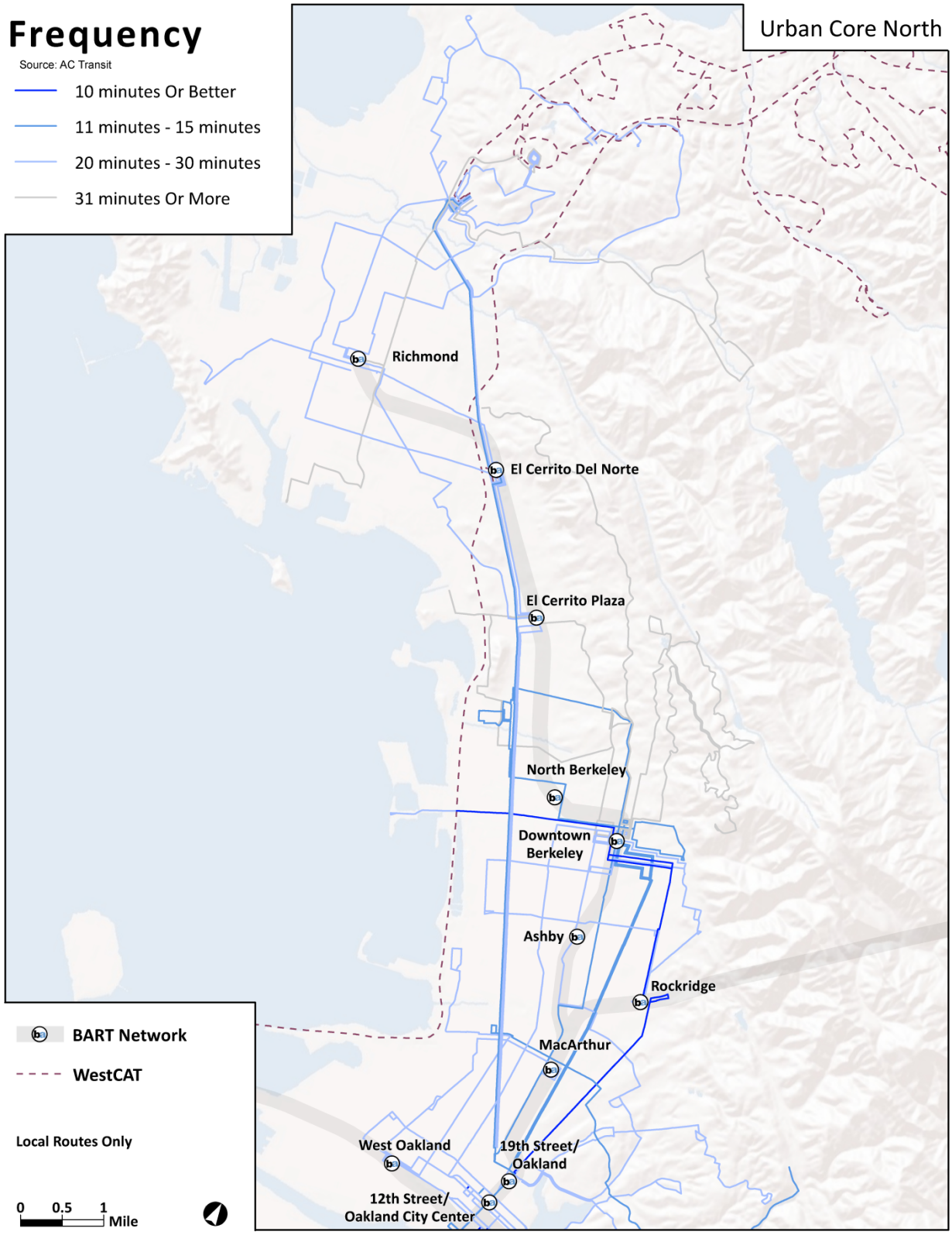
The following maps show frequency by route broken into four key thresholds:

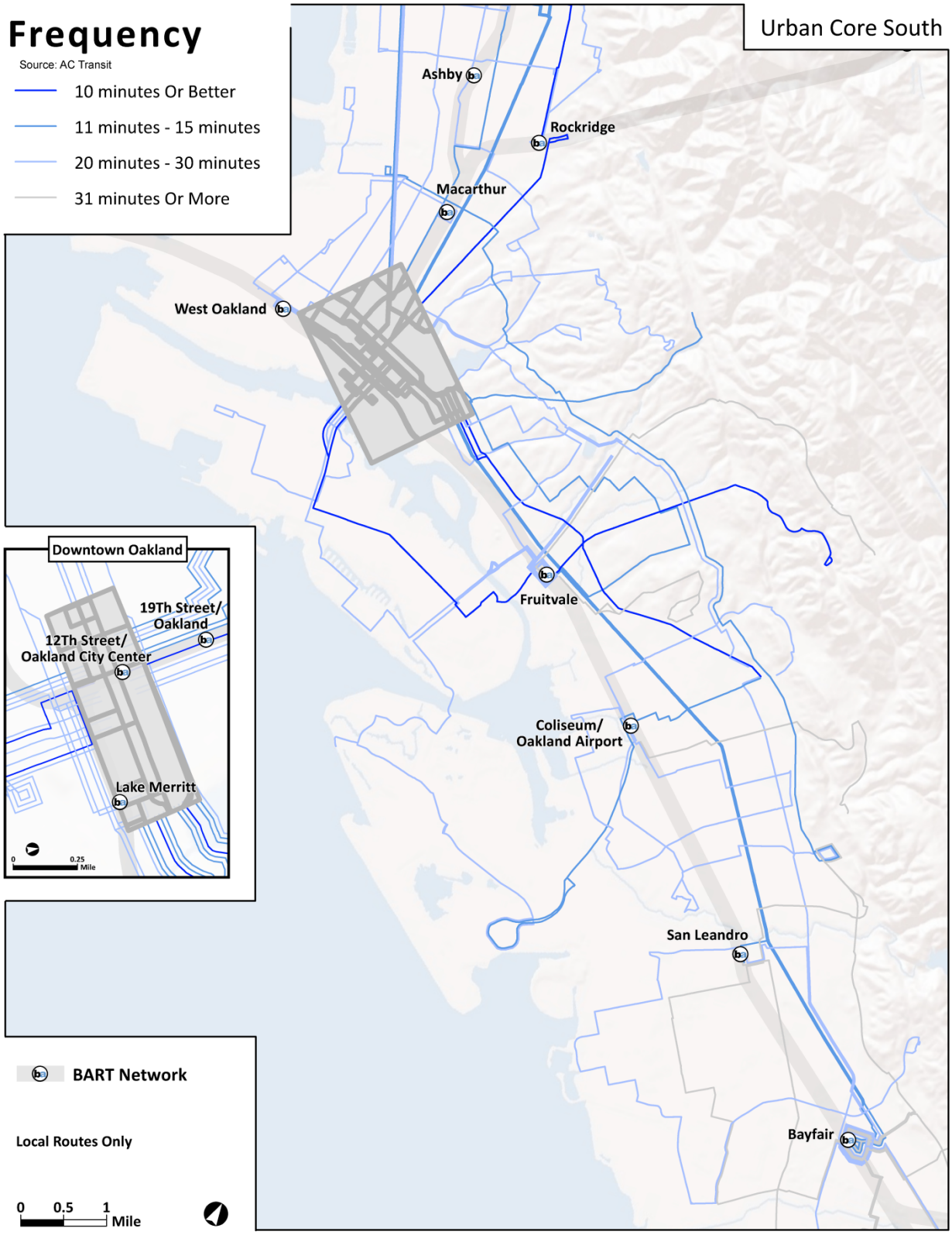
- 10 minutes or better – the threshold needed to begin to attract the large "show and go" customer market. While new "real-time trip arrival information" appears to improve the experience for customers who plan their arrivals at the stop, all of the evidence indicates that to capture a significant market share of the huge "on-demand" travel market, frequencies of 10 minutes or better are needed.
- 11-15 minutes – at these frequencies about half of the riders plan their arrival at the stop around trip times while half "just show up." The minimum threshold for a reasonable effective urban core network.
- 20-30 minutes – the vast majority plan their arrival at the stop around the published trip times. At these frequencies, real-time information can improve the customer experience. Some riders of choice, but comprised of mostly riders without choice for particular trip.
- More than 30 minutes – nearly everyone plans their stop arrival around trip times. Ridership made up of customers making the same required trip daily (e.g., commute or school) or use the service as a lifeline. This is lifeline coverage service.

Importantly, frequency has a key linkage with productivity when higher frequencies are matched with strong market areas. The following table presents frequency and productivity together with the percent of operating cost. For instance, just ¼ of AC Transit's operating cost is invested in service operating every 10 minutes or better, but it generates almost twice the ridership per hour of 20-30 minute service and over three times the ridership of services operating less frequently than every 30 minutes. Over half of AC Transit's operating budget is invested in services averaging fewer than 25 passenger boardings per revenue hour.

Frequency	Percent of Cost	Productivity
10 Minutes	26%	52.2 pph
11-15 Minutes	19%	41.0 pph
20-30 Minutes	37%	24.7 pph
45-75 Minutes	18%	16.8 pph

Reinvesting 10 percent of the operating budget from services averaging 20 passengers per hour (pph) to 50 per hour will generate an **operating budget revenue increase of $4.6 million annually** that can be spent on more service including maintaining coverage service, facilitating ongoing financial sustainability. The key is to invest in and protect the highly productive services.


Frequency
Source: AC Transit
10 minutes Or Better
11 minutes - 15 minutes
20 minutes - 30 minutes
31 minutes Or More
Urban Core North
Richmond
El Cerrito Del Norte
El Cerrito Plaza
North Berkeley
Downtown Berkeley
Ashby
Rockridge
MacArthur
West Oakland
19th Street/ Oakland
12th Street/ Oakland City Center
BART Network
WestCAT
Local Routes Only
0 0.5 1 Mile


Frequency
Source: AC Transit
10 minutes Or Better
11 minutes - 15 minutes
20 minutes - 30 minutes
31 minutes Or More
Urban Core South
Ashby
Rockridge
Macarthur
West Oakland
Downtown Oakland
19Th Street/ Oakland
12Th Street/ Oakland City Center
Lake Merritt
0 0.25 Mile
Fruitvale
Coliseum/ Oakland Airport
San Leandro
Bayfair
BART Network
Local Routes Only
0 0.5 1 Mile

Operating Speeds

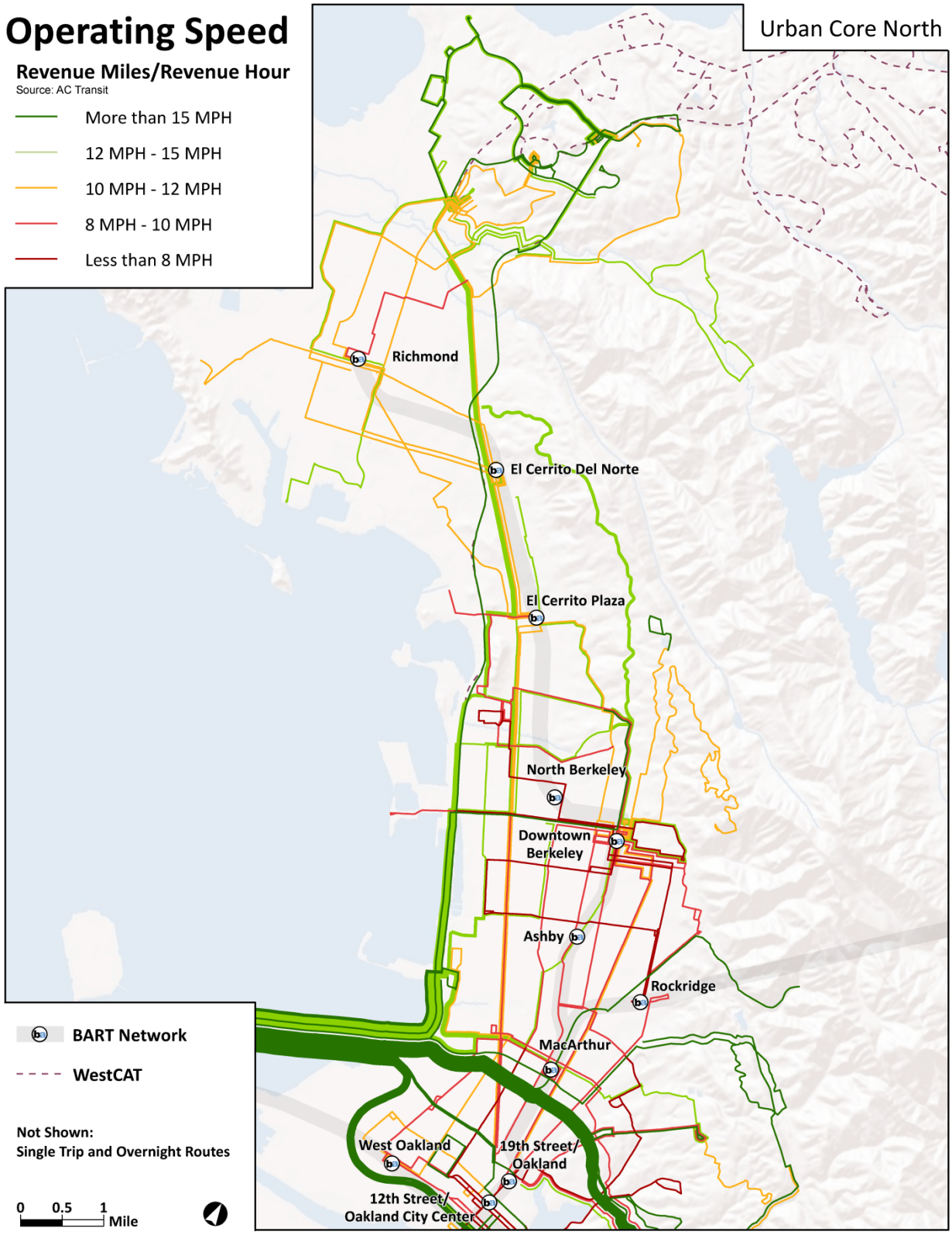
Productivity is a function of both ridership generation and revenue hours required for the service. Frequency and operating speed are the two key controllable elements in revenue hours (the miles are a function of the route alignment). The table below indicates that AC Transit has slow operating speeds for all service tiers. For instance, while the Rapid operates 20 percent faster than the local (an industry best practice minimum) it runs at a speed much slower than in other cities (e.g., LA's Wilshire Rapid Bus operates at around 15-16 mph without bus lanes).

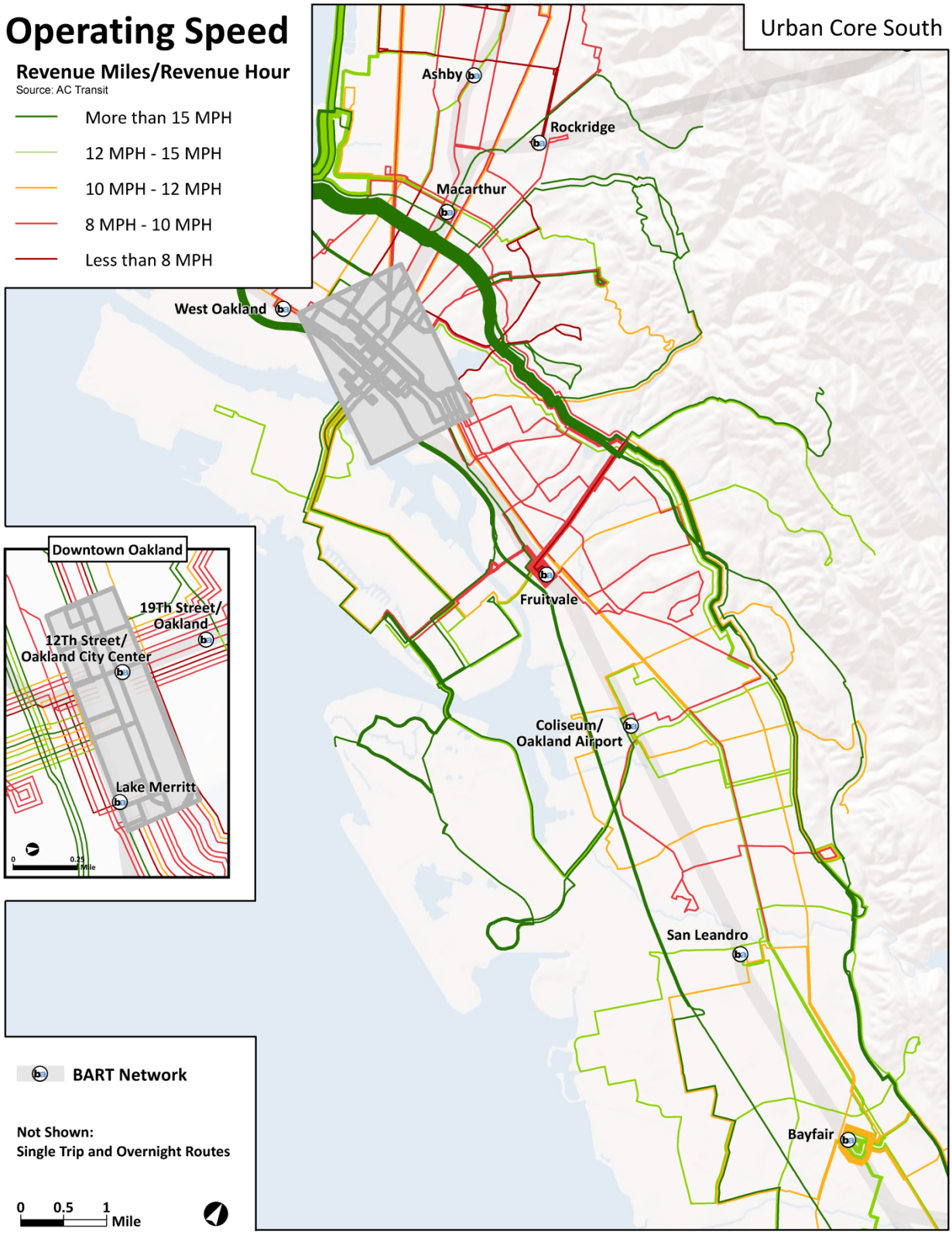
Average	Rapid	Urban Trunk	Local
Productivity	50.1	46.4	25.8
Speed (mph)	11.4	9.5	10.7

Improving operating speed **pays off in two ways:** 1) faster travel will attract more customers and operating revenue and 2) faster service requires fewer hours and buses reducing the operating cost.

A 10 percent improvement in operating speed (just 1 mph) between operating cost savings and increased operating revenue will **positively impact the operating budget by approximately $15 million.**

The maps that follow detail operating speed by route segment and present opportunities for targeted delay reduction initiatives.


Operating Speed
Revenue Miles/Revenue Hour
Source: AC Transit
More than 15 MPH
12 MPH - 15 MPH
10 MPH - 12 MPH
8 MPH - 10 MPH
Less than 8 MPH
Urban Core North
Richmond
El Cerrito Del Norte
El Cerrito Plaza
North Berkeley
Downtown Berkeley
Ashby
Rockridge
MacArthur
West Oakland
19th Street/ Oakland
12th Street/ Oakland City Center
BART Network
WestCAT
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile


Operating Speed
Revenue Miles/Revenue Hour
Source: AC Transit
More than 15 MPH
12 MPH - 15 MPH
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Urban Core South
Ashby
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Lake Merritt
Fruitvale
Coliseum/ Oakland Airport
San Leandro
Bayfair
BART Network
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile

Urban Trunk Overview

The Existing Conditions report identified seven Urban Trunk corridors in the Urban Core area:

- International
- Telegraph
- Broadway-Santa Clara
- College-University
- San Pablo
- MacArthur
- Foothill

These corridors were broken down in their component segments and analyzed in terms of service, ridership, productivity, operating speed, and how the various services on the corridor work in concert or competition with one and other. Specific Corridor Profiles can be found in Appendix A.

Urban Trunk Corridor Service and Ridership Summary

Corridor	Route	Route Miles	Total Boardings	Passenger Miles*	Revenue Hours
Macarthur (Consolidated Segment)	57	7.7	4,308	15,363	106
	58L	5.5	661	2,287	22
	NL	5.5	1,146	7,033	45
	Corridor (to Lakeshore)	**7.7**	**6,115**	**24,683**	**172**
Macarthur (Branches)	57 (to San Pablo:40th)	2.9	2,341	8,274	50
	58L (to Alice:2nd)	3.0	315	1,147	16
	NL (to SF Terminal)	10.2	1,322	8,929	48
San Pablo (Consolidated Segment)	72	10.6	2,383	8,859	80
	72M	10.6	2,516	9,826	74
	72R	10.6	4,565	20,563	120
	Corridor (to Del Norte BART)	**10.6**	**9,464**	**39,248**	**274**
San Pablo (Branches)	72 (to Hilltop Mall)	6.7	1,315	6,043	40
	72M (to Point Richmond)	5.1	1,259	3,769	34
	72R (to Contra Costa College)	3.3	1,914	7,290	45
Telegraph	1	5.4	3,666	11,210	73
	1R	5.4	3,879	14,049	68
	Corridor	**5.4**	**7,545**	**25,258**	**141**
International	1	11.6	7,742	32,460	155
	1R	11.6	7,861	40,044	130
	Corridor	**11.6**	**15,603**	**72,504**	**285**

** Calculated as average load on board times distance to the next stop. Function of ridership and trip length.*

Corridor	Route	Route Miles	Total Boardings	Passenger Miles*	Revenue Hours
Foothill	40	12.3	8,823	30,313	198
	Corridor	**12.3**	**8,823**	**30,313**	**198**
Broadway/Santa Clara	51A	8.7	9,337	25,426	186
	Corridor	**8.7**	**9,337**	**25,426**	**186**
College/University	51B	5.3	9,030	13,248	141
	Corridor	**5.3**	**9,030**	**13,248**	**141**

Urban Trunk Performance Indicators

Corridor	Route	Boardings Per Route Mile	Passenger Miles Per Route Mile	Boardings per Revenue Hour	Pass. Miles per Revenue Hour
Macarthur (Consolidated Segment)	57	559	1,995	40.7	145.2
	58L	120	416	30.7	106.1
	NL	208	1,279	25.5	156.6
	Corridor (to Lakeshore)	**794**	**3,206**	**35.5**	**143.3**
Macarthur (Branches)	57 (to San Pablo:40th)	807	2,853	46.8	165.5
	58L (to Alice:2nd)	105	382	19.7	71.7
	NL (to SF Terminal)	130	875	27.5	186.0
San Pablo (Consolidated Segment)	72	225	836	29.8	110.7
	72M	237	927	34.0	132.8
	72R	431	1,940	38.0	171.4
	Corridor (to Del Norte BART)	**893**	**3,703**	**34.5**	**143.2**
San Pablo (Branches)	72 (to Hilltop Mall)	196	902	32.9	151.1
	72M (to Point Richmond)	247	739	37.0	110.9
	72R (to Contra Costa College)	580	2,209	42.5	162.0
Telegraph	1	679	2,076	50.2	153.6
	1R	718	2,602	57.0	206.6
	Corridor	**1,397**	**4,677**	**53.5**	**179.1**
International	1	667	2,798	49.9	209.4
	1R	678	3,452	60.5	308.0
	Corridor	**1,345**	**6,250**	**54.7**	**254.4**
Foothill	40	717	2,464	44.6	153.1
	Corridor	**717**	**2,464**	**44.6**	**153.1**
Broadway/Santa Clara	51A	1,073	2,923	50.2	136.7
	Corridor	**1,073**	**2,923**	**50.2**	**136.7**
College/University	51B	1,704	2,500	64.0	94.0
	Corridor	**1,704**	**2,500**	**64.0**	**94.0**

Urban Trunk Operating Speeds

Corridor	Route	Average Operating Speed (PM Peak)	Segment with Slowest Speed (PM Peak)	Operating Speed (Segment with Slowest Speed)
Macarthur (Consolidated Segment)	57	11.6	Eastmont to High	9.8
	58L	14.1	Eastmont to High	13.3
	NL	14.6	Eastmont to High	11.6
	Corridor (to Lakeshore)	**13.0**		
San Pablo (Consolidated Segment)	72	9.8	Oakland Amtrak to San Pablo Av:40th St	8.1
	72M	10.3	Oakland Amtrak to San Pablo Av:40th St	8.7
	72R	11.7	Oakland Amtrak to San Pablo Av:40th St	10.7
	Corridor (to Del Norte BART)	**10.8**		
Telegraph	1	9.1	12th St BART to Telegraph Av:40th St	9
	1R	11.0	Telegraph Av:40th St to Berkeley BART	9.3
	Corridor	**10.0**		
International	1	11.4	San Leandro BART to Int'l:Hegenberger:73rd	10.8
	1R	13.7	Fruitvale BART to 12th St BART	12.2
	Corridor	**12.5**		
Foothill	40	11.1	Foothill:Fruitvale Av to 11th St:Jefferson St	8.9
	Corridor	**11.1**		
Broadway/Santa Clara	51A	10.6	12th St BART to Rockridge BART	9.3
	Corridor	**10.6**		
College/University	51B	7.6	Berkeley BART to Berkeley Amtrak	6.8
	Corridor	**7.6**		

Urban Trunk Passenger Loads

Corridor	Route	Segment with Highest Average Load (PM Peak)	Operating Speed (Segment with Highest Average Load)
Macarthur (Consolidated Segment)	57	Fruitvale to Lakeshore (274)	12.2
	58L	Fruitvale to Lakeshore (53)	14.7
	NL	Fruitvale to Lakeshore (177)	15.8
	Corridor (to Lakeshore)		
San Pablo (Consolidated Segment)	72	40th to University (77)	10.9
	72M	40th to University (85)	11.1
	72R	40th to University (244)	10.7
	Corridor (to Del Norte BART)		

Corridor	Route	Segment with Highest Average Load (PM Peak)	Operating Speed (Segment with Highest Average Load)
Telegraph	1	12th St BART to Telegraph:40th (221)	9.0
	1R	12th St BART to Telegraph:40th (251)	12.6
	Corridor		
International	1	Int'l:Hegenberger:73rd to Fruitvale BART (263)	11.3
	1R	Int'l:Hegenberger:73rd to Fruitvale BART (363)	13.8
	Corridor		
Foothill	40	Eastmont TC to Fruitvale Av (321)	11.1
	Corridor		
Broadway/Santa Clara	51A	Fruitvale BART to 12th St BART (256)	11.5
	Corridor		
College/University	51B	Rockridge BART to Berkeley BART (327)	7.5
	Corridor		

Urban Trunk Productivity and Speed Summary

Corridor	Route	Boardings per Revenue Hour	Average Operating Speed (PM Peak)
Macarthur (Consolidated Segment)	57	40.7	11.6
	58L	30.7	14.1
	NL	25.5	14.6
	Corridor (to Lakeshore)	**35.5**	**13.0**
Macarthur (Branches)	57 (to San Pablo/40th)	46.8	7.3
	58L (to Alice/2nd)	19.7	9.2
	NL (to SF Terminal)	27.5	19.3
San Pablo (Consolidated Segment)	72	29.8	9.8
	72M	34.0	10.3
	72R	38.0	11.7
	Corridor (to Del Norte BART)	**34.5**	**10.8**
San Pablo (Branches)	72 (to Hilltop Mall)	32.9	12.4
	72M (to Point Richmond)	37.0	10.5
	72R (to Contra Costa College)	42.5	13.3
Telegraph	1	50.2	9.1
	1R	57.0	11.0
	Corridor	**53.5**	**10.0**

Corridor	Route	Boardings per Revenue Hour	Average Operating Speed (PM Peak)
International	1	49.9	11.4
	1R	60.5	13.7
	Corridor	**54.7**	**12.5**
Foothill	40	44.6	11.1
	Corridor	**44.6**	**11.1**
Broadway/Santa Clara	51A	50.2	10.6
	Corridor	**50.2**	**10.6**
College/University	51B	64.0	7.6
	Corridor	**64.0**	**7.6**

AC Transit has seven excellent Urban Trunk corridors in the Urban Core area. Summary findings for each of the corridors focus on both individual corridor and Urban Trunk network opportunities.

- International – slated to become a Bus Rapid Transit corridor with a combination of local and BRT service in operation. The BRT implementation will break AC Transit's most successful route pair into two separate routes. As with the other corridors with existing Rapid service, the differentials were found with the Rapids much more productive in terms of both boardings (unexpected) and passenger miles (expected) per revenue hour and faster by some 20 percent.
- Telegraph –. Failure to secure lanes in Berkeley have led AC Transit to consider less priority on the corridor and breaking it from the "true" BRT on International. The Rapid Bus shows the same positive differentials over Local Bus service as on International.
- Broadway/Santa Clara – is part of an MTC Urban Trunk speed improvement pilot project together with College/University. Currently highly frequent, single service type (not counting the separately marketed Transbay service) with very good productivity. Slow operation, but significantly faster than the 51B Berkeley route. Originally paired with 51B, broken in the interest of improved operating performance. The City of Alameda supported a nearby parallel street for BRT in the Alameda County Transportation Initiative (at this time appears to have fallen short by a handful of votes from securing 2/3 passage).
- College/University – part of MTC speed improvement initiative (see above). Very frequent route with excellent productivity, but very slow speed (averaging just 7.6 mph). If it ran at the same speed as the 51A (still slow, but faster) it would generate at least 100 passengers per hour simply from more efficient and effective use of vehicle and operator resources.
- San Pablo – good productivity for the corridor served by a Rapid and two Local routes split between branches. Service frequencies not meeting 10 minute threshold for successful Rapid service (12 minutes) with the Locals combining for just 15 minutes (30 minutes each). Opportunity to simplify corridor with one Local and one Rapid operating more frequently and faster.

- Foothill – strong corridor productivity from a largely residential community angling between the very strong International and MacArthur Urban Trunk corridors. Operating speed is still low at just 11 mph.
- MacArthur – a challenging corridor with right-of-way discontinuity weaving around the I-580 Freeway. Served by a daunting number of routes running unique patterns (morning and afternoon Transbay service operates differently). The three main services (57, 57L, NL) were the focus on the analysis because they serve the Urban Trunk (Transbay NL was included because 60 percent of the riders were local, not Transbay). Corridor is not as productive as the other Urban Trunks with the 58L being surprisingly weak given that it is the only service to downtown Oakland, but not surprising given the limited consumer market attracted to a 30-minute frequency. Both the 57 and NL operate every 15 minutes during the peaks providing some attraction for customers with choice. The 58L and NL with limited stops operate much faster than the very slow 57 Local service (stops are very close together over much of the route).

Summary

Branding AC Transit should focus its branding of Urban Trunk services on the customer experience. The experience is short waits in a comfortable, secure stop or station, fast travel (much faster than today), on comfortable state-of-the-art vehicles with clearly demarcated liveries.

Speed Improvement Despite AC Transit's efforts to date, Urban Trunk operating speeds are very slow, with both Local and Rapid service lagging (although they show an expected 20 percent speed differential). The International BRT and Telegraph BRT/Rapid together with the MTC pilot for the 51 A/B (Santa Clara/Broadway and College/University) are a good initial program assuming that the expectation bar is not set too low.[1]

Wait Times AC Transit's best lines don't meet the minimum frequency for Rapid/BRT success of at least 10 minutes (ACT's Rapid lines are at best every 12 minutes). One suggested lower cost option is to operate the Rapids every 10 minutes and the Locals every 15 minutes (likely save one bus that can be reinvested).[2]

Simplify Corridor Service Choices While most of the Urban Trunk corridors have a simple service structure that is easy for consumers to understand and easy for operators to deliver reliably, both the MacArthur and San Pablo corridors are complicated. As part of the Urban Core and Transbay service restructuring, consideration should be given to rethinking the service structure on these corridors.

Match the Service to the Corridor Depending on the corridor, market density, and network role, the service structure should be adjusted to the best advantage for AC Transit and its customers. For instance, in assessing the 51 A/B the structure has several options that balance high frequency, stop spacing access, and corridor service complexity:

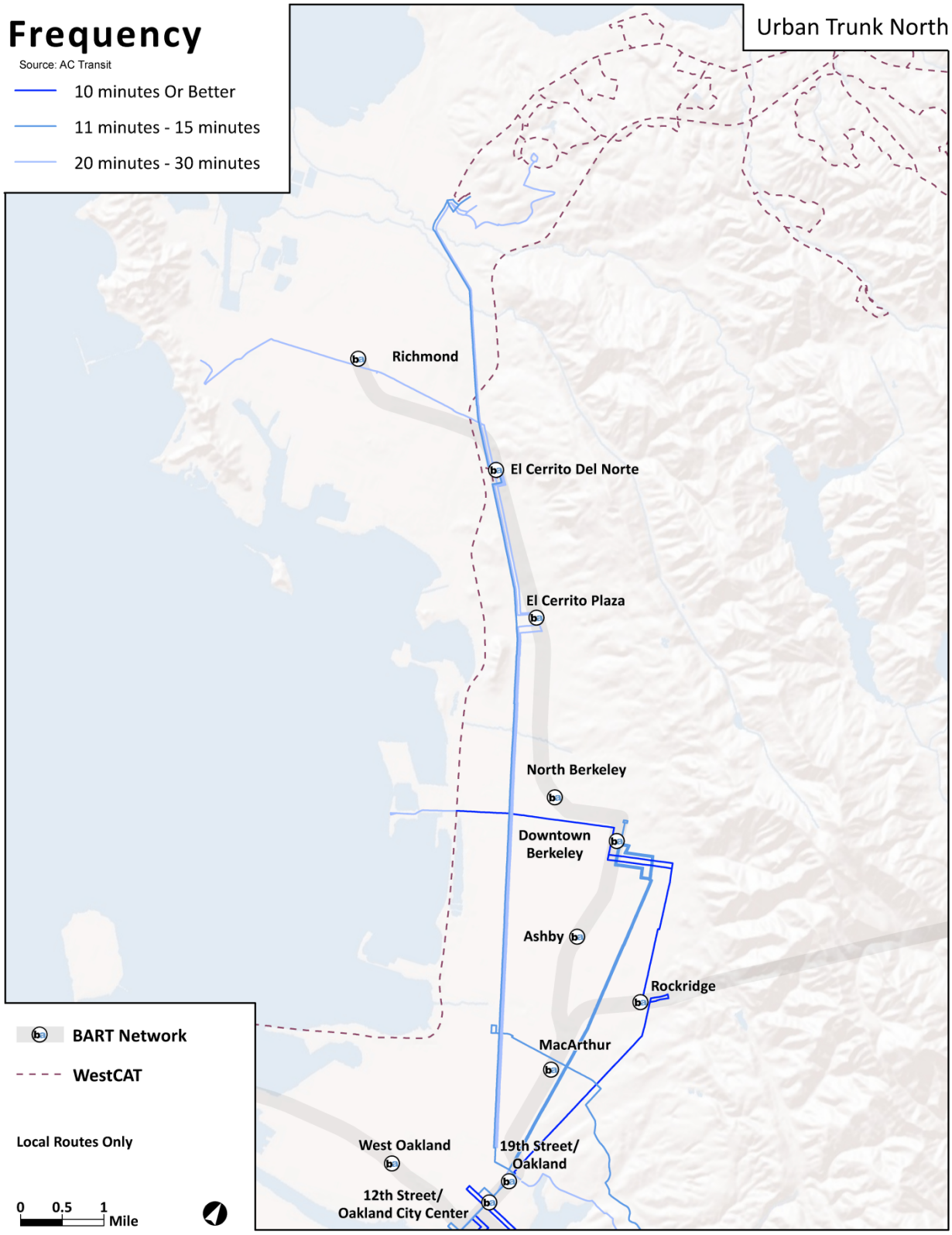
[1] For instance, LA Metro and LADOT used unconstrained transit operating speeds (free running with no timepoints) from late evening and very early morning to set the target for speed improvement.

[2] For example, Santa Monica Big Blue Bus recently switched it Pico corridor service from one where the Local (7) was more frequent to one where the Rapid (R7) had the higher frequency and experienced a 16 percent increase in ridership.

- A combination of Local and Rapid/BRT bus transit on the same right-of-way.
- A single service that provides a combination of Local and Rapid/BRT customer experience: stop spacing somewhere between Rapid/BRT and regular tight Local (i.e., around ¼ to 1/3 mile), 10-minute or better frequency, and the stop/station and vehicle experience of AC Transit's enhanced transit brand. Basically a Rapid/BRT with closer stop spacing than possible with a separate underlying local service.

The choices are heavily influenced by the ability of the corridor to support frequent transit and AC Transit's ability to afford frequent service. Given that the passenger wait experience trumps the in-vehicle speed in attracting and retaining customers, preference should always be given to maintaining high frequency on the Rapid/BRT service. If the Rapid cannot operate at least every 10-minutes with a Local supporting it,[3] then consideration of a faster Rapid/Local hybrid should be considered.

[3] For most Urban Trunk corridors at other transit systems the Locals run less frequently than Rapids or BRT; usually operating every 10-15 minutes, but in some cases just as lifeline Locals every 30 minutes.


Frequency
Source: AC Transit
10 minutes Or Better
11 minutes - 15 minutes
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Urban Trunk North
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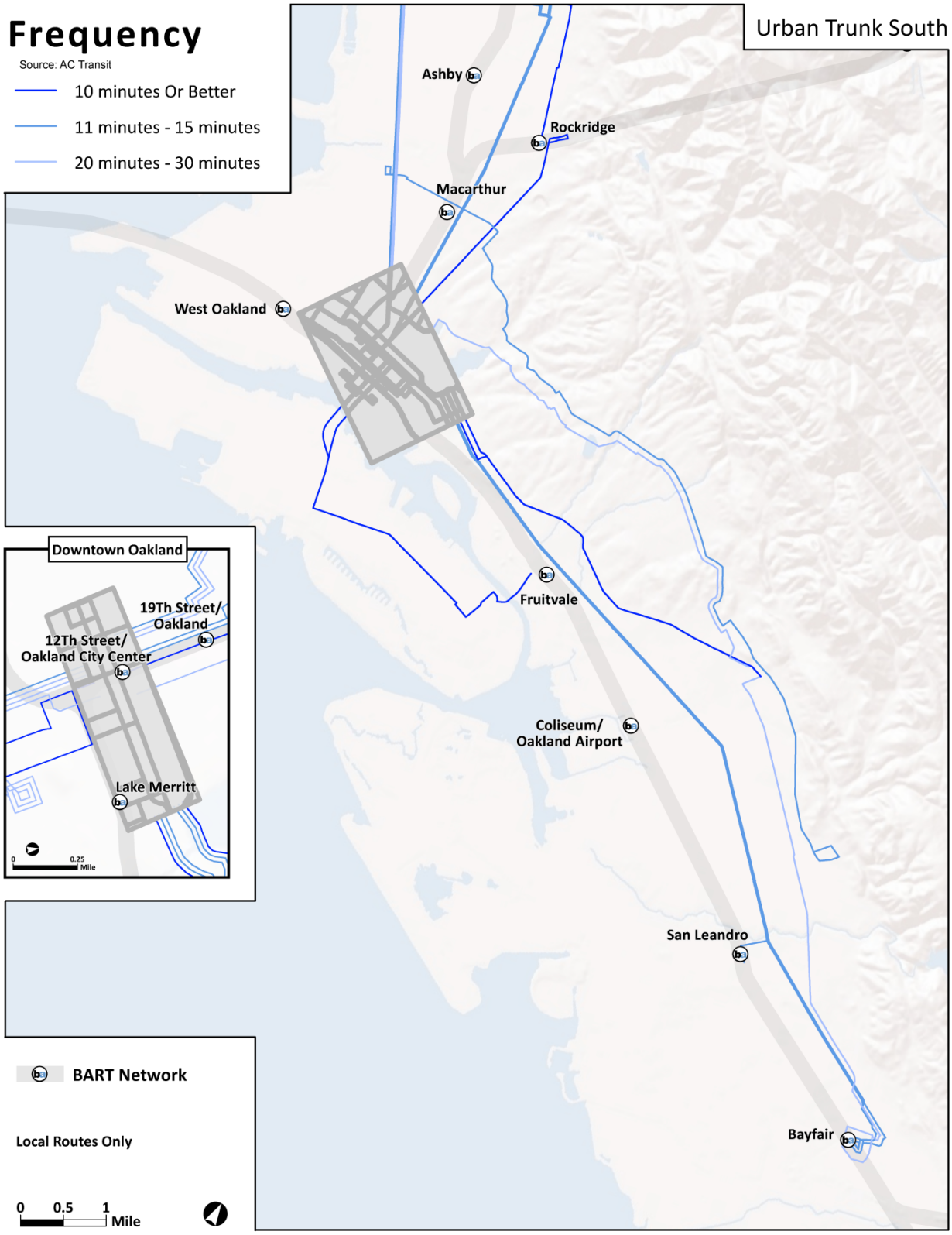
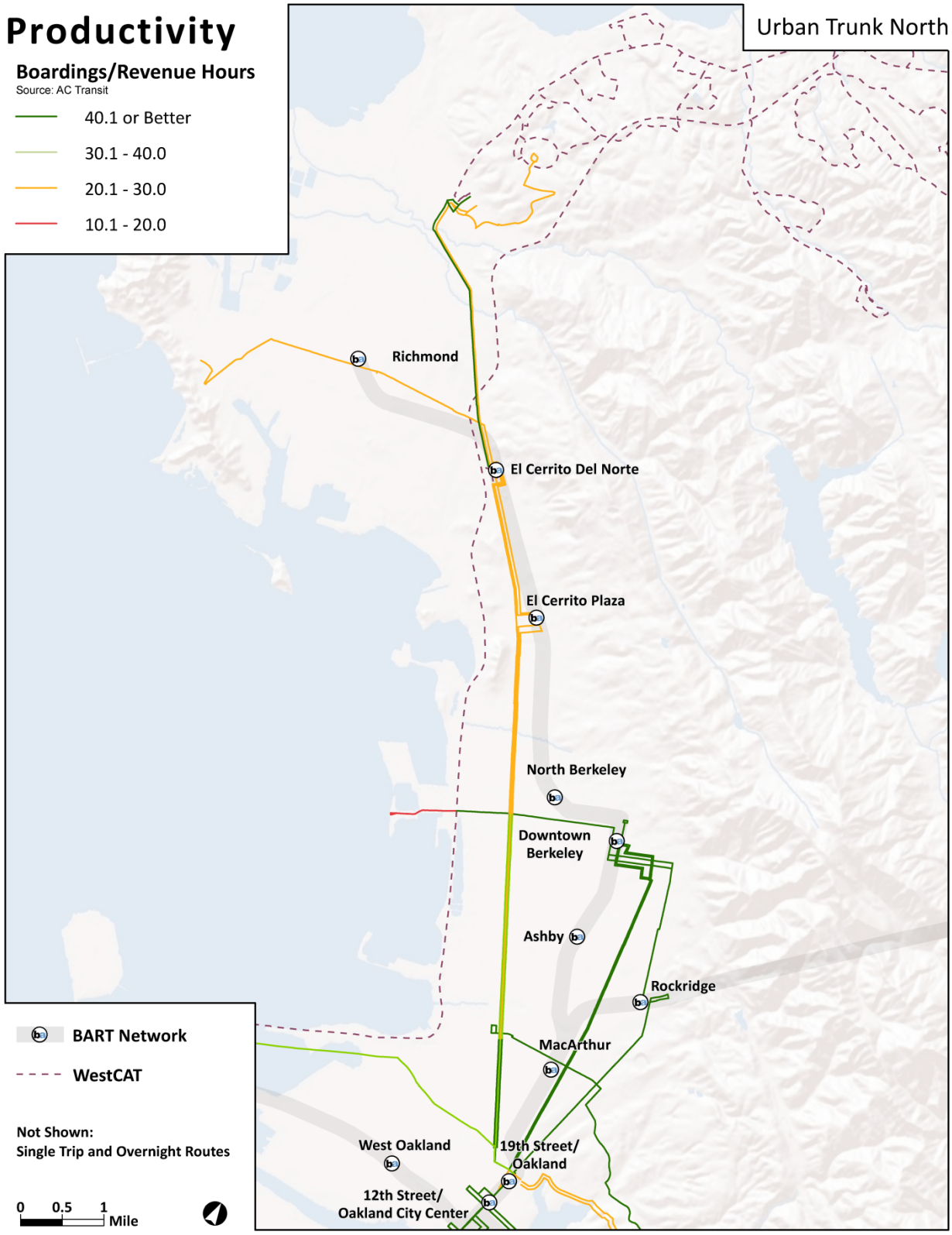
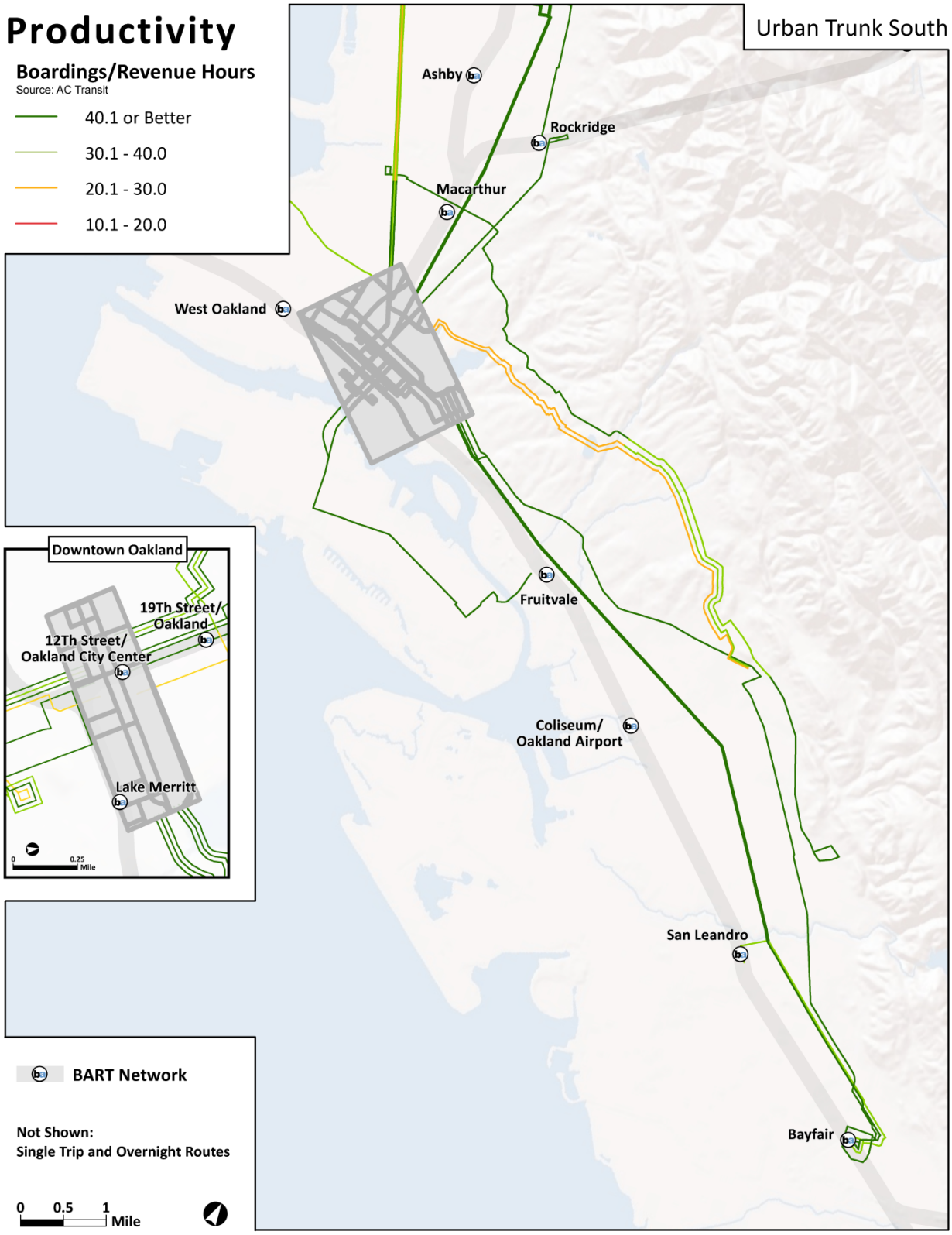
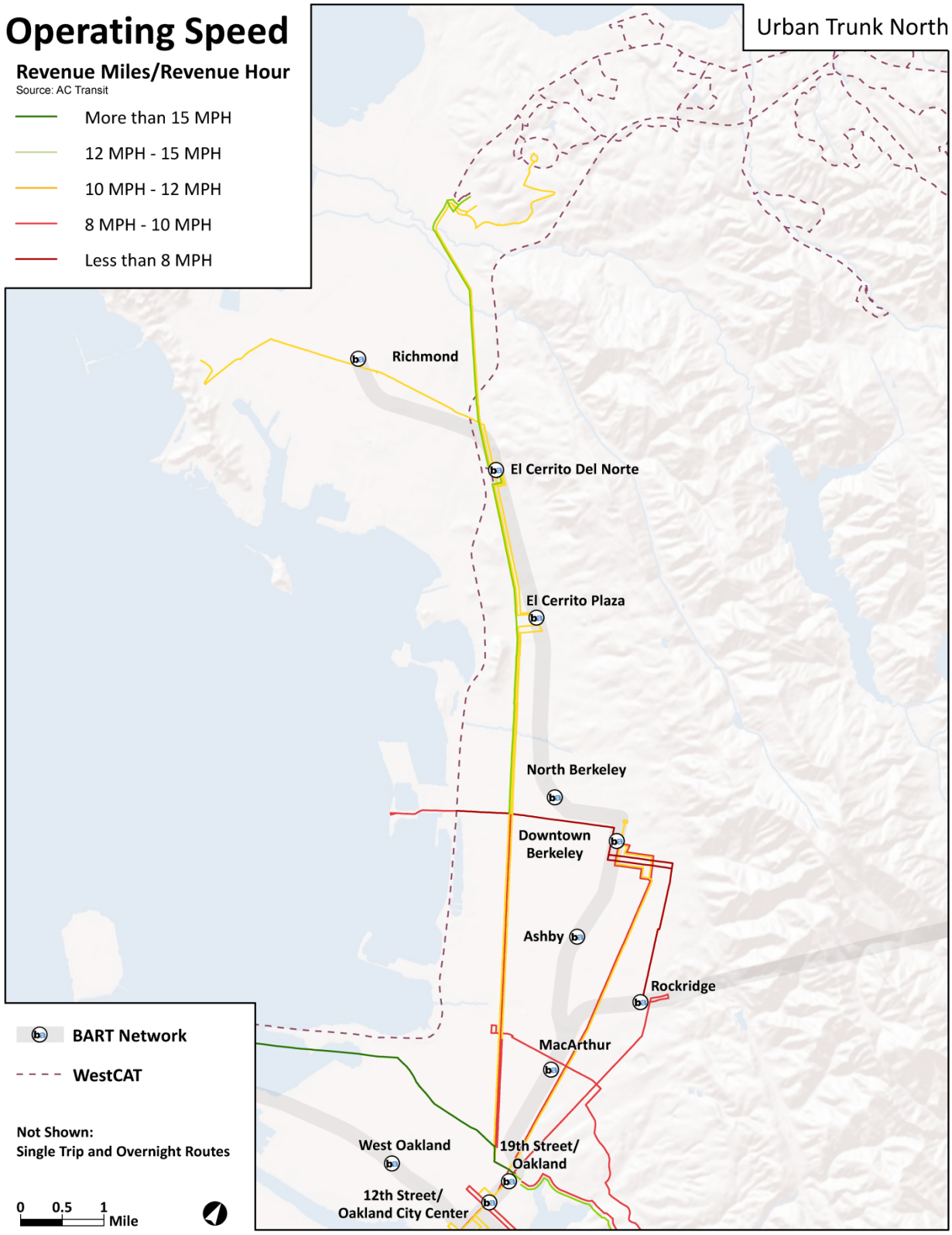
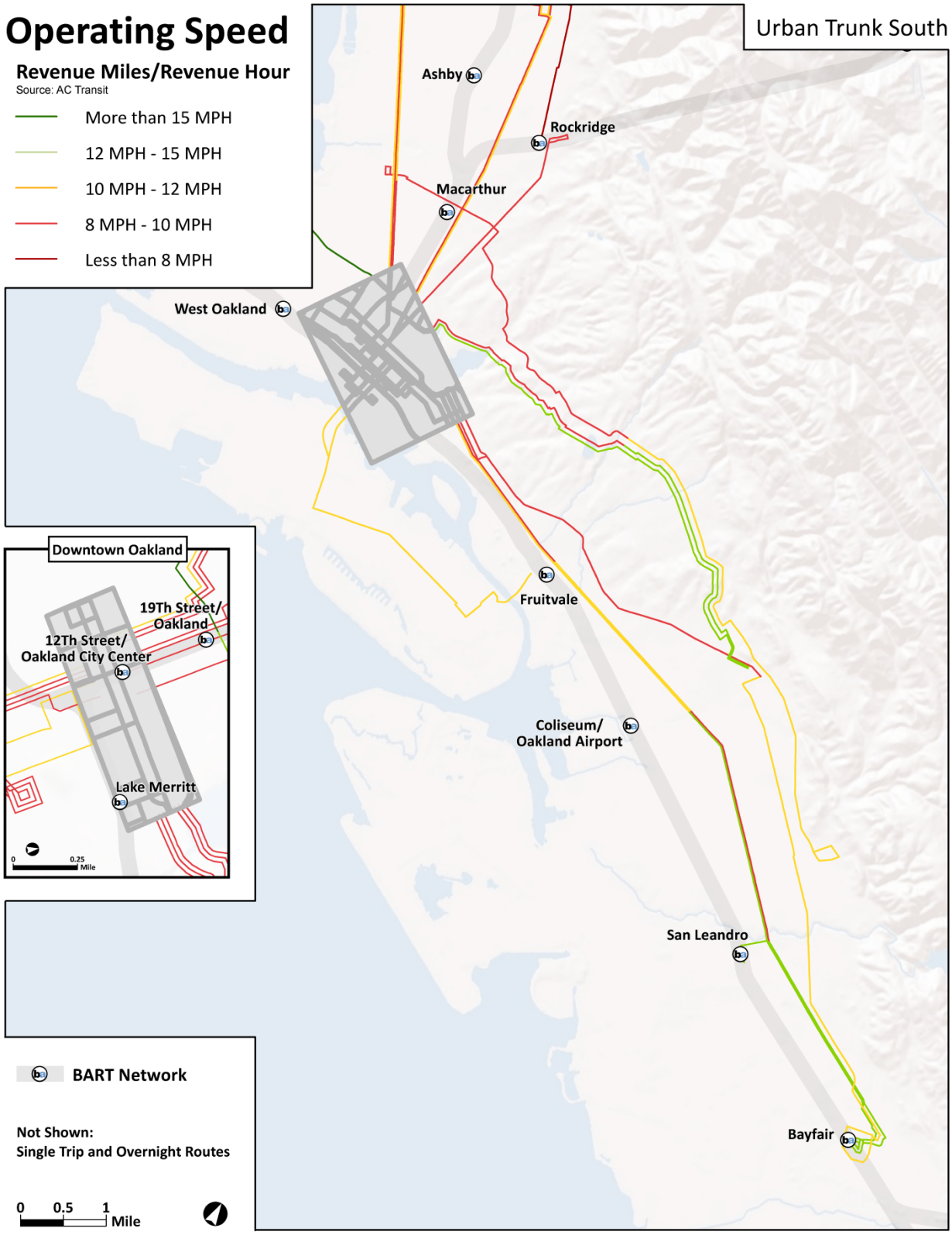
12th Street/ Oakland City Center
BART Network
WestCAT
Local Routes Only
0 0.5 1 Mile


Frequency
Source: AC Transit
10 minutes Or Better
11 minutes - 15 minutes
20 minutes - 30 minutes
Urban Trunk South
Ashby
Rockridge
Macarthur
West Oakland
Downtown Oakland
19Th Street/ Oakland
12Th Street/ Oakland City Center
Lake Merritt
0 0.25 Mile
Fruitvale
Coliseum/ Oakland Airport
San Leandro
Bayfair
BART Network
Local Routes Only
0 0.5 1 Mile


Productivity
Boardings/Revenue Hours
Source: AC Transit
40.1 or Better
30.1 - 40.0
20.1 - 30.0
10.1 - 20.0
Urban Trunk North
Richmond
El Cerrito Del Norte
El Cerrito Plaza
North Berkeley
Downtown Berkeley
Ashby
Rockridge
MacArthur
West Oakland
19th Street/ Oakland
12th Street/ Oakland City Center
BART Network
WestCAT
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile


Productivity
Boardings/Revenue Hours
Source: AC Transit
40.1 or Better
30.1 - 40.0
20.1 - 30.0
10.1 - 20.0
Urban Trunk South
Ashby
Rockridge
Macarthur
West Oakland
Downtown Oakland
19Th Street/ Oakland
12Th Street/ Oakland City Center
Lake Merritt
0 0.25 Mile
Fruitvale
Coliseum/ Oakland Airport
San Leandro
Bayfair
BART Network
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile


Operating Speed
Revenue Miles/Revenue Hour
Source: AC Transit
More than 15 MPH
12 MPH - 15 MPH
10 MPH - 12 MPH
8 MPH - 10 MPH
Less than 8 MPH
Urban Trunk North
Richmond
El Cerrito Del Norte
El Cerrito Plaza
North Berkeley
Downtown Berkeley
Ashby
Rockridge
MacArthur
West Oakland
19th Street/ Oakland
12th Street/ Oakland City Center
BART Network
WestCAT
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile


Operating Speed
Revenue Miles/Revenue Hour
Source: AC Transit
More than 15 MPH
12 MPH - 15 MPH
10 MPH - 12 MPH
8 MPH - 10 MPH
Less than 8 MPH
Urban Trunk South
Ashby
Rockridge
Macarthur
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19Th Street/ Oakland
12Th Street/ Oakland City Center
Lake Merritt
0 0.25 Mile
Fruitvale
Coliseum/ Oakland Airport
San Leandro
Bayfair
BART Network
Not Shown:
Single Trip and Overnight Routes
0 0.5 1 Mile

Transbay Overview

The IEB COA presented Guiding Principles for rethinking the role of Transbay service:

> "In combination with matching service to demand, cross-bay transit solutions should be evaluated independent of their historic transit tiers and operators. Most AC Transit Transbay services are highly unproductive, in many cases due to their duplication of the faster, more direct BART network. However, Transbay routes are more successful where they provide unique or convenient connections and/or enjoy park-and-ride access. In addition, some Transbay services may provide relief to overcrowded peak BART trips. Transbay services should be reevaluated on a line-by-line basis to ensure they supplement BART rather than compete with or duplicate service. Developing a new integrated role for Transbay will leverage the investment in BART, free up critical operating funds to improve other AC Transit services, and strengthen the overall transit network."

As it stands today, AC Transit's Transbay service is currently configured to provide local pickup service for the majority of its riders, emphasizing the one-seat ride to San Francisco as an essential part of delivering quality service. However, the vast majority of Transbay routes experience low financial productivity and ridership not conducive towards financial sustainability as shown in the tables and charts on the following pages and in Appendix B Transbay Route Profiles.

Transbay Performance

In the face of the one-seat ride's convenience, long local alignments and travel times provide a disincentive in travel time for those riding closer towards route ends, and lead to higher costs and lower operational efficiencies. The following table presents both productivity (boardings per trip) and financial performance (subsidy per boarding) for all Transbay routes. Those routes performing better fell into a couple of categories:

- Not competing with BART (Dumbarton Bridge and San Mateo Bridge services)
- Serves area with park-and-ride (SB)
- Serves high density residential catchment (O, OX, V)
- Favorable fare compared to BART (SB)

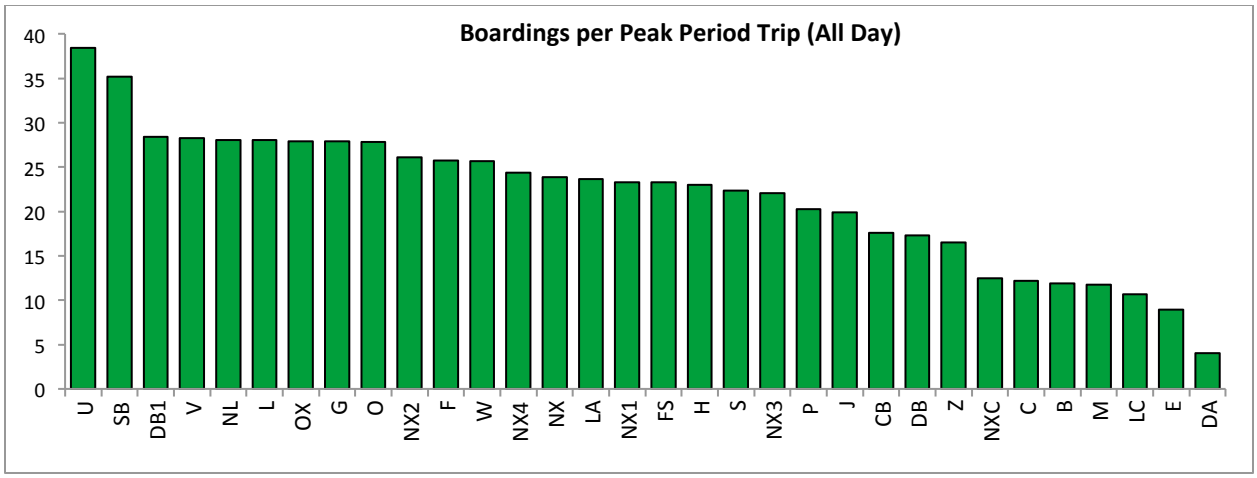
This low performance is not unique to the Inner East Bay. *In fact, most transit systems that operate local pick-up express bus service in medium to lower density residential communities struggle to achieve half full buses with typical trip loads of between 12-25 passengers for similar reasons.* The key issues challenging cost effective and efficient Transbay services are:

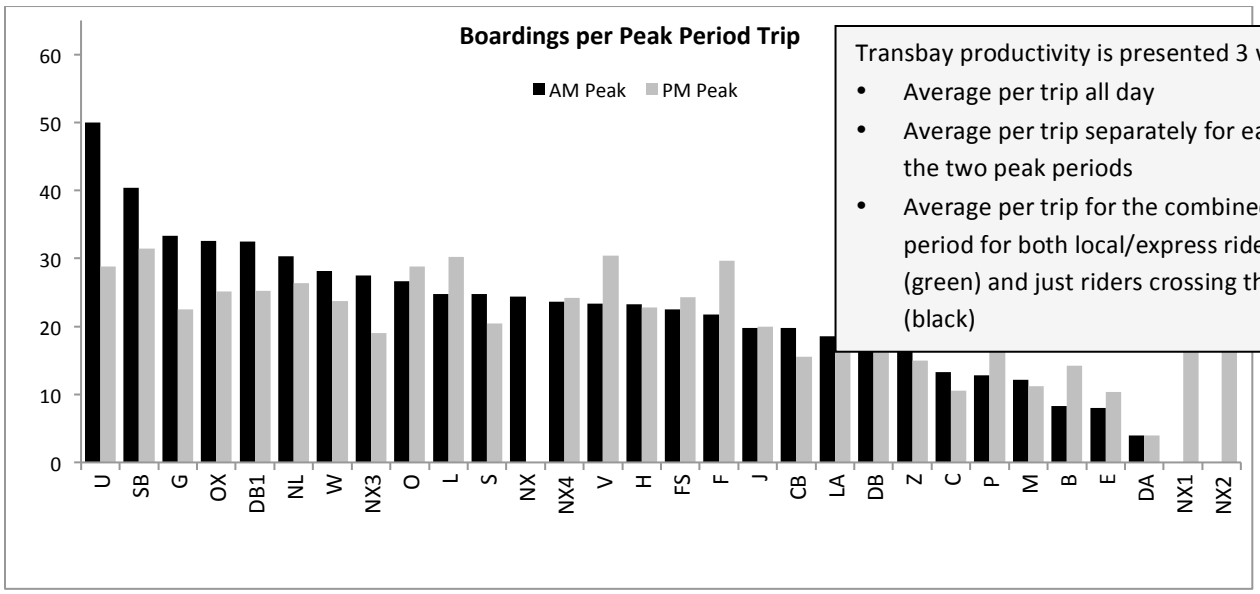
- Express bus services work best where ridership is heavily concentrated, providing a fast trip for consumers and a cost-effective trip for the agency. With San Francisco at the destination end, the issue is collecting a full busload time-competitively at the residential origin end. Three catchment approaches are cost effective: a) high density residential areas dominated by multi-story apartments and condominiums; b) park-and-ride lots; and c) hubs or stations where the transit network concentrates patrons.

- Current Transbay utilization of resources (buses and operators) is very inefficient with many trips involving one bus and one operator. This results in a situation where *Transbay carries just 9 percent of AC Transit riders, but uses 29 percent of the peak buses (PM).*

At the moment, few of AC Transit's Transbay route alignments reflect a focus on high-density areas and/or park-and-rides or allow for multiple trips per bus during the peak period. The routes that do so generally experience better financial performance and higher ridership numbers.

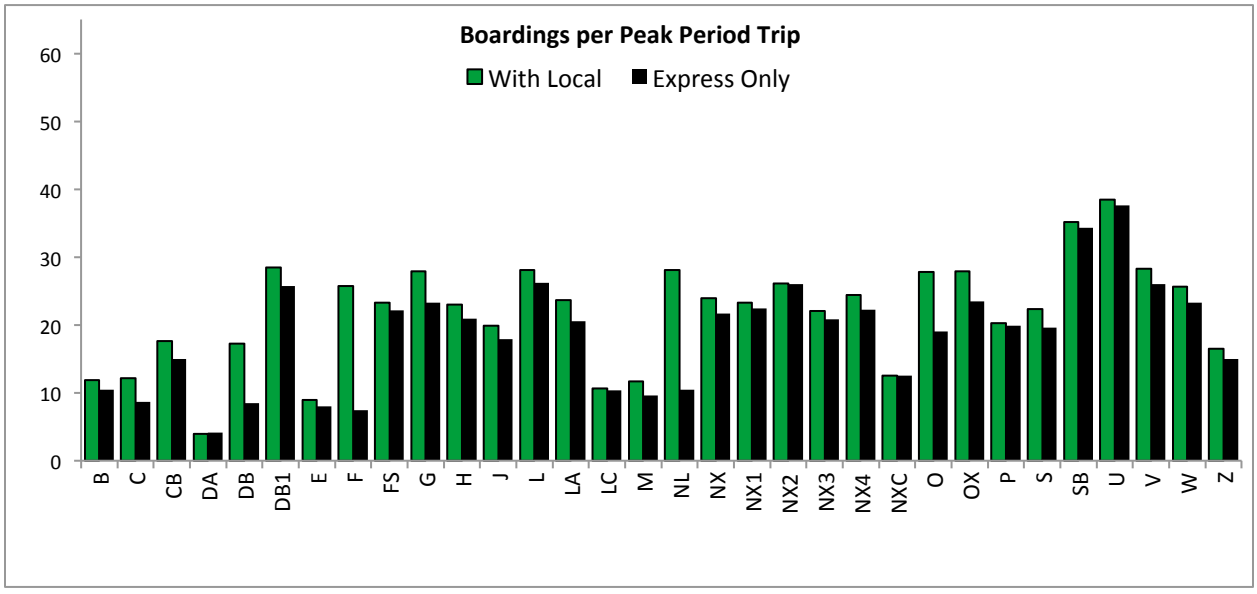
Route	Boardings per Trip		Subsidy per Boarding	
	Crossbay & Local	Crossbay Only	Crossbay & Local	Crossbay Only
B	11.9	10.5	($10.94)	($12.40)
C	12.2	8.6	($17.42)	($22.31)
CB	17.6	15.0	($11.78)	($13.84)
DA	4.0	4.2	($49.68)	($49.68)
DB	17.3	8.5	($30.73)	($31.93)
DB1	28.4	25.8	($9.58)	($9.87)
E	8.9	8.0	($18.26)	($20.37)
F	25.7	7.4	($9.92)	($26.59)
FS	23.3	22.1	($7.61)	($7.65)
G	27.9	23.3	($8.76)	($9.18)
H	23.0	20.9	($12.11)	($12.59)
J	19.9	17.9	($8.48)	($8.74)
L	28.1	26.2	($9.99)	($10.09)
LA	23.6	20.6	($12.19)	($12.67)
LC	10.7	10.3	($38.82)	($40.07)
M	11.7	9.6	($24.03)	($26.83)
NL	28.1	10.5	($7.24)	($18.32)
NX	23.9	21.7	($7.23)	($7.56)
NX1	23.3	22.4	($5.80)	($6.02)
NX2	26.1	26.0	($6.25)	($6.28)
NX3	22.1	20.8	($10.84)	($11.14)
NX4	24.4	22.3	($14.41)	($14.76)
NXC	12.5	12.5	($29.04)	($29.04)
O	27.8	19.0	($7.86)	($10.65)
OX	27.9	23.4	($7.80)	($8.94)
P	20.3	19.9	($5.92)	($5.93)
S	22.3	19.6	($17.88)	($18.46)
SB	35.2	34.3	($10.02)	($10.22)
U	38.5	37.6	($5.17)	($5.27)
V	28.3	26.0	($7.40)	($7.68)
W	25.7	23.3	($8.84)	($9.04)
Z	16.5	15.0	($10.86)	($11.95)

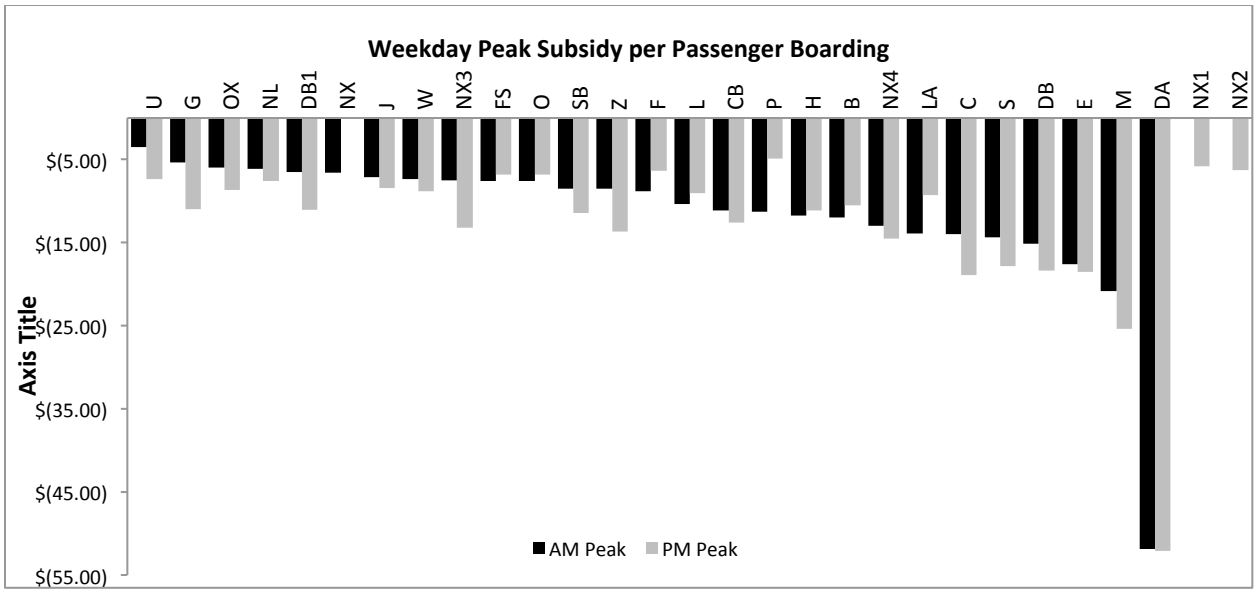


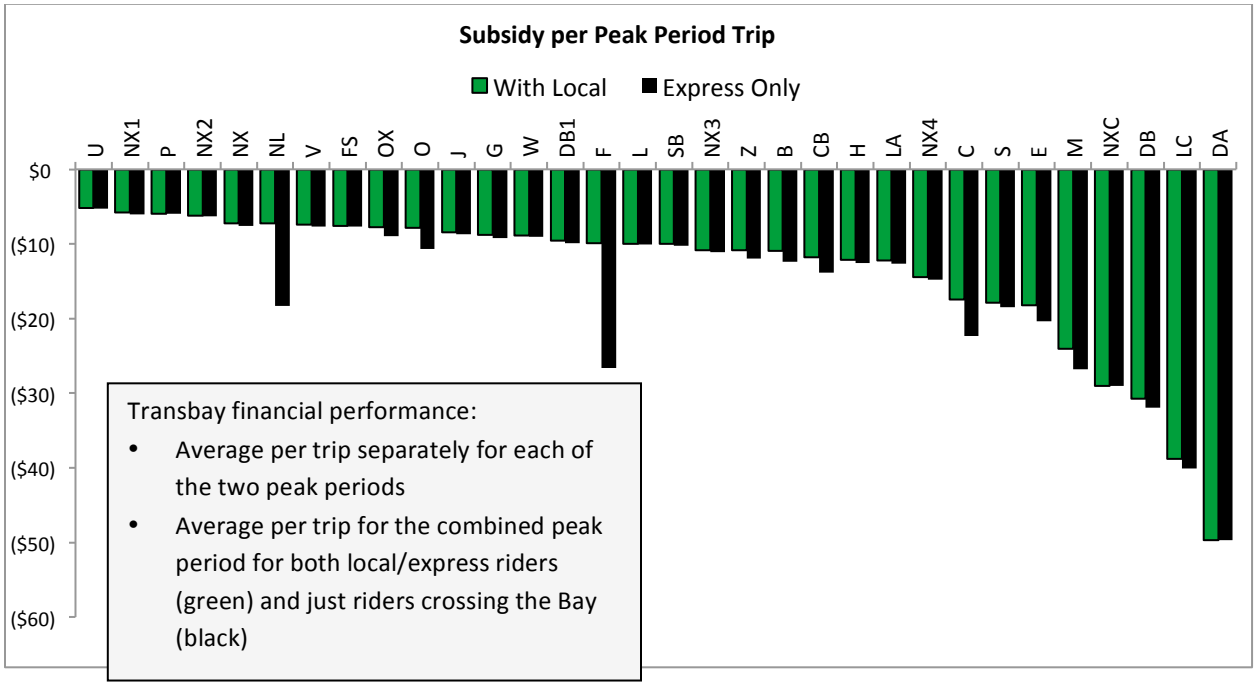


Transbay productivity is presented 3 ways:

- Average per trip all day
- Average per trip separately for each of the two peak periods
- Average per trip for the combined peak period for both local/express riders (green) and just riders crossing the Bay (black)







BART Capacity Shortfalls

The IEB COA also studied BART performance and capacity and found that BART would likely need help in meeting capacity requirements in the near term and potentially longer if the region does not fund the needed increases. Currently BART's daily ridership fluctuates by much more than the total daily Transbay ridership of just over 14,000 boardings. In meetings, BART expressed a need for ongoing

Transbay service to augment BART capacity but recognized that half-full or less buses would not make the needed impact on capacity moving into the future. As a result, any Transbay strategy or service concepts should consider BART capacity needs, especially along the high demand corridor from Bay Fair to West Oakland.

Transbay Service Concepts

The Transbay service concepts available to improve service productivity and financial performance are:

- High-Density Residential Market Service (one-seat) – focus service on high density corridors with access provided through limited stops potentially with on-route park-and-rides. Keep pick-up segment of route short and close to express segment.
- Park-and Ride Service (one-seat) – reorient service around 1-2 park-and-ride facilities with space for around 35-40 cars per trip. Short non-express segment of route with stops only at park-and-rides.
- Service to BART Stations (two-seat) – serves San Francisco indirectly via frequent service to nearby BART station. Should be integrated with core area network and can be local shuttle or peak period limited-stop enhanced bus service overlay to maximize customer experience.

Overall design guidelines for all Transbay services:

- Cross the bay only when and where ridership supports the cost of the bus and operator. In other circumstances and times of day (as on certain Transbay routes peak-period ridership is much stronger than midday), operate as a connecting service to a nearby BART station. Differences between the Transbay route and the underlying Urban Core network services should be minimized to simplify customer understanding of options by time of day and day of week.
- Minimize any local pick-ups through use of limited stops and park-and-ride to maintain a fast-moving service.

Nearby BART stations should be served where feasible to a) minimize differences between the weekday peak service and off-peak, b) to provide high-quality connections for trips on BART other than to downtown San Francisco including the upcoming extension to Santa Clara County, and c) to provide additional capacity at stations on corridor segments identified by BART as needing capacity augmentation.

Appendix A

Urban Trunk Corridor Profiles

Appendix B

Transbay Route Profiles

Appendix C

BART Station Profiles