



Massachusetts Bay Transportation Authority (MBTA) Boston, Massachusetts



Lessons Learned from the Peer Systems Review

MassDOT/MBTA wish to learn from peer commuter rail systems in the U.S. and internationally how other agencies have optimized their rail networks to serve passenger demand efficiently and effectively. In spring 2018, the Rail Vision team conducted a desktop review of 16 domestic and international commuter rail systems. The 16 systems reviewed are illustrated in the map on this page. The systems were evaluated for their applicability to the MBTA's commuter rail region and for ideas that could potentially benefit future service planning for the Rail Vision study. The bullets below provide some of the key takeaways from this effort:

- **Fleet Composition:** Very few peer systems operate diesel-powered trains alone, with only two other systems (Caltrain and Metrolink) relying solely on diesel-powered locomotives. The majority (ten) operate a fully electrified system, with the remaining four systems operating both diesel-powered trains and electric-powered trains. None of the international systems rely on diesel-powered technology at this time. The most recent peer system to commit to purchasing electric trains is GO Transit in Toronto, with environmental benefits cited as a key factor in this decision.
- **Operations:** Of the systems reviewed, about half operate their services with in-house agency resources and half contract out the operations of the service. This is an equal distribution for both the U.S. and international systems reviewed. No major pattern has emerged from this topic, although interestingly, the MBTA is the only system among its east coast peers (Metro-North, LIRR, NJ Transit, and SEPTA, as well as Metra in Chicago) that contracts out the operation; all other east coast peer systems operate their own services.
- **Size of Service Area:** The MBTA's service area is large compared to its peer systems. Although agencies do not consistently report the size of their service area, and therefore size of service area is not included in the key statistics table at the end of this document, the



Map of Peer Systems Reviewed

MBTA operates more commuter rail lines with a longer network of route miles than most of the systems reviewed. NJ Transit is a notable exception, providing service between New York City and Philadelphia. GO Transit in Toronto supplements its commuter rail network with buses (branded in the same way as the commuter rail trains) by running them in lieu of train service during the midday and to extend the reach of commuter rail past the terminal stations at a lower cost.

- **Transfers:** Many of the systems reviewed, including MNR, LIRR, and NJ Transit in the greater NYC region, and the European systems such as London Overground, S-Bahn, and Paris RER, operate on a time-based transfer model. Instead of focusing on the provision of a one-seat ride, these peer systems assume transfers will be made, and thus work to minimize the wait time when transferring between trains.
- **Farebox Recovery:** The MBTA's commuter rail system operates at a lower farebox recovery rate (49 percent) than most of the systems reviewed. The highest farebox recoveries were observed in the San Francisco Bay Area (Caltrain, at a 79 percent farebox recovery), and in Singapore (which operates at a 101 percent farebox recovery). At 49 percent, MBTA ranked 6th out of the 8 domestic systems and 12th out of the 17 systems in total (7 domestic, 9 international, and the MBTA). Interestingly, however, the systems with the lowest farebox recovery both recover less than \$4 for every \$10 invested – Paris's system observes a 38 percent farebox recovery and Melbourne's Metro observes a 27 percent farebox recovery.
- **Accessibility of Stations:** Providing accessible stations appears to be a challenge and a priority for the peer systems. Many of the newer systems – Caltrain, GO Transit, and Metrolink – provide high rates of accessibility, whereas older systems such as Metro-North and SEPTA are below 50 percent. MBTA fares well in comparison to other systems with 75 percent of the commuter rail stations being accessible. With the exception of London Overground, all international systems reviewed feature station accessibility at rates of 75 percent or higher.
- **Frequency:** Most peer systems operate more frequent service than the MBTA's commuter rail system. The average peak hour frequency of the peer systems is every 12 minutes, and the average off-peak frequency is every 32 minutes (for comparison, MBTA commuter rail peak hour frequency is 20 minutes and off-peak frequency is 60 minutes). All international systems outside North America operate at peak hour frequencies of at least trains operating every 10 minutes, with many operating trains every 20 minutes or better in the off peak.
- **On-Time Performance:** On-time performance (OTP) data were averaged for 2017, and most systems reviewed – 12 in total – feature OTP of 90 percent or higher, with four systems reporting an OTP of 95 percent or higher. At 89 percent, MBTA was not far behind. Chicago's Metra system reports the highest OTP at 96 percent, and SEPTA reports the lowest OTP at 86 percent.
- **Operating Efficiencies:** Operating efficiencies are reported in a number of ways and can be difficult to capture for the international peer systems. One metric that was collected for most systems was the operating cost per passenger trip, and those numbers varied dramatically between systems, ranging from \$1.75/trip in Berlin to \$15.85/trip in Los Angeles. In general, the international systems operated more efficiently than the U.S. systems, and at \$11.93/trip, MBTA operates on par with many of the U.S. systems. Of note, however, is the exceptional efficiency of SEPTA with operating expenses of \$7.40/trip.

- Number of Terminals:** Boston has two stub end terminals in the Central Business District (CBD) of downtown Boston – North Station and South Station. The peer reviews evaluated how this compares to other cities, with the result varying – from Paris having none and operated as run-through service in the CBD to five terminals in Melbourne, all encircling the CBD. What is interesting is that many of the systems reviewed operate through service between terminals, or offer creative solutions to provide some rail service between central terminals. For example, in Manchester, England the agency built a light rail system to link the 2 central terminal stations and built a physical rail link on the outskirts to allow services from the North to connect into the South).

Key Reporting Statistics from the Desktop Review of Peer Systems

	City/ Region Served	No. Routes	No. Route Miles	Fleet Power Source*	Fleet Operations	Farebox Recovery	% Stations Accessible	Peak Frequency	Off-Peak Frequency**	On-Time Performance	Operating Expenses/ Passenger Trip***	No. Central Terminals
	Boston	14	388	Diesel	Contracted	49%	75%	20	60	89%	\$ 11.93	2
1	Toronto	7	341	Both	Contracted	62%	92%	15	30	95%	\$ 8.80	1
2	Barcelona	9	290	Electric	Inhouse	57%	75%	10	10	94%	\$ 3.61	3
3	Paris	13	900	Electric	Inhouse	38%	75%	5	5	90%	\$ 8.03	0
4	London	9	103	Electric	Contracted	78%	51%	7.5	10	95%	\$ 2.18	2
5	Manchester	10	189	Both	Contracted	61%	100%	15	15	88%	\$ 8.86	3
6	Berlin	15	203	Electric	Inhouse	71%	90%	10	15	92%	\$ 1.75	3
7	Melbourne	8	298	Electric	Contracted	27%	100%	10	20	92%	\$ 10.75	5
8	NYC - MNR	5	273	Electric	Inhouse	60%	41%	5	20	94%	\$ 13.43	1
9	NYC - LIRR	11	319	Electric	Inhouse	55%	83%	10	30	91%	\$ 12.69	1
10	NYC - NJ Transit	12	501	Both	Inhouse	57%	47%	15	30	91%	\$ 11.25	2
11	Philadelphia	13	224	Electric	Inhouse	57%	45%	15	30	86%	\$ 7.40	3
12	Chicago	11	488	Both	Inhouse	47%	76%	20	90	96%	\$ 10.00	4
13	Los Angeles	7	412	Diesel	Contracted	39%	100%	30	120	94%	\$ 15.85	1
14	SF Bay Area	1	77	Diesel	Contracted	79%	81%	20	45	95%	\$ 6.11	2
15	Singapore	8	131	Electric	Contracted	101%	100%	2	5	Uncertain	Uncertain	0
16	Hamburg	6	91	Electric	Inhouse	Uncertain	Majority	10	10	Uncertain	Uncertain	Uncertain

NOTES:

* Use of the term “both” represents that the agency operates both diesel-powered trains and electric-powered trains

** Off-peak frequency varies by system and by line. What is represented in this table is the best off-peak frequency operated for all systems.

*** Operating expenses for international systems should be viewed with caution because they are not reported in a reliable manner and were converted into U.S. dollars.

