



## TOKYO-YOKOHAMA SUBURBAN RAIL SUMMARY (COMMUTER RAIL, REGIONAL RAIL)

October 2003

Tokyo-Yokohama (Tokyo) is the world's largest urban area, with approximately 31,200,000 people, 1.5 times the population of the New York urban area. Tokyo is also one of the automotive world's most densely populated urban areas, at more than 15,000 persons per square mile. The urban area covers more than 2,000 square miles, greater than that of the Boston or Los Angeles urban areas. The Tokyo continuously built-up urban area, in geographical expanse, is larger than all others in the world except for New York and Chicago.

Because auto ownership rates reached the US 1930 automobile era threshold only in the middle 1980s, much of the Tokyo-Yokohama area is of a pre-automobile design. Population growth in Tokyo-Yokohama's automobile era has been only five percent since that time. Approximately 71 percent of the population lives in areas above 15,000 density (pre-automotive densities), which account for 46 percent of the land area

Tokyo has the automotive world's most successful public transport system. More than 15 billion annual rides are carried, which is 60 percent more than all of the public transport systems in the United States combined. Approximately 57 percent of all travel in Tokyo is by public transport.<sup>1</sup> Tokyo maintains the highest public transport market share among urban areas with high-automobile ownership.

Most of Tokyo's public transport ridership is on the privately owned commuter rail lines,<sup>2</sup> which carry 10.6 billion annual trips, a level comparable to that of all public transport in the United States and Canada combined. Commuter rail carries more than two-thirds of public transport ridership in the Tokyo-Yokohama area (Figure 4). The routes extend nearly 1,800 miles with more than 1,200 stations on more than 60 lines. The routes are virtually all without interference from freight trains. Finally, the commuter rail routes are profitable, receiving neither capital nor operating subsidies.

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<sup>1</sup> Calculated from data in Jean Vivier, "Millennium Cities Database for Sustainable Mobility: Analyses and Recommendations," UITP (International Union of Public Transport), Brussels: May 2001.

<sup>2</sup> This includes East Japan Railway, formerly owned by the national government.

The commuter rail system feeds two of the world's largest subway systems in Tokyo, as well as the Yokohama subway system and the Chiba urban monorail system. Some of the commuter rail trains continue in and through the central city on subway tracks, a type of service coordination limited to urban areas in Japan. In addition, most of the commuter railroad companies have dense bus networks that feed the rail systems. It is estimated that nearly 5,000 buses are engaged in these systems, which is more buses that operate in Los Angeles and Denver combined.<sup>3</sup> There are, in addition, conventional city bus systems.

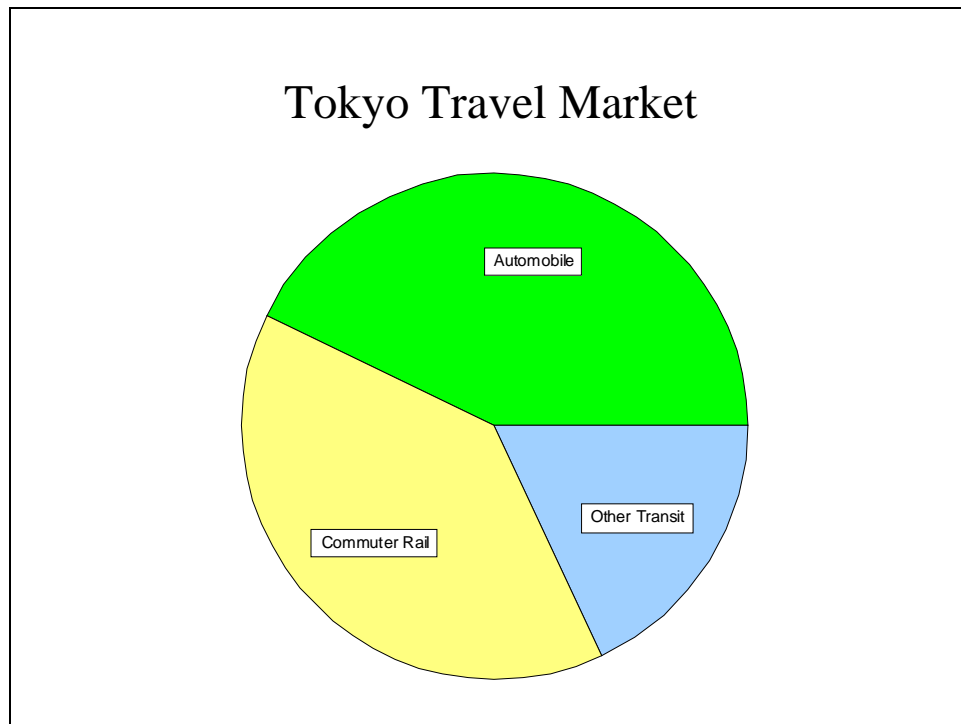


Figure 1

There are 0.61 commuter rail stations in the Tokyo area per square mile (one for each 1.6 square miles) of developed land area, which when combined with the high density connecting bus networks, and intense traffic congestion makes public transport highly competitive with the automobile throughout the entire area. From one-third to 90 percent of services operate every five minutes or less during off-peak periods.<sup>4</sup> On average, automobile operating speeds are 15 miles per hour, one-third less than that of public transport trips.<sup>5</sup>

Most of the commuter rail system was constructed before the urban expansion that followed World War II, when Tokyo-Yokohama housed approximately two-thirds fewer people. Commuter rail ridership very dense, at 6 million per line mile annually, by the highest among automotive urban areas.

<sup>3</sup> Estimated from data in *Janes Urban Transport*, (multiple editions).

<sup>4</sup> *Comparaison des systems de transport de quarte metropoles (Four City Report)*, IAURIF (Paris, 1988)

<sup>5</sup> Calculated from Kenworthy & Laube.

The central business district (CBD) is surrounded by the Yamanote Loop, a commuter rail line inside of which are more than 4.2 million jobs, with more than 2.4 million in the core CBD, the largest in the world. This represents 15 percent of metropolitan area employment. Overall employment levels have declined in Japanese urban areas in recent years. However, the rate of loss in the central business district has more than double that of the suburbs.<sup>6</sup>

Some trains end their journeys at stations near or on the Yamanote Loop, where riders transfer to a dense mesh of subway lines that provide convenient access throughout the central area. Other commuter rail trains, as noted above, continue their operations onto city-owned subway lines.

Nonetheless, public transport's market share is dropping in Tokyo. Within the central city of Tokyo ("Ku area"),<sup>7</sup> 78 percent of trips were by public transport in 1998, down less than two percent from 1975. But much larger losses are being registered in the suburbs. Public transport's share of trips is still a significant, at 47 percent. This, however, represents a 32 percent loss since 1975, reflecting the rising importance of the automobile. Approximately 75 percent of the urban area population is outside the former city of Tokyo, along with nearly 60 percent of the employment.

Further, despite the late achievement of high auto ownership rates, traffic is very congested in Tokyo, at 119,000 vehicle miles per square mile. This compares to a US average of under 50,000, and the 113,000 in the nation's most congested area, Los Angeles.

A number of factors contribute to the success of commuter rail and public transport in Tokyo. The extent of pre-automobile development (the result of reaching high-automotive status late), the extensive commuter rail system and connecting bus systems, the higher public transport system speeds and the high service frequency combine to make public transport competitive with the automobile throughout the urban area.

## APPENDIX TABLES

Appendix Table A International Pre-Automobile Commuter Rail Systems						
	Tokyo	Osaka	Nagoya	Paris	London	Sydney
<b>DEMOGRAPHICS</b>						
Population (000)	31,200	15,250	8,050	9,650	12,230	3,539
Urban Area (Square Miles)	2,030	1,050	1,090	1,060	1,600	811
Population Density	15,369	14,524	7,385	9,104	7,644	4,365
Gross Product/Capita 1999	\$28,327	\$25,376	\$28,535	\$32,343	\$27,365	\$25,643
Compared to Tokyo	0.0%	-10.4%	0.7%	14.2%	-3.4%	-9.5%

<sup>6</sup> Calculated from Japan Statistical Bureau data.

<sup>7</sup> The central city of Tokyo was abolished during World War II and is simply a part of the Prefecture of Tokyo. Statistical data, however, is maintained for the 23 wards (Ku area) that constituted the city of Tokyo.

## CENTRALIZATION

% Population>15,000 Density	71%	70%	24%	56%	23%	1%
% Land>15,000 Density	46%	43%	9%	18%	8%	0%
Core Population Share	26%	17%	27%	22%	59%	15%
Suburban Population Share	74%	83%	73%	78%	41%	85%
CBD (Downtown) Employment Share	16%	18%	13%	17%	16%	11%
Outside CBD Employment Share	84%	82%	88%	83%	84%	89%
Employment in CBD (000)	2,434	1,380	500	891	1,099	175

## PUBLIC TRANSPORT SYSTEM

Public transport Market Share	56.7%	59.5%	24.6%	24.1%	17.1%	13.6%
Public transport/Auto Speed	1.6			1.5		

## COMMUTER RAIL

Commuter Rail Market Share	39.5%	36.4%	12.0%	7.2%	3.7%	5.6%
Compared to New York	59.9	53.3	18.2	11.0	5.6	8.5
Miles of Route	1,779	1,095	528	1,012	2,260	1,273
Stations	1,243	1,065	843	540	940	306
Station Density	0.61	1.01	0.77	0.51	0.59	0.38
Operating Subsidy?	No	No	No	Yes	Yes	Yes
Capital Subsidy	No	No	No	100%	100%	100%
Share with Freight?	No	No	No	Little	Little	Little

## HIGHWAYS

Traffic Density (Vehicle Miles/Sq.Mi.)	118,854			83,462		
Compared to Tokyo	0.0%			-29.8%		

## EXTENT OF AUTO COMPETITIVE PUBLIC TRANSPORT SERVICE

Within Core	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
Suburbs to Core	HIGH	HIGH	HIGH	MIDDLE	MIDDLE	MIDDLE
Within Suburbs	HIGH	HIGH	HIGH	LOW	NIL	NIL

Appendix Table B  
United States Pre-Automobile Commuter Rail Systems

New York Chicago Boston Philadelphia

## DEMOGRAPHICS

Population (000)	20,253	8,307	4,032	5,149
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Urban Area (Square Miles)	4,711	2,123	1,736	1,799
Population Density	4,299	3,913	2,323	2,862
Gross Product/Capita 1999	\$43,805	\$39,384	\$40,301	\$36,025
Compared to Tokyo	54.6%	39.0%	42.3%	27.2%

#### CENTRALIZATION

% Population>15,000 Density	44%	24%	20%	22%
% Land>15,000 Density	5%	4%	2%	3%
Core Population Share	40%	35%	15%	29%
Suburban Population Share	60%	65%	85%	71%
CBD (Downtown) Employment Share	19%	13%	13%	14%
Outside CBD Employment Share	81%	87%	87%	86%
Employment in CBD (000)	1,733	485	280	351

#### PUBLIC TRANSPORT SYSTEM

Public transport Market Share	9.0%	3.6%	3.8%	2.9%
Public transport/Auto Speed	0.9	0.8	0.6	

#### COMMUTER RAIL

Commuter Rail Market Share	0.7%	0.5%	0.4%	0.3%
Compared to New York	1.0	0.7	0.6	0.4
Miles of Route	979	333	328	304
Stations	404	250	116	176
Station Density	0.09	0.12	0.07	0.10
Operating Subsidy?	Yes	Yes	Yes	Yes
Capital Subsidy	100%	100%	100%	100%
Share with Freight?	Little	Little	Little	Little

#### HIGHWAYS

Traffic Density (Vehicle Miles/Sq.Mi.)	63,312	57,968	43,350	57,168
Compared to Tokyo	-46.7%	-51.2%	-63.5%	-51.9%

#### EXTENT OF AUTO COMPETITIVE PUBLIC TRANSPORT SERVICE

Within Core	HIGH	HIGH	HIGH	HIGH
Suburbs to Core	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Within Suburbs	NIL	NIL	NIL	NIL

Appendix Table C  
United States Automobile Era Commuter Rail Systems and Lines

	Washington- Baltimore	Los Angeles	San Diego	Miami	Dallas-Fort Worth	Seattle
<b>DEMOGRAPHICS</b>						
Population (000)	6,010	14,000	2,674	4,919	4,146	2,712
Urban Area (Square Miles)	1,840	2,299	782	1,116	1,407	954
Population Density	3,266	6,090	3,419	4,408	2,947	2,843
Gross Product/Capita 1999	\$41,316	\$33,486	\$34,495	\$31,261	\$40,306	\$38,928
Compared to Tokyo	45.9%	18.2%	21.8%	10.4%	42.3%	37.4%
<b>CENTRALIZATION</b>						
% Population>15,000 Density	10%	23%	3%	7%	2%	2%
% Land>15,000 Density	1%	6%	2%	2%	0%	0%
Core Population Share	20%	26%	46%	7%	29%	21%
Suburban Population Share	80%	74%	54%	93%	71%	79%
CBD (Downtown) Employment Share	19%	2%	6%	2%	6%	12%
Outside CBD Employment Share	81%	98%	94%	98%	94%	88%
Employment in CBD (000)	444	167	73	41	112	171
<b>PUBLIC TRANSPORT SYSTEM</b>						
Public transport Market Share	3.3%	1.4%	1.5%	1.3%	0.5%	1.8%
Public transport/Auto Speed	0.8	0.4	0.5			
<b>COMMUTER RAIL</b>						
Commuter Rail Market Share	0.05%	0.02%	0.02%	0.03%	0.01%	0.01%
Compared to New York	0.08	0.03	0.03	0.04	0.02	0.01
Miles of Route	191	415	43	71	35	34
Stations	56	48	9	19	9	7
Station Density	0.03	0.02	0.01	0.02	0.01	0.01
Operating Subsidy?	Yes	Yes	Yes	Yes	Yes	Yes
Capital Subsidy	100%	100%	100%	100%	100%	0%
Share with Freight?	Yes	Yes	Yes	Yes	Yes	Yes
<b>HIGHWAYS</b>						
Traffic Density (Vehicle Miles/Sq.Mi.)	74,798	104,970	85,687	109,613	68,077	60,936
Compared to Tokyo	-37.1%	-11.7%	-27.9%	-7.8%	-42.7%	-48.7%

EXTENT OF AUTO COMPETITIVE PUBLIC TRANSPORT SERVICE

Within Core	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
Suburbs to Core	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Within Suburbs	NIL	NIL	NIL	NIL	NIL	NIL

Note: Washington-Baltimore CBD data is for Washington and Baltimore.

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