Chapter 11 "Do-nothing" Analysis and Capacity Requirement

11.1 Do-Nothing Analysis

As seen in the previous chapter, modal share will be affected by travel time and cost, and, accordingly, by transport network conditions. In this chapter, the travel demand is forecasted under present transport network, assuming no transport project would be implemented in the future. This is called "Do-nothing" analysis which is made to know what would happen without network improvement.

11.1.1 Modal Split

1) Daily Travel Demand by Modes

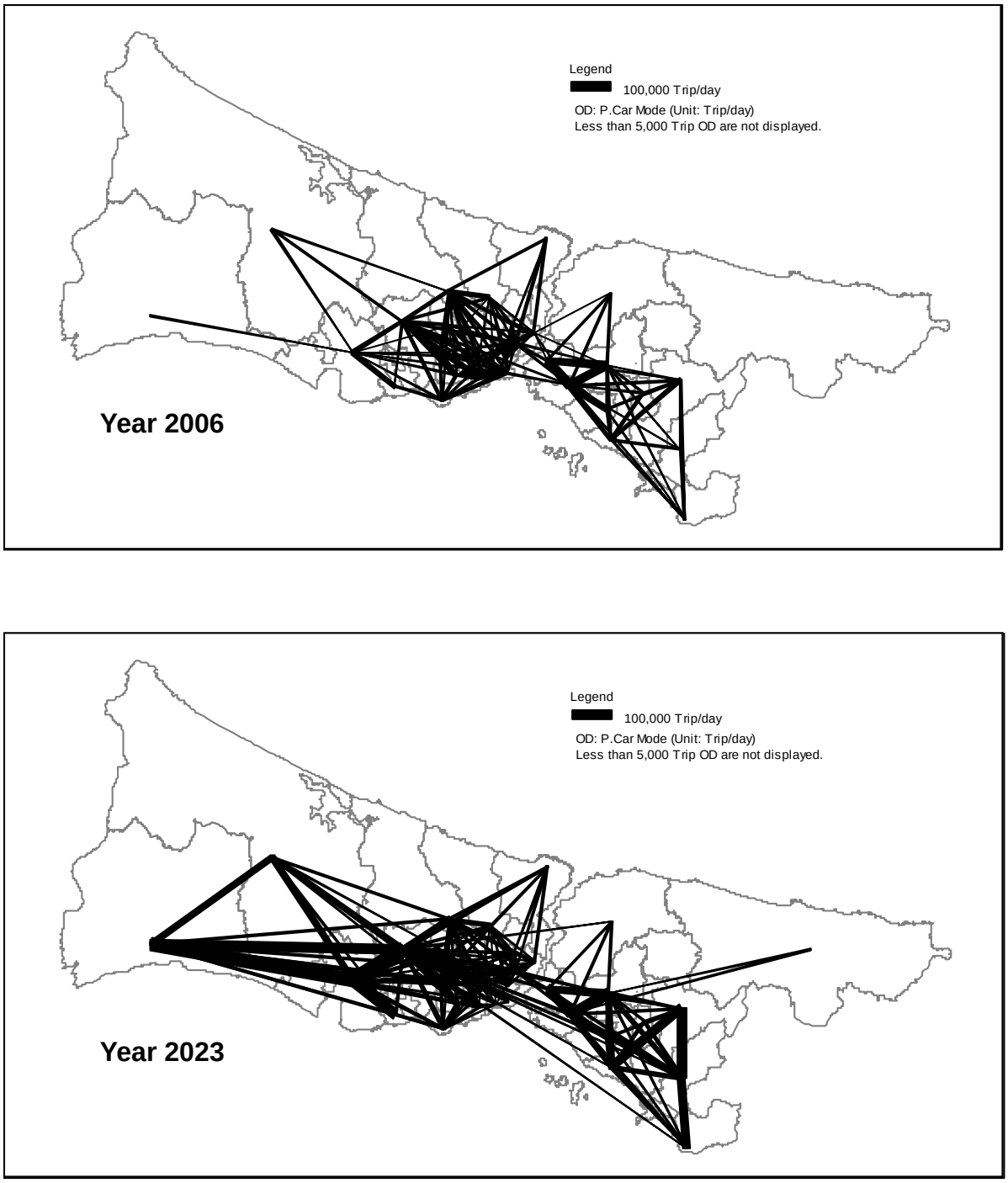
Table 11.1.1 shows modal shares in daily trips in 2005 and 2023 in the "Do-nothing" case. The future modal share was forecasted by trip purpose and summed up by mode. No significant model change was observed in case of "Do Nothing" with slight increase of shares of trips by "walk", "Passenger Car" and "Service".

Daily Origin-Destination trips are shown in desire lines by mode in Figure 11.1.1 to Figure 11.1.3 for the year 2005 and 2023. Presently, coverage of trips is rather limited to the east of Buyukcekmece. In 2023, however, distribution of trips will expand to all the IMM Area with a remarkable increase in the western part.

Table 11.1.1 Modal Share in 2005 and 2023 in "Do-nothing" Case

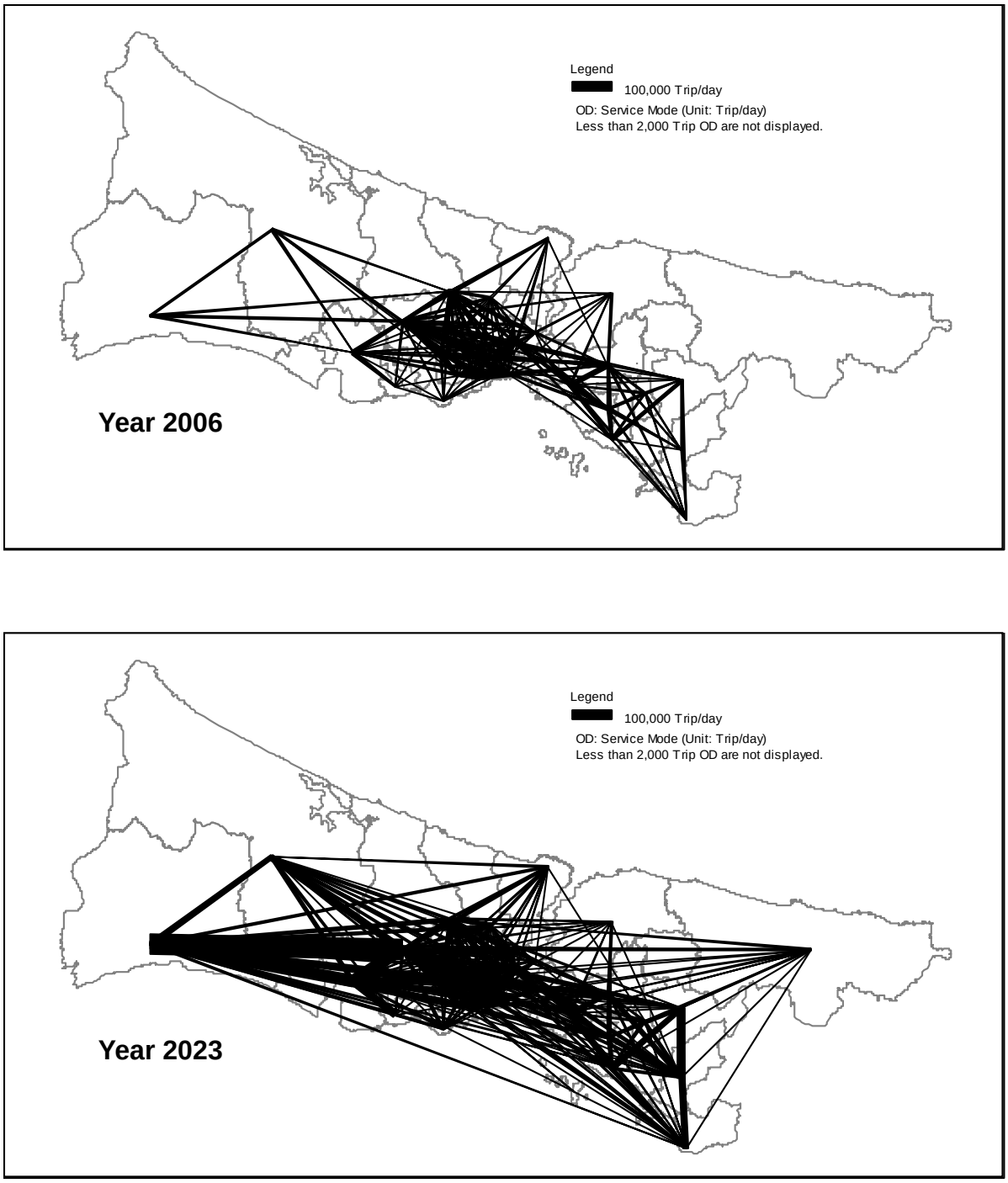
2005	Walk	P.Car	Service	Public	Total	Composition (%)
HBW	1,918,181	1,403,427	1,355,520	2,053,594	6,730,722	32.35%
HBS	3,067,657	157,316	625,850	593,100	4,443,923	21.36%
HBO	4,468,562	1,348,664	-	1,959,077	7,776,303	37.37%
NHB	590,573	681,212	93,464	491,261	1,856,510	8.92%
Total	10,044,973	3,590,619	2,074,834	5,097,032	20,807,458	100.0%
Composition (%)	48.28%	17.26%	9.97%	24.50%	100.0%	
	w/o walk	33.36%	19.28%	47.36%	100.0%	
2023 Do Nothing Case	Walk	P.Car	Service	Public	Total	Composition (%)
HBW	2,702,411	2,705,035	2,553,906	3,559,618	11,520,970	34.30%
HBS	4,481,250	385,140	1,555,225	1,222,174	7,643,789	22.76%
HBO	6,832,286	2,139,276	-	2,730,422	11,701,984	34.84%
NHB	879,645	1,016,431	156,952	671,080	2,724,108	8.11%
Total	14,895,592	6,245,882	4,266,083	8,183,294	33,590,851	100.0%
Composition (%)	44.34%	18.59%	12.50%	24.36%	100.0%	
	w/o walk	33.41%	22.82%	43.77%	100.0%	

Source : Study Team



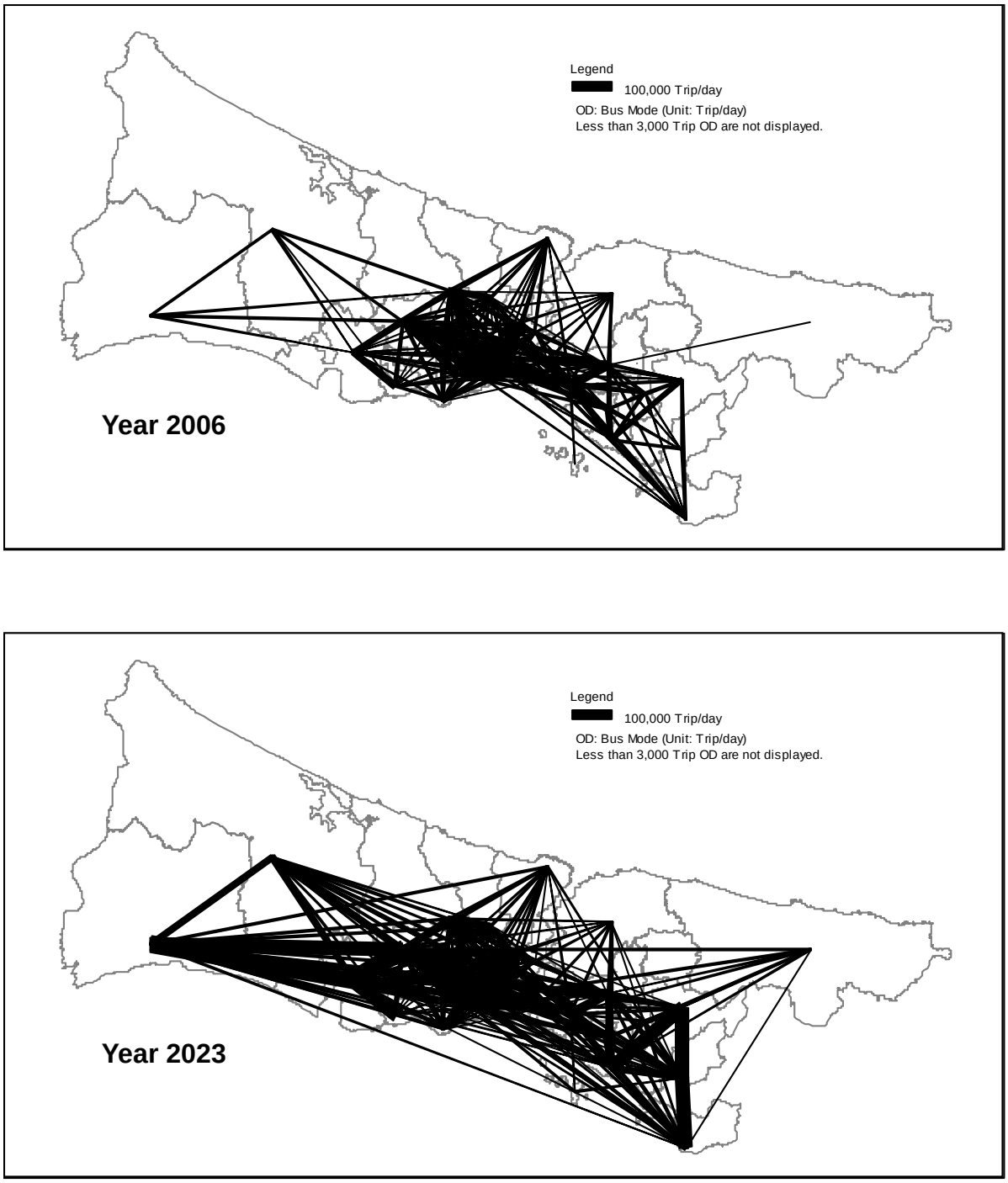
Source : *ibid.*

Figure 11.1.1 Daily Trips by Car for All Purposes in 2005 and 2023



Source : *ibid.*

Figure 11.1.2 Daily Trips by Service for All Purposes in 2005 and 2023



Source : *ibid.*

Figure 11.1.3 Daily Trips by Public Transport for All Purposes in 2005 and 2023

2) Hourly Travel Demand in Peak Hour

Table 11.1.2 shows the hourly modal shares during peak hours in 2005 and 2023 in the "Do-nothing" case. The share of car rises to 60% in 2023 , from 30% in 2005. The increase is 3.9 times of the present value. On the other hand, the share of public transport is reduced from 44% in 2005 to 22% in 2023.

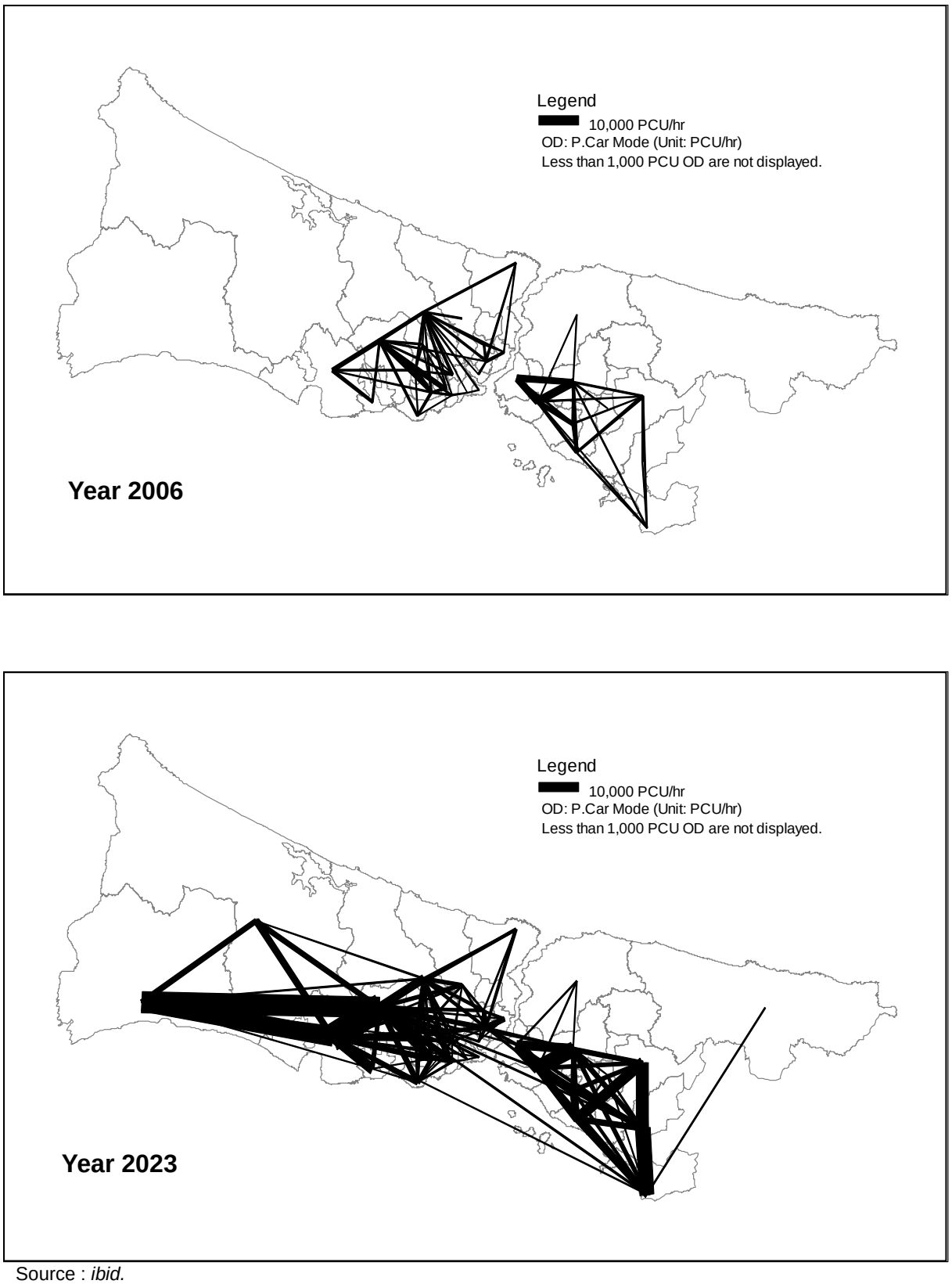
Trip distribution during morning peak hours in 2005 and 2023, by car and public modes, are shown in Figure 11.1.4 and Figure 11.1.5 in desire lines. Band width is proportional to the number of trips between zones. In these figures, strong movements by car are observed in 2023 to/from new suburban areas. Newly urbanized area in the suburbs will have heavy traffic in the future. Movements of public mode in 2023 show similar patterns to the present, although volumes are less than those of cars.

Table 11.1.2 Modal Share of Peak Hour Trips in 2005 and 2023 in "Do-nothing" Case

(Units: trips/hr)

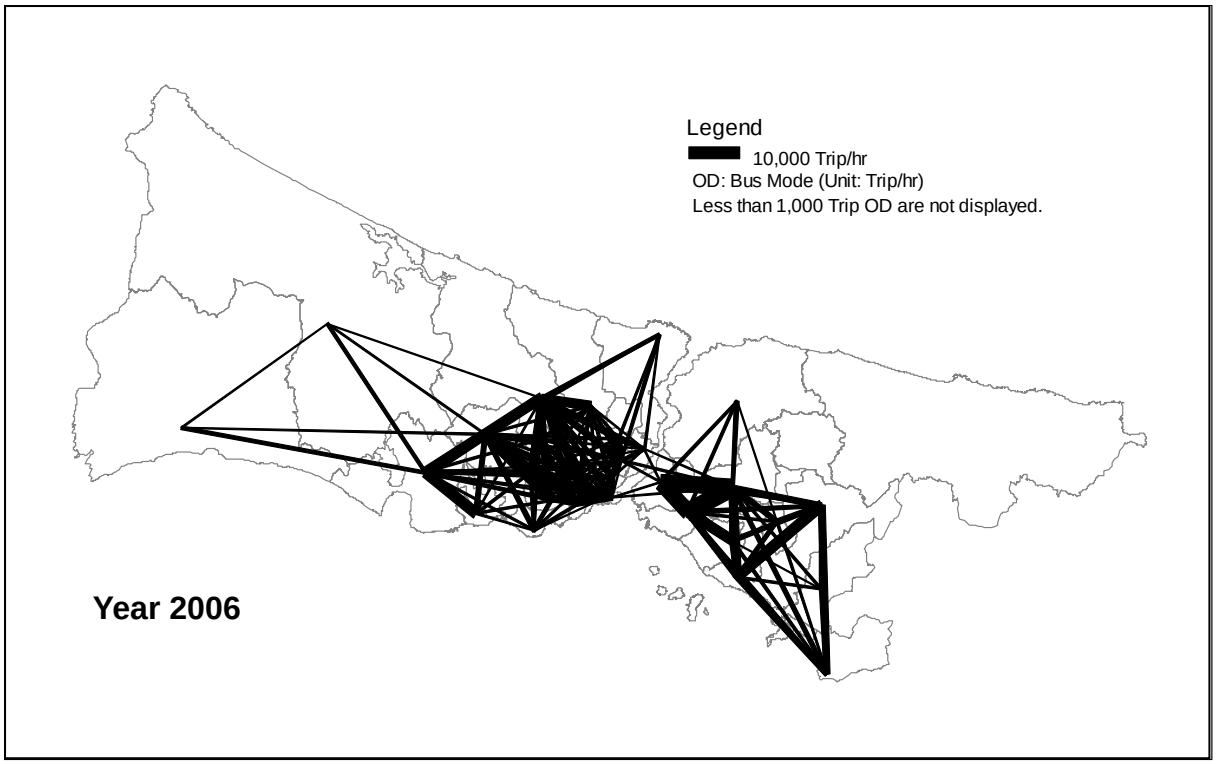
	Year	Walk	P.Car	Service	Public	Total
Trips/hr	2005	---	492,076	358,350	725,858	1,110,952
	2023	---	1,295,892	385,790	601,902	1,504,468
Composition (%)	2005	---	44.3	32.3	65.3	100.0
	2023	---	86.1	25.6	40.0	100.0
Average Peak Ratio (%)	2005	---	9.1	11.9	9.6	5.3
	2023	---	8.7	10.9	9.0	4.9
Increase Ratio	2023 /2005	---	2.63	1.08	0.83	1.35
PCU/hr	2005	---	313,424	71,670		
	2023	---	825,409	77,158		

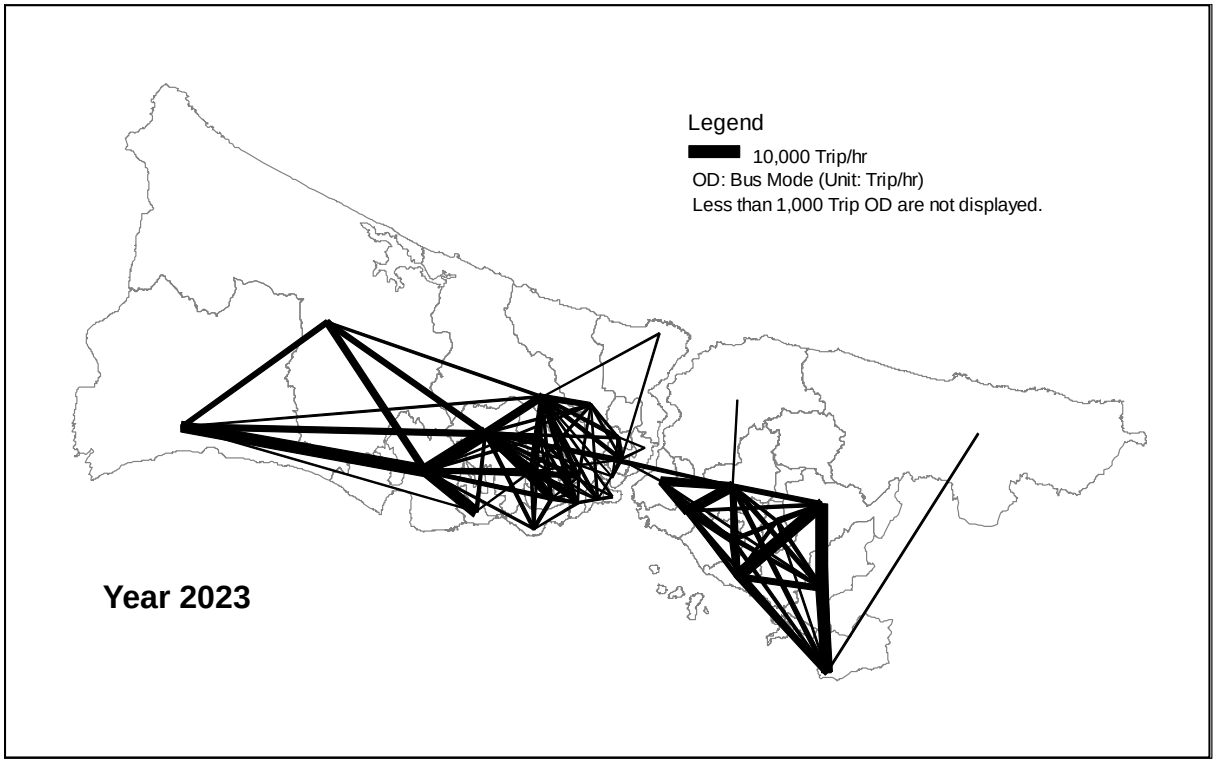
Source : *ibid.*



Source : *ibid.*

Figure 11.1.4 Peak Hour Trips by Car in 2005 and 2023





Source : *ibid.*

Figure 11.1.5 Peak Hour Trips by Public Mode in 2005 and 2023

11.1.2 Screen Line Traffic Volumes at Morning Peak Hour

Table 11.1.3 shows the traffic volumes for morning peak hours on four screen lines in 2005 and 2023 in the “Do-nothing” case. The screen lines are: BOP at the Bosporus Crossing, BP3 between Kucukcekmese and Buyukcekmece in the European side, BP4 along in the Golden Horn and DP2 in the Asian side. The traffic volumes were calculated from the hourly trip OD tables along the screen lines.

The largest volume of screen line traffic is observed on BP4 at present. In 2023, however, another two lines of BP3 and DP2 will catch up to the volume of BP3. On the Bosporus Crossing BOP, the total volume in 2023 is 71,429 PCU/hr, 2.4 times of that in 2005. In consideration of present traffic conditions in the Bosporus Crossing, it will be necessary to construct two or more bridges or tunnels under the “Do-nothing” scenario because no modal shift is expected.

Table 11.1.3 Traffic Volumes on Four Screen Lines in 2005 and 2023

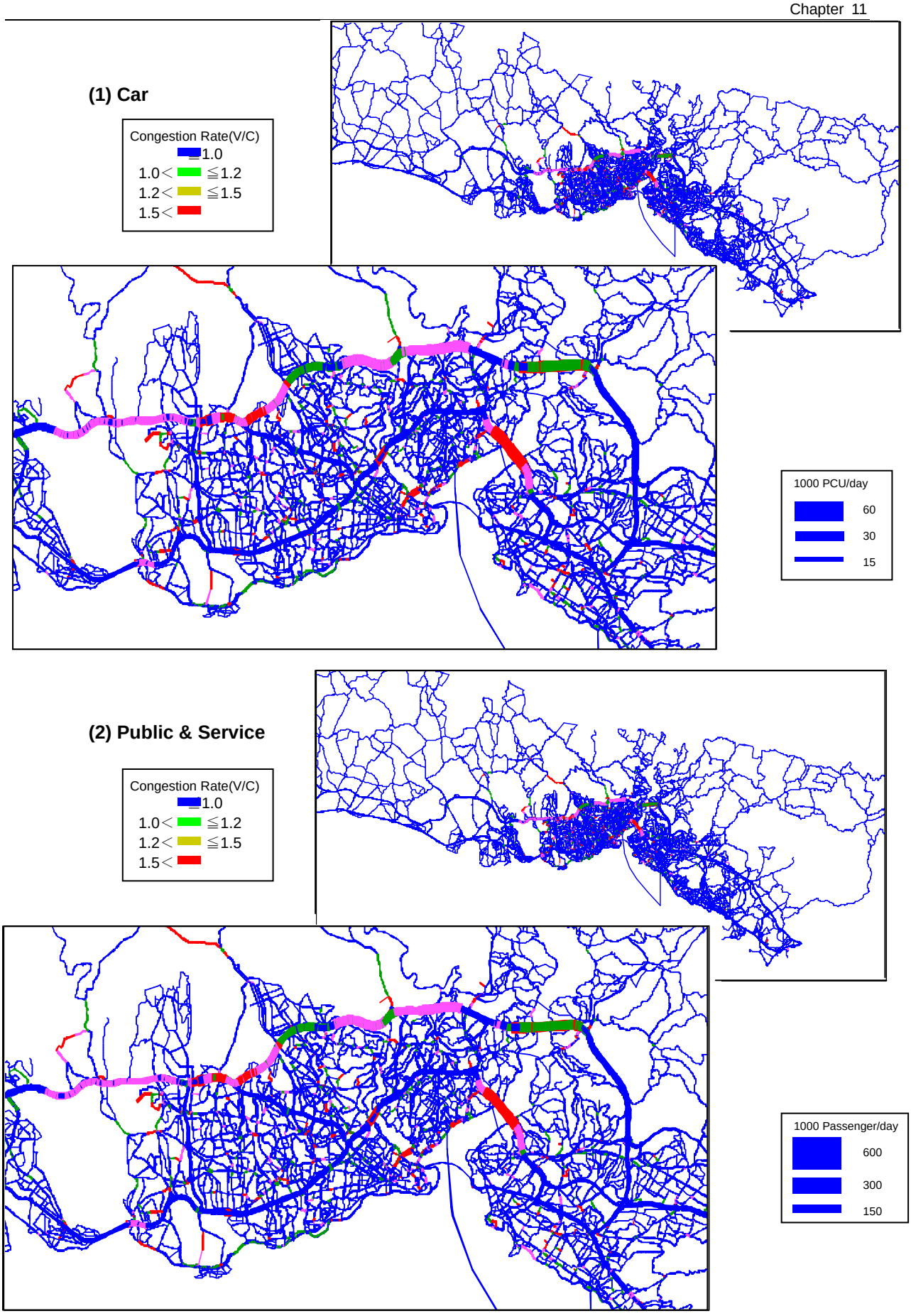
(Unit: PCU/hr)

Vehicle Type and Case		BoP		BP3		BP4		DP2	
		to east	to west	inbound	outbound	inbound	outbound	inbound	outbound
Car	2005	3,104	20,781	15,958	12,223	24,680	24,580	17,868	14,453
	2023 Do Nothing	12,185	54,132	71,341	45,868	42,388	58,674	46,544	53,125
	2023/2005	3.93	2.60	4.47	3.75	1.72	2.39	2.60	3.68
Service	2005	222	3,472	3,235	2,390	4,503	3,095	3,783	2,449
	2023 Do Nothing	545	2,043	5,234	2,846	2,420	2,492	3,176	3,925
	2023/2005	2.45	0.59	1.62	1.19	0.54	0.81	0.84	1.60
Public	2005	131	2,033	2,434	2,832	4,231	3,028	3,390	2,551
	2023 Do Nothing	718	1,806	2,861	2,928	2,144	2,501	2,569	3,050
	2023/2005	5.48	0.89	1.18	1.03	0.51	0.83	0.76	1.20
Total	2005	3,457	26,286	21,627	17,445	33,414	30,703	25,041	19,453
	2023 Do Nothing	13,448	57,981	79,436	51,642	46,952	63,667	52,289	60,100
	2023/2005	3.89	2.21	3.67	2.96	1.41	2.07	2.09	3.09

Source : *ibid.*

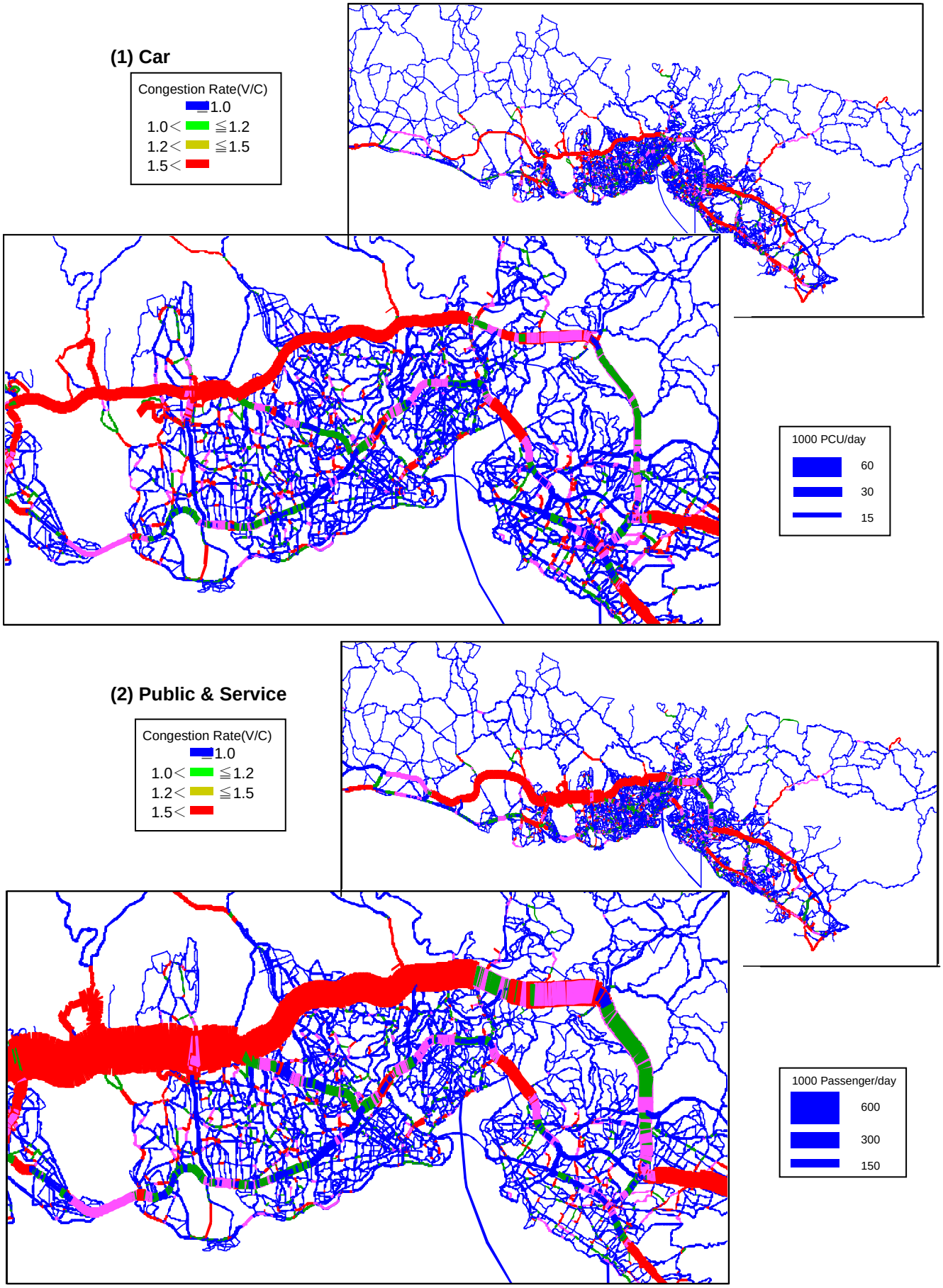
11.1.3 Travel Demand on Road Networks

Peak hour trips in 2023 were assigned on to the 2005 road network to simulate the “Do Nothing” scenario. Passenger trips using public transport were assigned on bus, railway and ferry lines, and after converting the resultant volumes to PCUs they were preloaded on road links. The results were shown in Figure 11.1.7. Figure 11.1.6 is the result of traffic assignment to simulate the present situation. In these figures traffic volume on each road section is drawn by a narrow band of which width is proportional to the assigned traffic volume. When comparing traffic volumes in both figures, the volume-capacity ratio exceeds 1.0 on almost all the road links in 2023. This means that future traffic conditions will be catastrophic if no improvement is made in the transport network.



Source : *ibid.*

Figure 11.1.6 2006 Traffic Demand on Present Transport Network



Source : *ibid.*

Figure 11.1.7 2023 Traffic Demand Loaded on Present Transport Network

11.2 Modal Share in Three Major Metropolitan Areas in Japan (Reference)

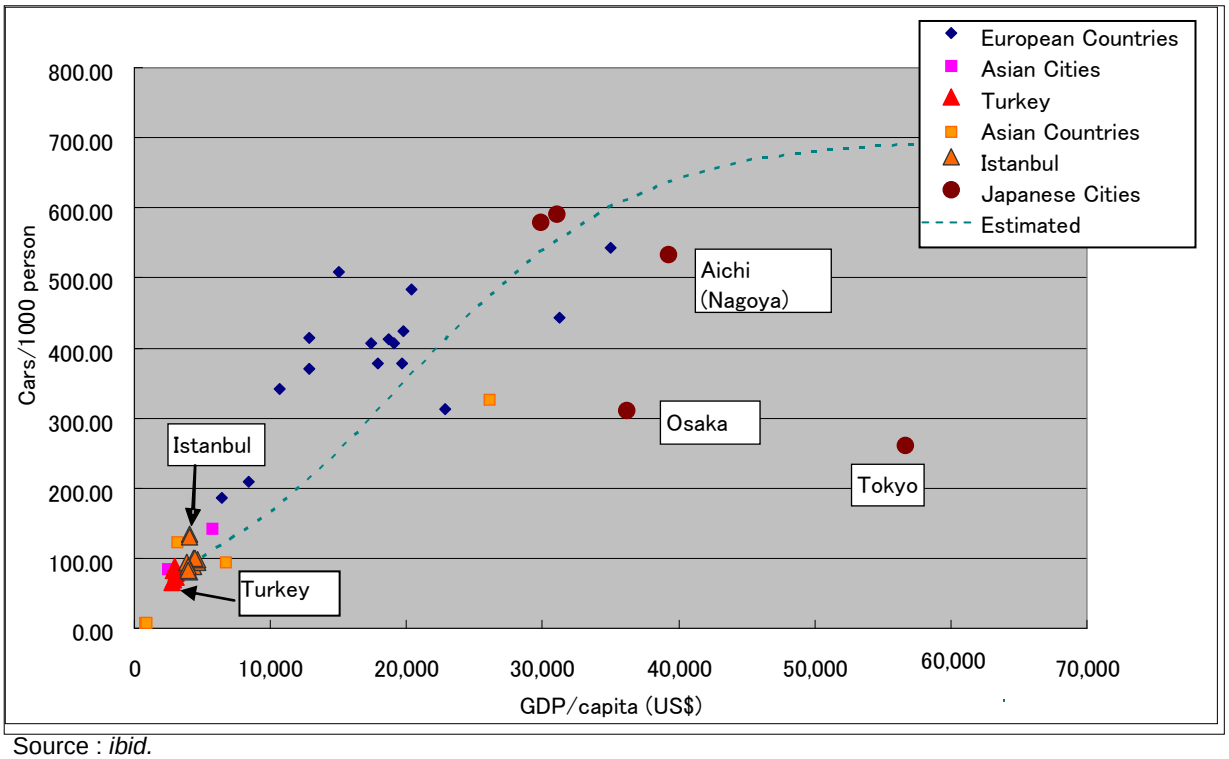
Experiences in large cities in the world show some possibilities to reduce car modal share by improvement and expansion of public transport services, even though car ownership grows. For reference, relationship between car ownership and modal share in three major metropolitan areas in Japan is presented in this section.

Figure 11.2.1 shows the relationship between car ownership and the GDP/capita in European countries, Asian cities, Turkey, Istanbul and Japanese cities in which the countries and major cities are mixed. Tokyo, Osaka and Aichi (Nagoya) have lower car ownership than in other countries relative to their GDP/capita.

Figure 11.2.2 shows the comparison of modal shares exclusive of walking and the motorcycle mode in three metropolitan areas in Japan and Istanbul. The car modal shares in Tokyo and Osaka metropolitan areas are 54% and 60% respectively, in contrast to 83% in Nagoya. On the other hand, Istanbul has a 29% share. The share for railway in Tokyo and Osaka is higher than in Nagoya. In Istanbul, bus has a predominant share while railway has only 7%.

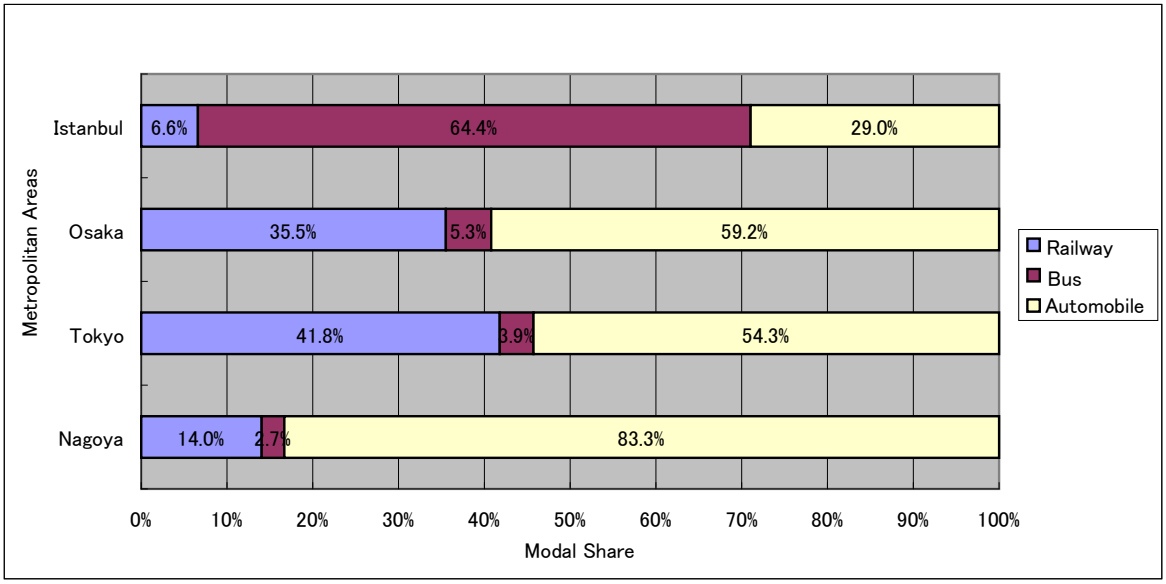
The higher ratios of railway composition in Tokyo and Osaka are related to railway operation distance as shown in Table 11.2.1 where data covers Japan Railway Company, private railway company and subway. The operating distances in Tokyo and Osaka are approximately 2,000 km and 1300 km, respectively, in contrast to 900 km in Nagoya.

Judging from the examples mentioned above, it may be possible to divert a transport demand from private car use to public transport (railway) use by improvement and expansion of rail transit services, even if car ownership increases.



Source : *ibid.*

Figure 11.2.1 Relationship between Car Ownership and GDP/Capita



Source : *ibid.*

Figure 11.2.2 Comparison of Modal Share of Metropolitan Areas in Japan and Istanbul

Table 11.2.1 Railway Operation Distance

	Tokyo Metropolitan Area	Chukyo (Nagoya)	Kei-Hanshin (Osaka)
Japan Railway Company (JR)	841	270	482
Private Railway Company	920	517	721
Subway	280	90	130
Sub-total of Railway	2,041	877	1,333
Tramway	17	31	55
Bus	9,951	6,807	7,446

Source: As of 1997 from Urban Public Transport by Gihodo Book, and as of 2005 for Subway