6.2.4. Bridge Data

(1) General

The collapse of a bridge at the time of an earthquake stops the flow of all vehicles, including emergency vehicles such as ambulances, fire engines, etc. In the Study, data on all bridges in Istanbul was collected to analyze their vulnerability.

For the Study, it was necessary to obtain information on bridges including their location, construction year, girder type, bearing type, height of abutment, structure, etc. Table 6.2.9 is created from original data received from the Highway 17th Regional Directorate, Ministry of Transportation and Communication. Using the Ministry's original data as a basis, the Study Team modified the data to fit the format designed for the Study.

(2) Relevant Organisation for Bridges

The following are relevant organisations in charge of designing, constructing, and maintaining bridges.

1) Highway Bridges

- 17th Regional Highway - TEM (from Edirne to Ümraniye), E5 (all routes in Istanbul)
- 1st Regional Highway - TEM (from Ümraniye to Tuzla)

2) Road Bridges

- IMM Construction Works Department (bridges constructed after 1994)
- IMM Infrastructure Coordination Department (bridges constructed after 1994)
- IMM Road Maintenance Department (bridges other than those mentioned above)
- IMM Transportation Department (location of each bridge)

3) Railway Bridges

- TCDD National Railway (all railway bridges)

4) Metro Bridges

- IMM Directorate of Technical Works

(3) Data Set-up

Some of these relevant organisations have limited information on their respective bridges; therefore, it was necessary to consider a way to create data required for the Study. Basic data was supplied by the relevant organisations, and the Study Team conducted its own inventory out in the field to supplement the data these organisations supplied. Table 6.2.9 shows the list of bridges received from relevant organisations and the inventory taken by the Study Team. Figure 6.2.22shows the location of all bridges with data attributes.

Table 6.2.9 List of Bridges

Organisation	Girder Type						Type of Bearing			Max. Height of Abut./Pier			Material of Abut./Pier			Foundation Type	
	1 Span		2 or More Spans														
	Arch/Rigid Frame	Simple	Simple	Continuous	More than 1 Continuous	Combination Of Continuous & Simple	Fall Prevention Device	Normal	M M	less than 5 m	5 to 10 m	more than 10m	Reinforced Concrete	Steel/Tentative	Masonry	Pile	Spread
17th Reg.Hwy.	0	12	202	120	2	0	0	0	336	1	269	66	336	0	0	76	260
	336						336			336			336			336	
1st Reg.Hwy.	0	0	8	38	1	2	0	0	49	0	0	49	49	0	0	1	48
	49						49			49			49			49	
IMM-construction Dept.	0	5	7	3	0	0	0	0	15	0	14	1	13	0	2	-	-
	15						15			15			15			-	
IMM-Infra. Coord.Dept.	1	17	11	1	0	0	0	0	29	18	11	1	28	2	0	22	8
	30						29			30			30			30	
IMM Maintenance Dept.	13	41	20	44	10	5	0	0	120	105	26	2	133	0	0	—	—
	133						120			133			133			—	
IMM Metro	0	12	3	0	0	5	0	0	20	8	12	0	20	0	0	6	14
	20						20			20			20			20	
TCDD Railway – Asian side	13	20	5	1	0	0	0	16	10	13	26	0	31	1	7	—	—
	39						26			39			39			—	
TCDD Railway - European side	2	18	17	0	0	0	0	26	9	15	22	0	37	0	0	-	-
	37						35			37			37			—	

Note: Compiled by the JICA Study Team

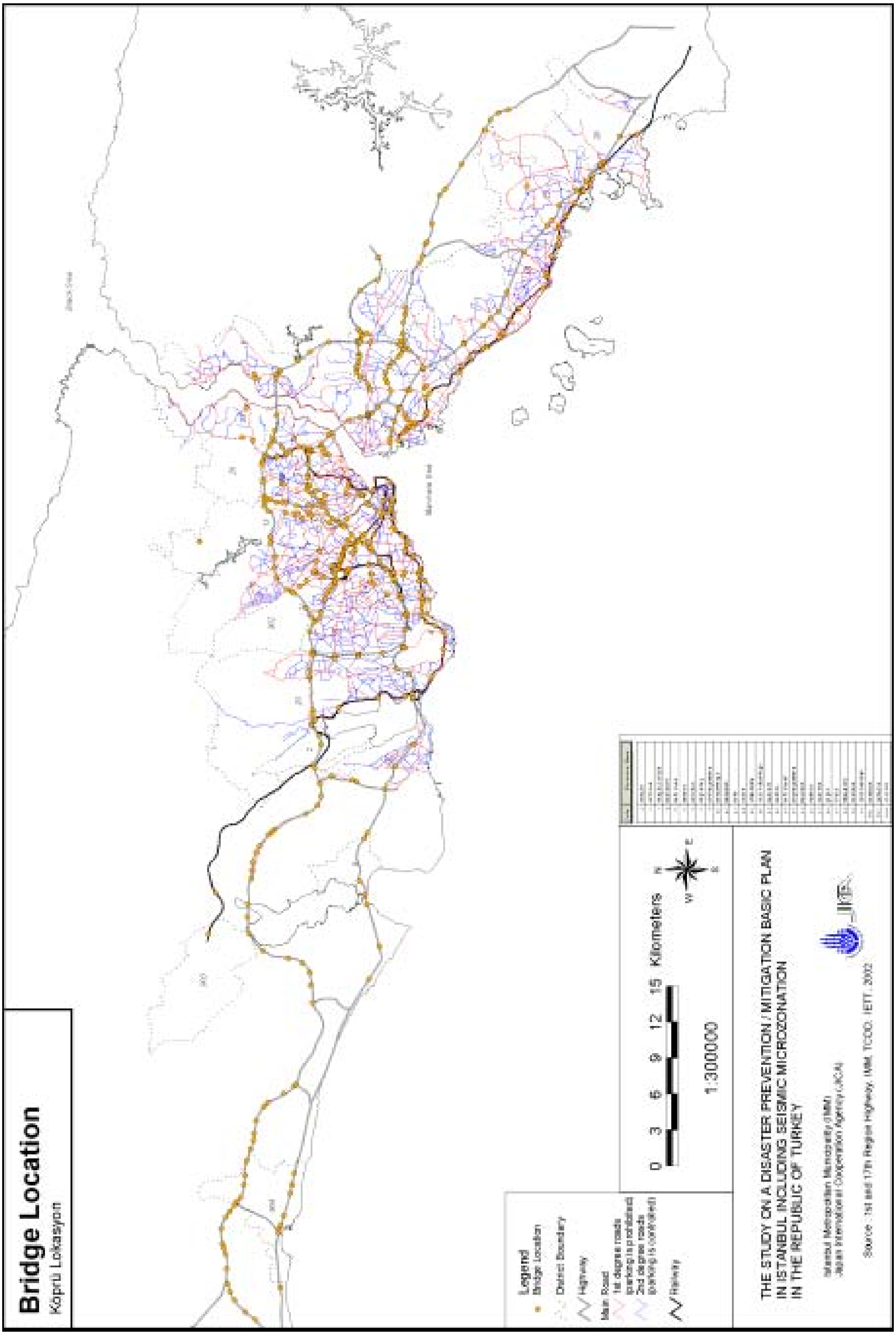

Figure 6.2.22 Bridge Locations

(4) Structural Feature of Bridges by Transportation Type

a. Motorway Bridges

Structure Type

Many overpass bridges have a simple support structure. Bridges with more than 2 spans are also simply supported as shown in Photo 1. Precast, prestressed concrete girders are mainly used and neoprene bearings are used as shown in Photo 2. Continuous bridges are also built on neoprene bearings. These bearings do not seem to be fixed to the superstructure and substructure. Continuous bridges are used as viaducts as shown in Photo 3. Many continuous bridges are cast-in-place, since the practice of connecting precast girders is notstandard in Turkey. Neoprene bearings are also used for continuous bridges.

Superstructure

Many motorway bridges are concrete bridges. Since steel bridges are so expensive, they are mainly used for curb alignment, in locations where the space for the substructure is restricted, or for cases in which quick construction is required.

Substructure

RC piers (wall type) are mainly employed as the intermediate pier of a simply supported 2-span overpass bridge. Some bridges have RC ramen type piers. Almost all bridges have reversed T-type abutments, and pier abutments are rarely used.

Foundation

The JICA study team asked relevant departments to the foundation type of their respective bridges. The Study Team confirmed the foundations of bridges of the 1st and 17th Regional Highway. Spread foundations existed in 77% of the 17th Regional Highway bridges (226 out of 336), and 98% of the 1st Regional Highway bridges (49 out of 50).Pile foundations accounted for the rest.

Unseating Prevention Structure

Unseating prevention structures were not found in almost all bridges covered in the field survey, and seat width, in most cases, was about 50cm.

b. TCDD Railway Bridges

Structure Type

Many bridges are simple span structures with two abutments or simply supported structures with 2 spans as shown in Photo 4. Steel rollers are the common bearing type. Both side abutments, but not the intermediate piers, bear lateral forces. No viaducts were observed on the European side. However, a multi-span, simply supported, gerber girder viaduct was found on the Asian side as shown in Photo 5. Several arched overpass bridges (stone masonry) can also be seen on the Asian side (Photo 6).

Superstructure

Similar to railway bridges, many TCDD bridges adopt a steel structure. Many I-beam and some truss bridges can be seen. Bridges with a span greater than 20 m tend to use truss girders. Other bridges with a span of less than 10 m have box culverts.

Substructure

Simple span bridges have a reversed T-type abutment, like motorway bridges. According to the collected data from TCDD, bridges on the Asian side are relatively old (constructed in 1912). Some bridges are masonry as shown in Photo 2.4.8. Many intermediate piers of 2 span, simply supported bridges adopt wall type piers. Some of these piers have RC rigid frame structures.

Foundation

According to TCDD technical information, spread foundations are used for bridges on the Asian side. Actually, some arch bridges, which usually have solid ground foundations, can be seen in this area.

Unseating Prevention Structure

Unseating prevention structures were not found in the Study Team's field observation. Seat widths were generally wider than that of motorway bridges. Seat widths were estimated as more than 70 cm.

c. IMM Metro Bridges

Structure Type

There are some viaducts whose length are more than several hundred meters as shown in Photo 9. The total length of these viaducts accounts for a considerable rate of gross railway bridge length. Viaduct structures are multi-span and simply supported, and their bearing material is neoprene. Other bridges are mainly simple beam bridges with a span of less than 20 m that pass over a road or cross a river.

Superstructure

Compared with the TCDD bridges, IMM Metro bridges are relatively new. These bridges were constructed circa 1990. Hence, relatively new techniques, such as the use of PC, precast and prestressed girders, were adopted. Steel girders are used for bridges with a long span or skewed angle; instances in which precast prestressed girders cannot be adopted.

Substructure

Metro bridges commonly have viaducts of RC rigid frames (ramen) with two pillars. Wall type piers are employed for skewed bridges as shown in Photo 2.4-10.

Foundation

Pile foundations are adopted for viaducts of several hundred-meter lengths.

Unseating Prevention Structure

Unseating prevention structures were not observed in the field observation. Seat widths were almost equal to that of motorway bridges, and seat widths were observed as about 50 cm.

(5) Structural Character by Route and Area

a. TEM

Asian Side

No viaducts were observed on the Asian side. Many PC overpass bridges were observed, but few subterranean bridges with substructures of two abutments were seen.

Standard overpass bridges are shown in Photo 11. Girders are precast, prestressed, and box beam as shown in Figure 6.2.23. Their structure type is 2 spans and simply supported. Since these bridges were constructed from 1990 to 1991, these bridges are relatively new. Judging from these bridges' proportions, this type of bridge seems to be constructed properly and strongly. Seat width of wall type pier is 50 cm. This value is relatively small compared to the value that is regulated by specifications for highway bridges.

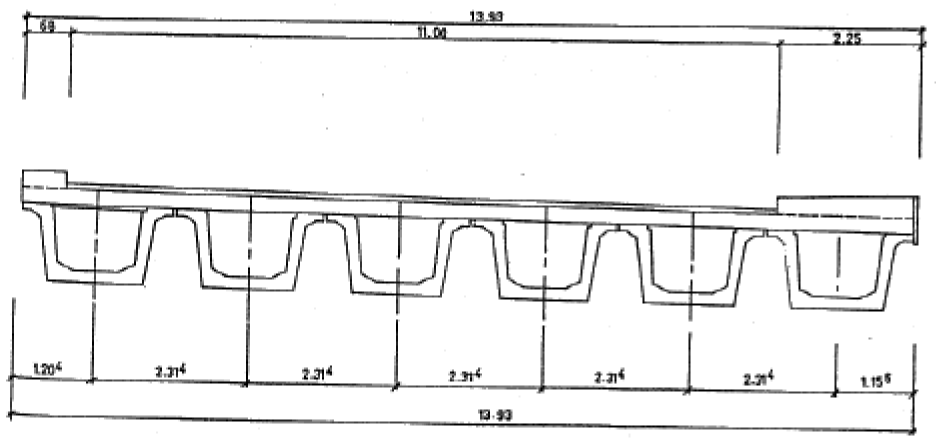

Figure 6.2.23 Typical Cross-section of Precast, Prestressed, Simple Box Beam

European Side

Overpass bridges on the European side have a similar structure type as those on the Asian side. The skew angle of bridges is shown in Photo 2.4-11. Superstructures are precast, prestressed, simple box beam, and the seat width does not seem to be expanded on account of skew angles.

Many viaducts were observed in this area. The bridge in Photo 2.4-12 is a multi-span, simply supported bridge and its bearing material is neoprene. The protrusions from the top of the substructure are a feature of this bridge whose purpose could not be confirmed. It is assumed that these projections are to prevent the collision of girders against each other during an earthquake. Their bearing material is neoprene, and the bearing footings do not seem to be fixed to the superstructure or substructure.

b. E5

Asian Side

The number of bridge on the Asian side is much less than that of TEM. Bridges that do exist are mainly 2 span, simply supported bridges.

European Side

Many precast, prestressed, concrete girder structures can be found in TEM. In E5, many bridges have a superstructure that is characterised by post-tensioned continuous plate girders (Figure 6.2.24).

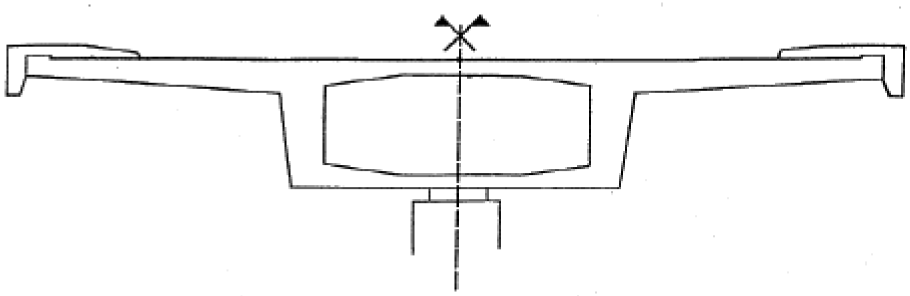

Figure 6.2.24 Post-tensioned Continuous Plate Girder

c. Old City

Photo 13 shows an example of a prestressed, concrete rigid frame. The superstructure is made up of post-tensioned, continuous plate girders. Overhang slabs are supported by abutments, and pier heights are irregular due to vertical liners. Therefore, there is a potential for the concentration of lateral forces in short columns in the event of an earthquake.

Photo 14 shows a steel bridge that is multi-span and simply supported. A large device is installed on the superstructure and substructure. This device seems to be the unseating prevention structure. In spite of curb alignment, a simple support is adopted. It might be installed in order to stabilise the superstructure. As the result of a detailed observation, the quality of bridge manufacturing, especially the quality of the welding, was observed as not high, since it is a relatively old bridge.

d. Bridges with High Pier

Photo 15 shows the approaching bridge to the first Bosphorus Bridge. It is a multi-span, simply supported, prestressed concrete bridge. The size of the substructure seems to be rather thin against the heavy concrete superstructure.

Photo 16 shows a bridge overpassing Golden Horn Bay. It is multi-span continuous bridge. Its superstructure consists of steel box girders and its bearing plate is metal. Statically indeterminate forces are small due to its high pier, so it could have multi-point fixed support.

e. Steel Bridges

Photo 17 shows a continuous, steel girder bridge with curb alignment. Each box girder is equipped with two (2) bearing plates and the substructure is RC. This substructure is very thin, and even lighter steel serves as the superstructure.

The substructure of the bridge in Photo 18 is a steel pier. To improve stability of superstructure, the bridge seat is widened.

The bridge in Photo 19 has a very wide superstructure in the transverse direction, and this bridge length (861 m) is the longest in the Study Area. Space between the right and left pier is also wide, so that a road could pass under the bridge. The bridge’s two girders are connected by cross beams. Compared to the superstructure size, the substructure size seems small.

f. Pedestrian Bridges

Compared to motorway bridges, the ratio of steel pedestrian bridges seems to be higher than that of concrete bridges. Steel pedestrian bridges can mainly be seen in E5 and other arterial roads. Almost all steel bridges are of continuous girders, and their substructure is

RC. Their superstructure hangs over the end of the substructure, which prevents the girders from falling during an earthquake.

Mainly concrete bridges can be seen in TEM. A standard pedestrian bridge is shown in Photo 20. Many of the same type of bridges can be seen in TEM, and, thus, they are considered the standard bridge type in TEM. Their superstructure is concrete and they are multi-span and simply supported. Their bearing plate is neoprene, and their bidge seat length is estimated to be 50 cm.


Photo 6.2.1


Photo 6.2.2


Photo 6.2.3


Photo 6.2.4


Photo 6.2.5


Photo 6.2.6


Photo 6.2.7


Photo 6.2.8


Photo 6.2.9


Photo 6.2.10


Photo 6.2.11


Photo 6.2.12


Photo 6.2.13


Photo 6.2.14


Photo 6.2.15


Photo 6.2.16


Photo 6.2.17


Photo 6.2.18


Photo 6.2.19


Photo 6.2.20


Photo 6.2.21


Photo 6.2.22


Photo 6.2.23


Photo 6.2.24

g. Considerations

The present condition of bridges in the Study Area is mentioned from many points of view. On the basis of the present condition, problems of bridges in the Study Area are observed as follows:

1) Simply supported bridges are adopted not only for overpass bridges, but also for viaducts, and the clearance between girders is narrow. Therefore, girders have the potential to collide with each other easily, and there is high possibility of collapse in case of an earthquake.

2) Observed seat length is relatively short compared to Japanese standard specifications for highway bridges, and even for cases where the superstructure is at a skewed angle, the seat length is not extended beyond the standard value.

3) In most cases, neoprene-bearing plates did not seem to be fixed to the superstructure or substructure. Thus, there is a high possibility of residual deformation after an

earthquake. Girders can collide with each other and there is the possibility of collapse due to an earthquake with large accelerations.

4) Many bridges do not have unseating prevention structures.

5) Compared to the scale of bridge superstructures, there are several substructures whose sizes seem to be relatively small.

h. Further Tasks

Necessary data for the damage analysis of bridges based on Katayama's method have been collected in this survey. Although unseating prevention structures were not observed in the site survey, it is said that some bridges have unseating prevention structures. The existence of unseating prevention structures is one of the most important items for damage assessment of bridges. In the next survey, it will be necessary to reconfirm existence of unseating prevention structures. Further data for assessment, such as ground data and seismic intensity, will be added to the bridge inventory.

6.2.5. Lifeline Data

In the Study, lifeline damage estimations are also undertaken. The importance of this damage estimation is that, by relaying the maximum potential damage, advance preparation of emergency supplies for a quick recovery can be ensured and the strengthening of resulting weak areas can be pursued. In this study, following 5 lifelines are included:

- Gas
- Water and Sewage
- Electricity
- Telecommunications

(1) Gas

In Istanbul, the natural gas distribution service is provided by IGDAŞ for both the European and Asian sides of the city. Among lifeline-related companies and organisations, IGDAŞ has made the most progress in digitising their network using GIS, since they are awarethat gas linescan cause the most serious damage and danger to the city during an earthquake. Their database is comprehensive and contains important and necessary information, such as pressure regulation valve locations, main pipe network, distribution pipe network, and other related attributes. However, the data received from IGDAS does not include information on the systems in Büyükçekmece. Çatalca and Silivri, which are not serviced by IGDAŞ. The data for these areas has already been integrated to the database prepared in this project and is ready to analyze. In addition, the Study Team has already calculated the length of pipes by type and width of pipes for each mahalle zone. Figure 6.2.25 shows the existing network of gas distribution in Istanbul.

(2) Water and Sewage

Water supply service and sewage is provided by ISKI for the entire Study Area except for Silivri, where their own water supply service is provided. ISKI is also managing their network using GIS; however, at the moment, not all of the network attributes (e.g., pipe type/diameter information, joint type information, etc.) are available. In the Study, the number of damage points will be estimated for each mahalle depending on the data quality. Therefore, pipeline data is necessary for transmission lines from the water resource area to purification plants and for distribution pipelines from purification plants to service areas. Figure 6.2.26 and Figure 6.2.27 illustrate service networks for water and sewage, respectively.

(3) Electricity

Electricity service is separated into two parts, electricity supply is operated by TEAŞ. This service is separate for the two sides of the city (TEAŞ European Side and TEAŞ Asian Side), and electricity distribution is operated by BEDAŞ (European Side) and AKTAŞ (Asian Side). Therefore, to complete an assessment of the electricity network in Istanbul, data from each company had to be integrated. However, each company had data in different formats or no data was available, and this created a delay of setting up data. In reality, electricity companies did not have digitised maps; therefore, the Study Team started to digitise all received hard copy network information. Figure 6.2.28 shows existing high voltage electricity lines based on the data received from TEAŞ. The received data also did not cover the additional 3 districts. For Bedaş and Aktaş, the Study Team received statistical tables prepared by their own service district. In the next phase, the Study Team will calculate the length of cables in each mahalle.

(4) Telecommunications

Turk Telecom provides telecommunication service for Turkey in its entirety. In Istanbul, their jurisdiction areas are separated into two parts: one is for the European side and the other is for the Asian side. Recently, at the beginning of this year, by order of the central office of Turk Telecom, the project to set up GIS network data for the fiber optic cable network has been started. It is expected to be completed soon and a request has been made for Turk Telecom to supply the data after its completion. Soon after the data is received from Turk Telecom, the Study Team will integrate this data into the database.

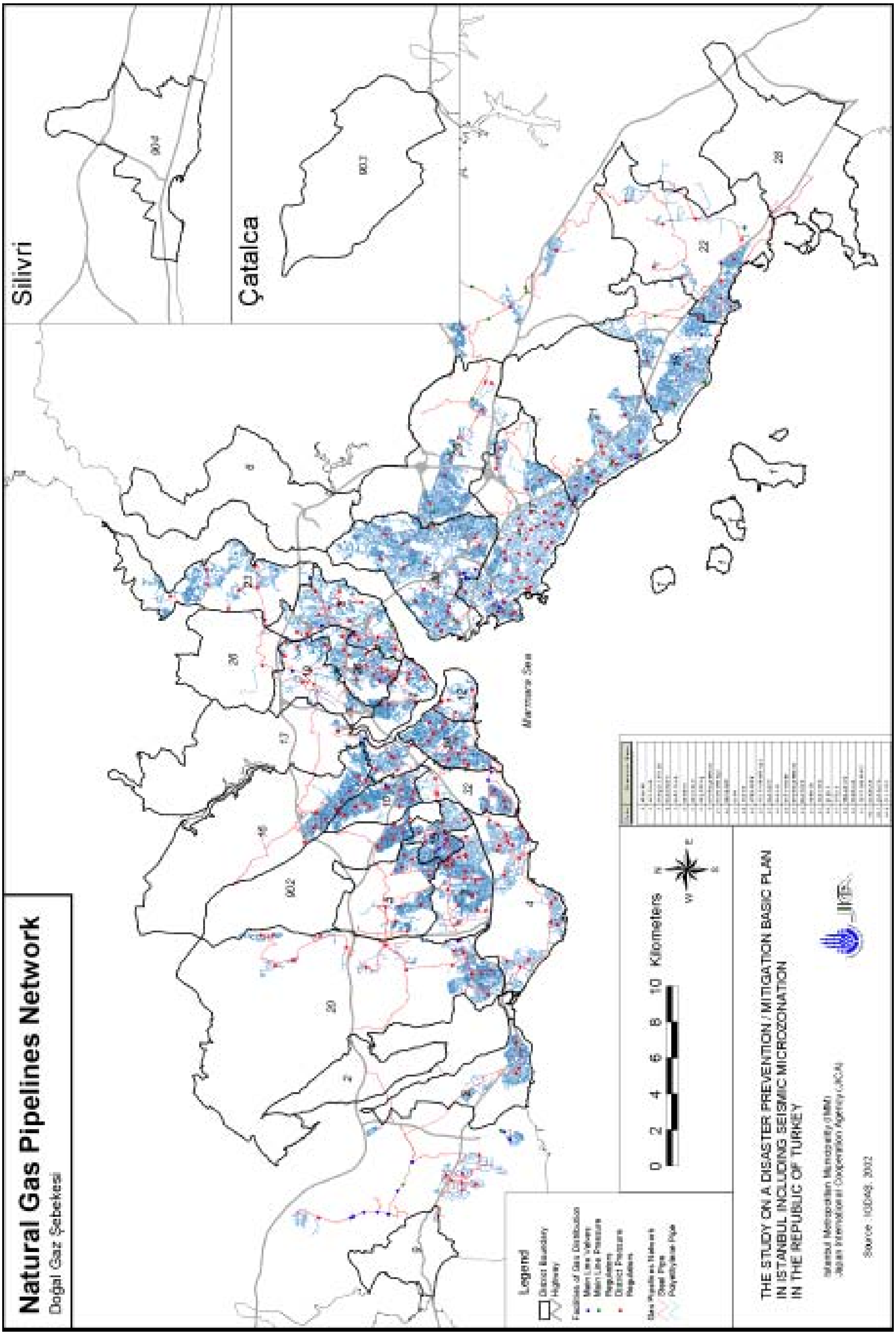

Figure 6.2.25 Gas Distribution Network

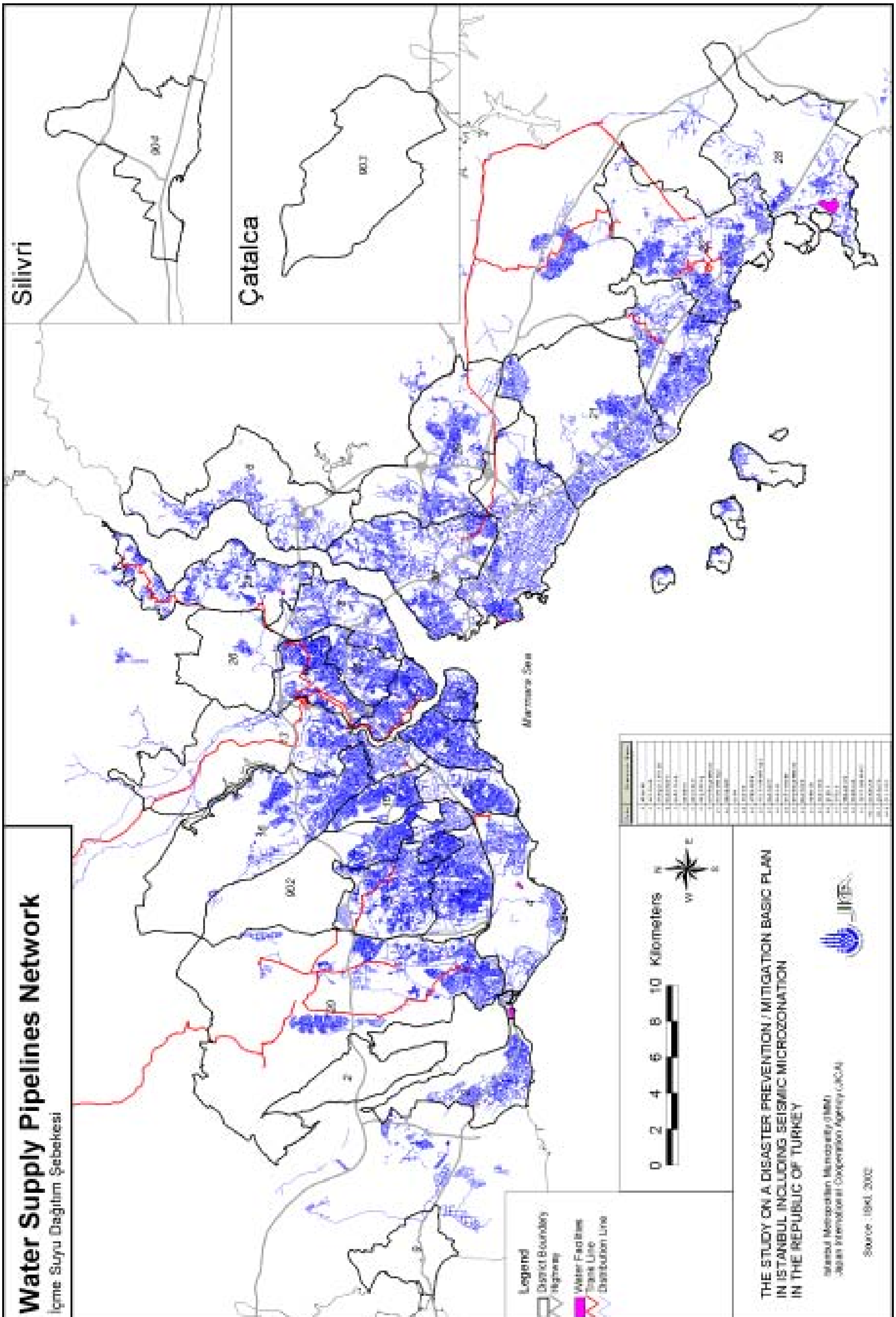

Figure 6.2.26 Water Distribution Network

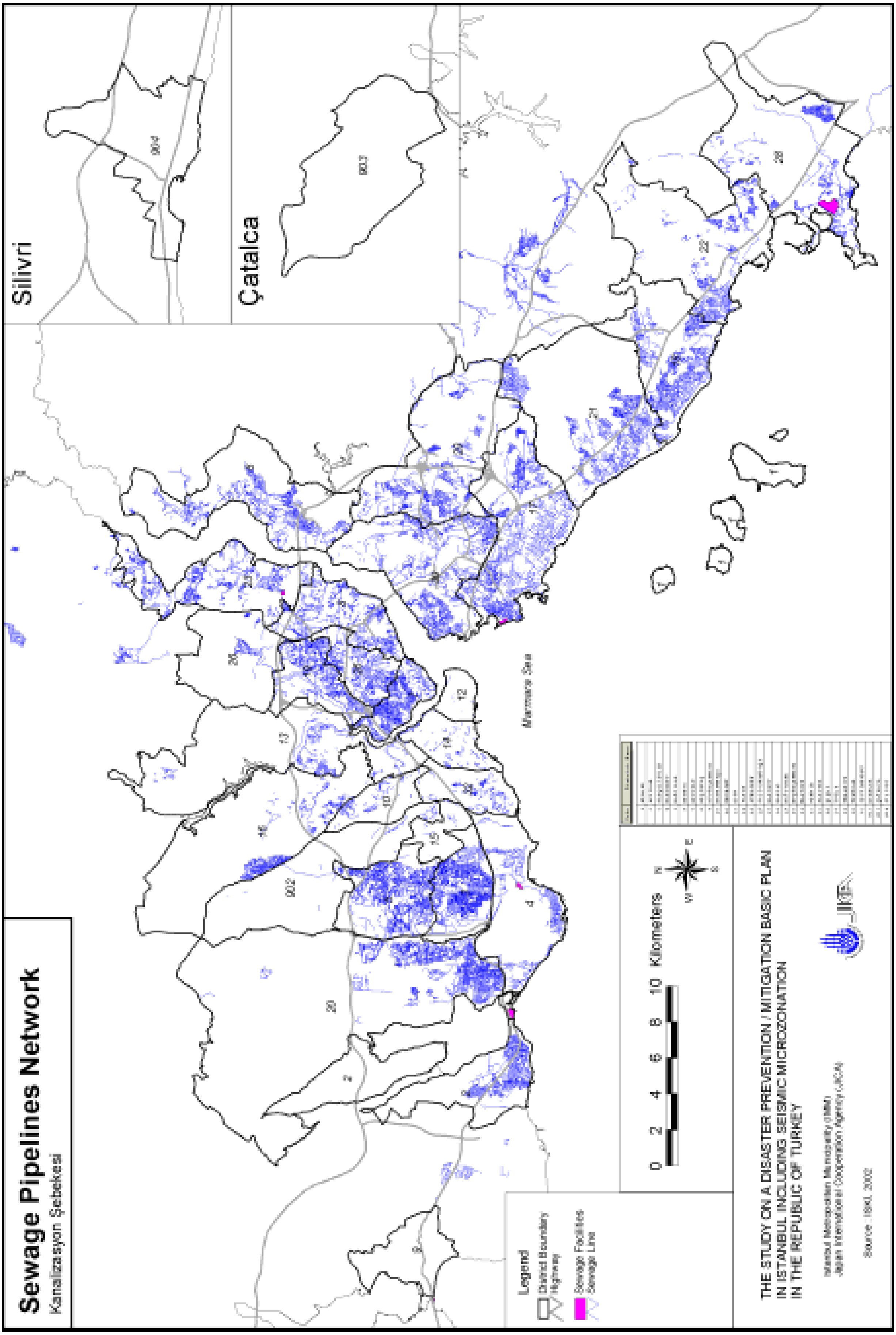

Figure 6.2.27 Sewage Network

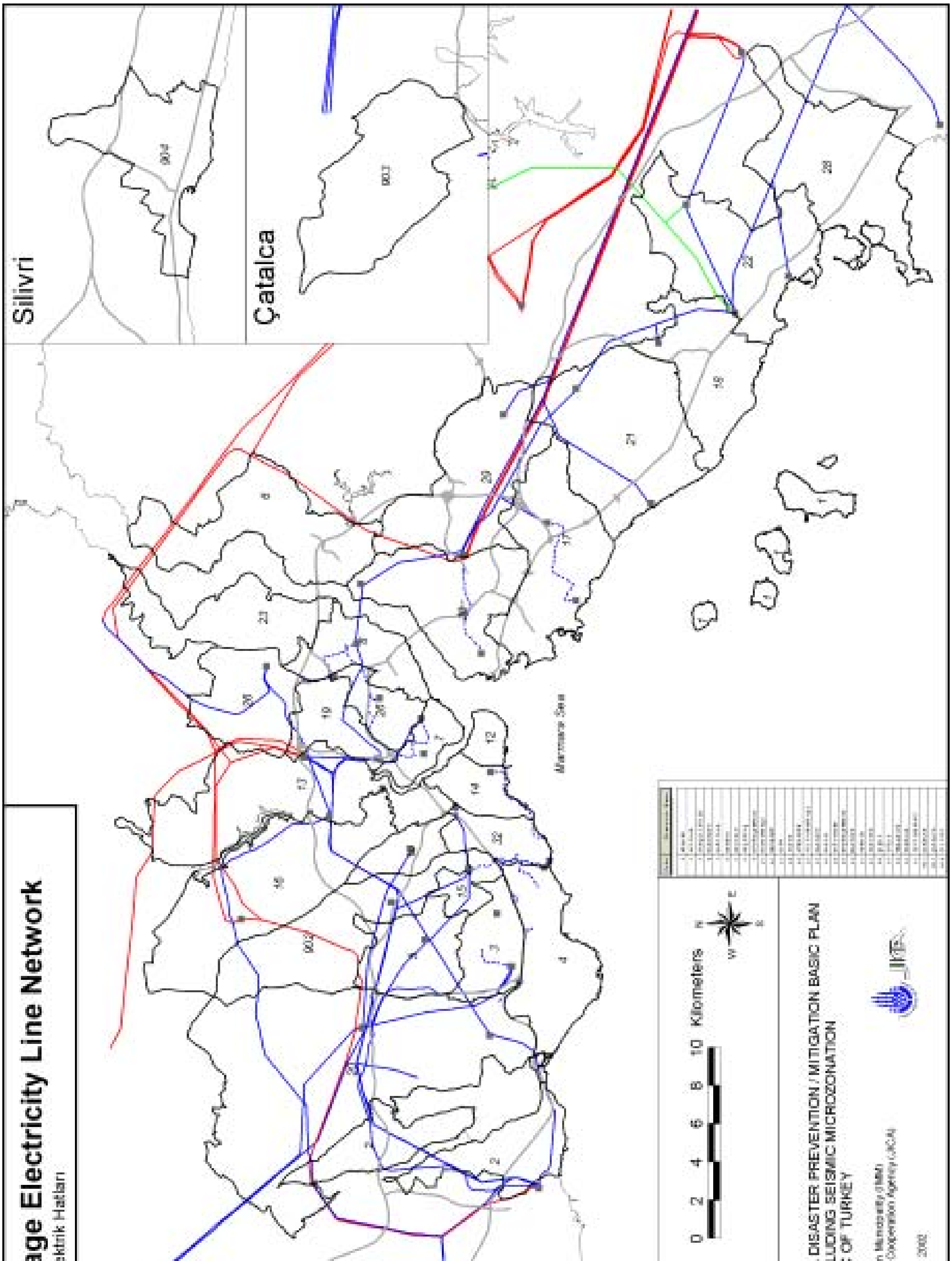

Figure 6.2.28 High Voltage Electricity Network

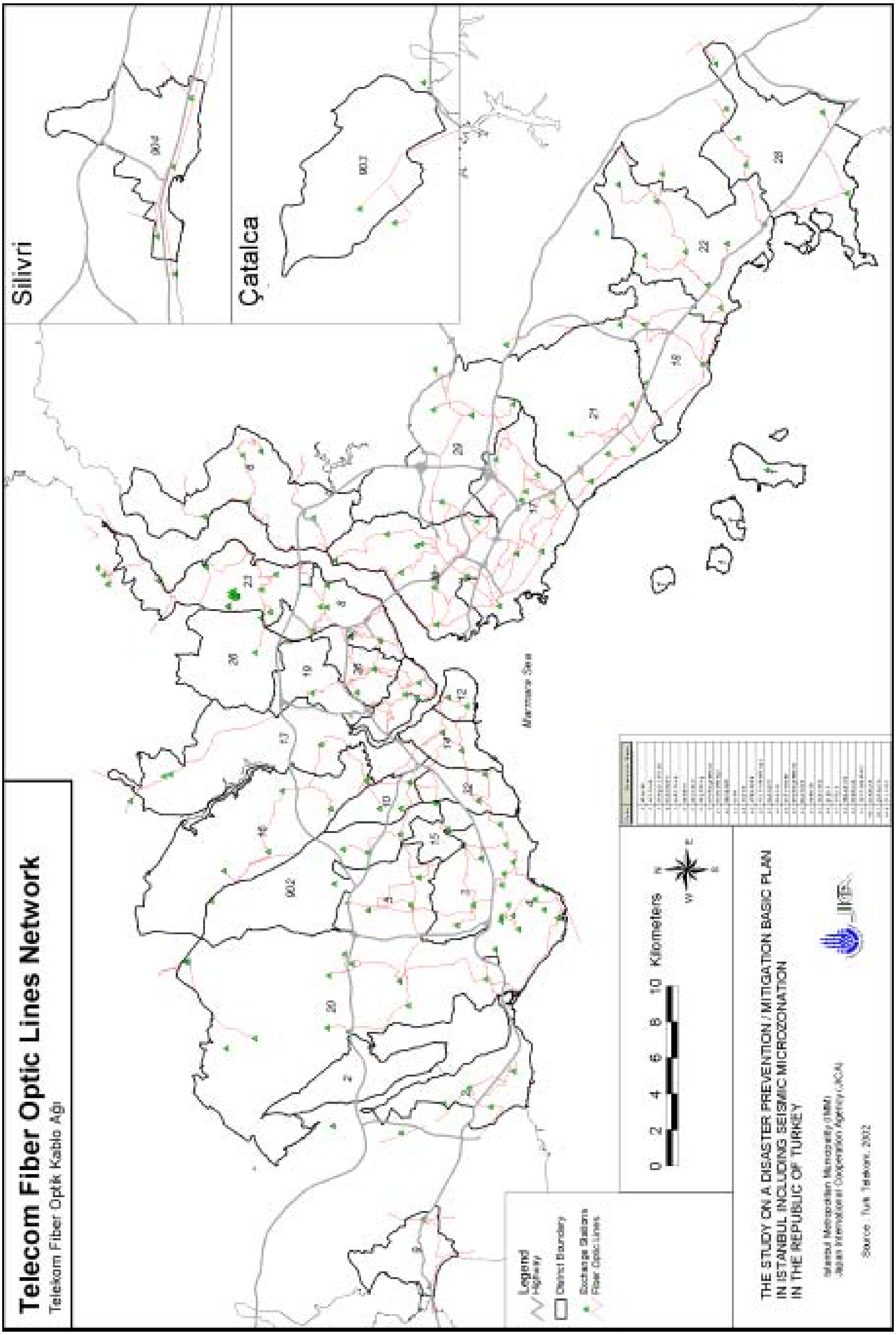

Figure 6.2.29 Telecom Fiber Optic Lines Network

6.2.6. Major Urban Facilities Data

(1) Educational Facilities

The current situation for the educational facilities was examined based on the data obtained from the provinces in May 2002. The numbers of primary schools and high schools, population, and holding capacity per school in each district in the Study Area are summarized in Table 6.2.10. Total numbers of primary school and high school for each district are stated in Figure 6.2.30.

Table 6.2.10 Numbers of Primary Schools, High schools, Population per School for Each District in the Study Area

Code	District	Primary School			High School			Total	Population	Population per School
		Public	Private	Sub Total	Public	Private	Sub Total			
1	ADALAR	5	1	6	1	1	2	8	17,738	2,217
2	AVCILAR	22	1	23	8	1	9	32	231,799	7,244
3	BAHÇELİ EVLER	36	11	47	17	9	26	73	469,844	6,436
4	BAKIRKÖY	28	12	40	13	5	18	58	206,459	3,560
5	BAĞCILAR	50	4	54	17	7	24	78	557,588	7,149
6	BEYKOZ	48	2	50	8	1	9	59	182,864	3,099
7	BEYOĞLU	26	6	32	13	18	31	63	234,964	3,730
8	BEŞİ KTAŞ	29	15	44	14	8	22	66	182,658	2,768
9	BÜYÜKÇEKMECE	50	8	58	9	9	18	76	34,737	457
10	BAYRAMPAŞA	22	0	22	12	0	12	34	237,874	6,996
12	EMİ NÖNÜ	9	3	12	11	1	12	24	54,518	2,272
13	EYÜP	43	3	46	10	0	10	56	232,104	4,145
14	FATİ H	51	7	58	17	11	28	86	394,042	4,582
15	GÜNGÖREN	20	4	24	8	6	14	38	271,874	7,155
16	GAZİ OSMANPAŞA	79	4	83	17	2	19	102	667,809	6,547
17	KADIKÖY	74	20	94	26	17	43	137	660,619	4,822
18	KARTAL	50	6	56	21	4	25	81	332,090	4,100
19	KAĞITHANE	46	1	47	12	0	12	59	342,477	5,805
20	KÜÇÜKÇKMECE	61	5	66	17	7	24	90	589,139	6,546
21	MALTEPE	41	5	46	14	9	23	69	345,662	5,010
22	PENDİ K	56	2	58	13	0	13	71	372,553	5,247
23	SARIYER	40	15	55	10	9	19	74	212,996	2,878
26	Şİ ŞLİ	30	13	43	16	10	26	69	271,003	3,928
28	TUZLA	25	2	27	8	1	9	36	100,609	2,795
29	ÜMRANİ YE	71	5	76	19	4	23	99	443,358	4,478
30	ÜSKÜDAR	66	17	83	22	21	43	126	496,402	3,940
32	ZEYTİ NBURUNU	21	1	22	14	1	15	37	239,927	6,485
902	ESENLER	24	2	26	3	1	4	30	388,003	12,933
903	ÇATALCA	46	0	46	6	0	6	52	15,624	300
904	Sİ Lİ VRİ	39	2	41	8	1	9	50	44,432	889
Total		1,208	177	1,385	384	164	548	1,933	8,831,766	-
Average		-	-	-	-	-	-	64	294,392	4,569

Source: Provincial Disaster Management Center

More than 100 schools, both primary and high schools, are located in Kadıköy (137 schools), Üsküdar(126 schools), and Gaziosmanpaşa (102 schools). Districts with less than 30 schools are Esenler (30 schools), Eminönü (24 schools), and Adalar (8 schools). An average of 64 schools are located in each district.

Population density per school was calculated by dividing district's population by the total number of schools in the district. Çatalca(300 persons/school), Büyükçekmece(457 persons/school), and Silivri(889 persons/school) are the districts with density of less than 1,000 persons per school. Districts with the density greater than 7,000 persons/school are Bağcılar (7,149 persons/school), Güngören (7,155 persons/school), Avcılar (7,244 persons/school), and Esenler (12,933 persons/school). Over all the average for the Study Area is 4,569 persons/school. The maximum difference can be observed from between Çatalca and Esenler; the density in Esenler is 43 times higher than that in Çatalca.

The ratios of the numbers of schools to population in each district are shown in Figure 6.2.31. The figure shows that the population per school is relatively smaller in the 3 cities located in the west of the City of Istanbul and higher in the districts west to Eyüp-Fatih area except Bakırköy.

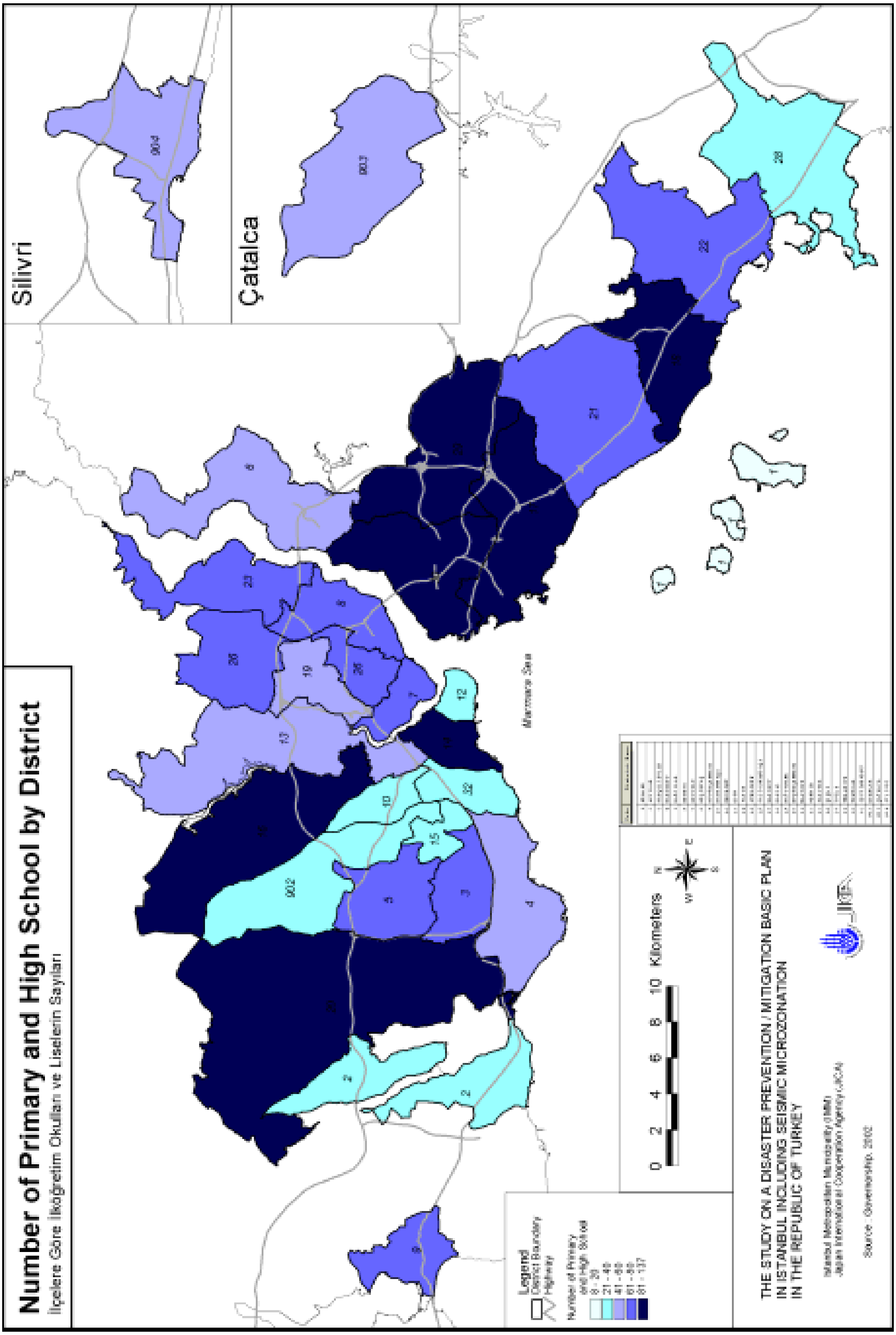

Figure 6.2.30 Number of Primary and High School by District

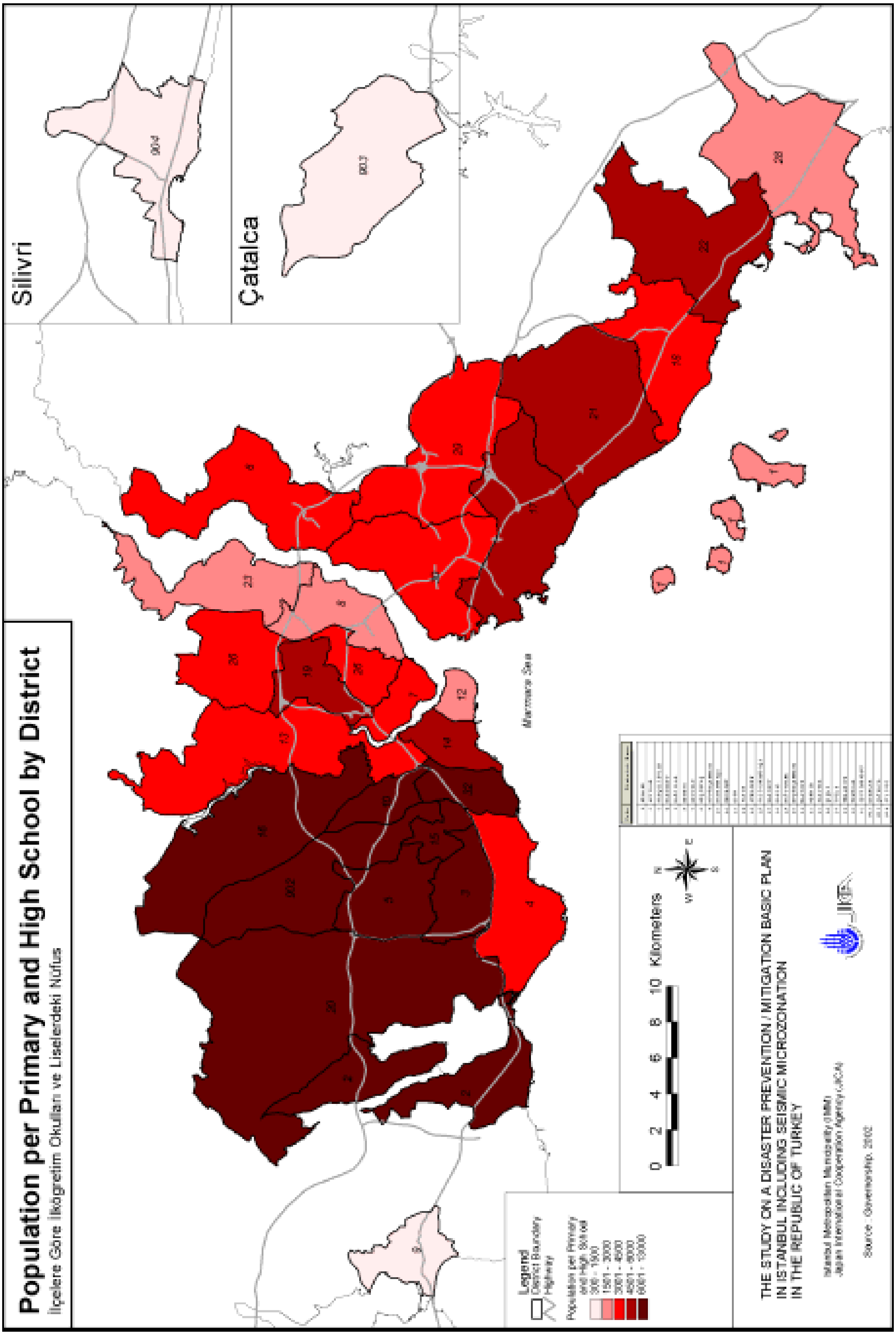

Figure 6.2.31 Population per Primary and High School by District

The province anticipates using total of 280 schools in Istanbul as emergency shelters/temporary housings. Table 6.2.11 shows available floor areas of schools, populations, and population densities to clarify usability of the schools for the purpose.

Table 6.2.11 Floor Areas of Schools and Populations

Code	District	Primary and High School	School Buildings Planned as Temporary Housing		Population	Area per Population (m^2 / person)
			Number	Available Floor Area (m^2)		
1	ADALAR	8	6	6,568	17,738	0.37
2	AVCILAR	32	5	18,980	231,799	0.08
3	BAHÇELİ EVLER	73	14	20,447	469,844	0.04
4	BAKIRKÖY	58	4	9,300	206,459	0.05
5	BAĞCILAR	78	9	10,816	557,588	0.02
6	BEYKOZ	59	8	7,135	182,864	0.04
7	BEYOĞLU	63	3	6,131	234,964	0.03
8	BEŞİ KTAŞ	66	3	6,677	182,658	0.04
9	BÜYÜKÇEKMECE	76	17	89,142	34,737	2.57
10	BAYRAMPAŞA	34	4	10,472	237,874	0.04
12	EMİ NÖNÜ	24	12	51,868	54,518	0.95
13	EYÜP	56	4	19,220	232,104	0.08
14	FATİ H	86	3	12,200	394,042	0.03
15	GÜNGÖREN	38	4	18,774	271,874	0.07
16	GAZİ OSMANPAŞA	102	16	40,419	667,809	0.06
17	KADIKÖY	137	9	24,825	660,619	0.04
18	KARTAL	81	16	25,746	332,090	0.08
19	KAĞITHANE	59	8	17,772	342,477	0.05
20	KÜÇÜKÇKMECE	90	18	103,705	589,139	0.18
21	MALTEPE	69	7	36,990	345,662	0.11
22	PENDİ K	71	16	56,364	372,553	0.15
23	SARIYER	74	4	6,310	212,996	0.03
26	Şİ ŞLİ	69	5	9,176	271,003	0.03
28	TUZLA	36	9	13,520	100,609	0.13
29	ÜMRANİ YE	99	25	60,996	443,358	0.14
30	ÜSKÜDAR	126	14	45,075	496,402	0.09
32	ZEYTİ NBURUNU	37	5	23,358	239,927	0.10
902	ESENLER	30	6	20,156	388,003	0.05
903	ÇATALCA	52	18	18,643	15,624	1.19
904	Sİ Lİ VRİ	50	8	17,785	44,432	0.40
Total		1,933	280	808,570	8,831,766	-
Average		64	9	26,952	294,392	0.09

Source: Provincial Disaster Management Center

The districts where schools with floor area greater than 1 m^2 per person are located are Büyükçekmece ($2.57m^2$) and Çatalca ($1.19m^2$). Unit floor area per person less than 0.03 m^2 is observed in Beyoğlu (0.03 m^2), Fatih (0.03 m^2), Saryer (0.03 m^2), Sisli (0.03 m^2), and Bağcılar (0.02 m^2). Over all the average of floor area per person, which would be served as a temporary housing space, is 0.09 m^2. The maximum difference is shown in between Büyükçekmece and Bağcılar: the unit floor area for Büyükçekmece is 129 times larger than that for Bağcılar. Figure 6.2.32 illustrates the available floor are school per person for each district. The figure indicates that the districts with available floor area per person less than the average are located mostly in the European side of the Study Area.

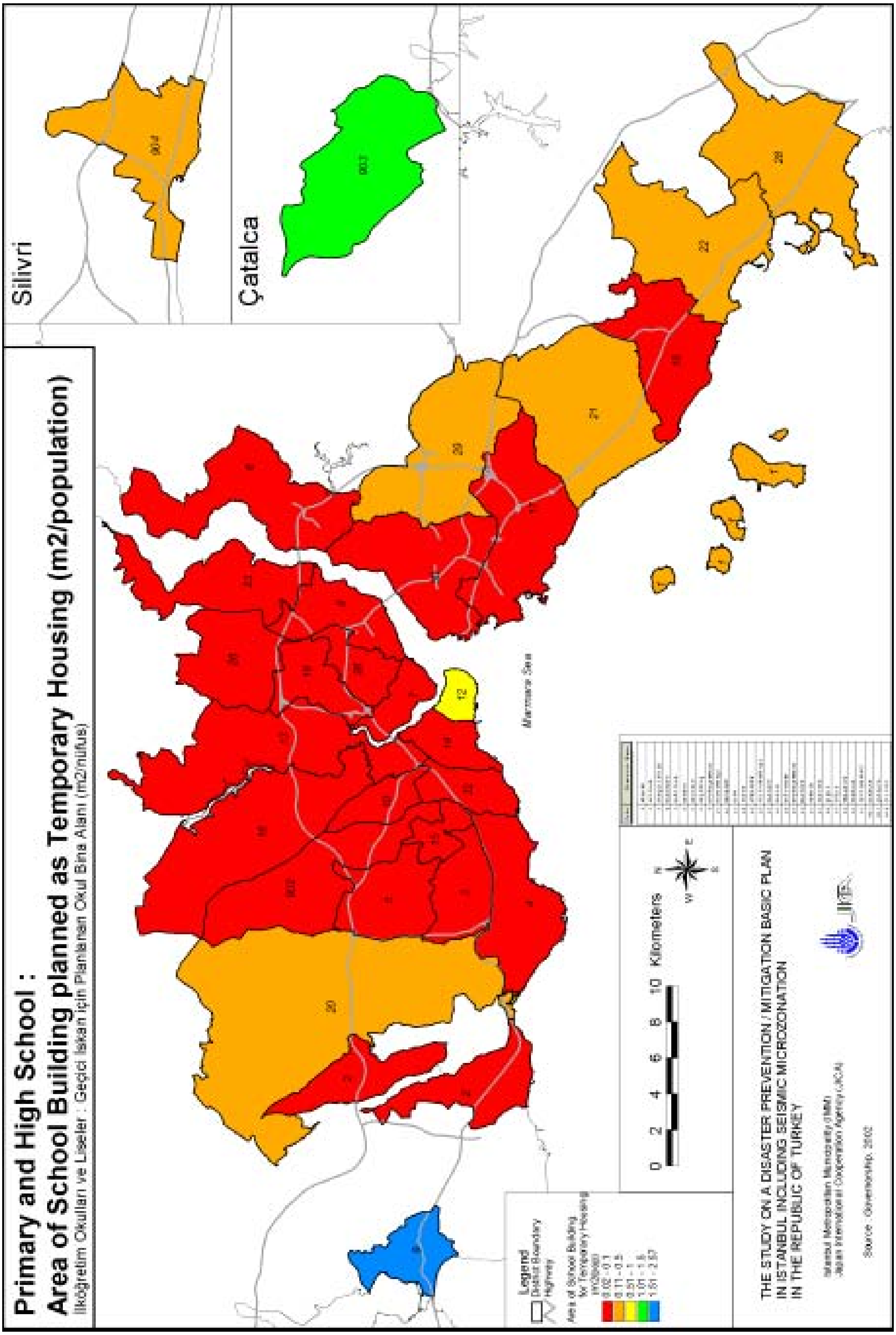

Figure 6.2.32 Primary and High School : Area of School Building Planned as Temporary Housing (m2/population)

(2) Medical Facilities

Current Situation for the medical facilities is examined based on the data obtained from the provinces in May 2002. The numbers of hospitals and policlinics are summarized in Table 6.2.12. The total numbers of hospitals and policlinics for each district are stated in Figure 6.2.33.

Table 6.2.12 Numbers of Hospitals and Policlinics for Each District

Code	District	Hospital						Policlinic			Total
		Public	Private	SSK	Univesity	Public Corporation	Sub Total	Public	Private	Sub Total	
1	ADALAR	2					2			0	2
2	AVCILAR		5				5		6	6	11
3	BAHÇELİEVLER	1	11				12			0	12
4	BAKIRKÖY	3	6	1			10		10	10	20
5	BAĞCILAR		4				4	1	22	23	27
6	BEYKOZ	2		1			3	1	5	6	9
7	BEYOĞLU	2	6				8		15	15	23
8	BEŞİKTAŞ		4				4			0	4
9	BÜYÜKÇEKMECE	1	3				4			0	4
10	BAYRAMPAŞA	1	4	1			6	2	10	12	18
12	EMİNÖNÜ	2	1				3	2	5	7	10
13	EYÜP	1	2	1			4		10	10	14
14	FATİH	1	9	2	4		16	1	15	16	32
15	GÜNGÖREN		5	1			6		1	1	7
16	GAZİOSMANPAŞA	1	10				11			0	11
17	KADIKÖY	1	15	3		1	20		42	42	62
18	KARTAL	1	3		1	1	6		9	9	15
19	KAĞITHANE		3				3			0	3
20	KÜÇÜKÇKMECE		6				6		21	21	27
21	MALTEPE		4	1			5		2	2	7
22	PENDİK	1	4				5	1	10	11	16
23	SARIYER	3					3		15	15	18
26	ŞİŞLİ	1	15	3		2	21			0	21
28	TUZLA						0			0	0
29	ÜMRANİYE		4				4	1	23	24	28
30	ÜSKÜDAR	3	8	1	1	4	17		16	16	33
32	ZEYTİNBURUNU	2	4				6		10	10	16
902	ESENLER		3				3		11	11	14
903	ÇATALCA	1					1			0	1
904	SİLİVRİ	1	2				3			0	3
Total		31	141	15	6	8	201	9	24	267	468
Average		-	-	-	-	-	7	-	-	9	16

Source: Provincial Disaster Management Center
Note: SSK ; Social Insurance Organization(Sosya Sigortalar Kurumu)

More than 30 medical facilities, both hospitals and policlinics, are located in Gaziosmanpaşa (62 facilities), Üsküdar (33 facilities), and Eyüp (32 facilities). Districts with less than or equal to 3 medical facilities are Kağıthane (3 facilities), Silivri (3 facilities), Adalar (2 facilities), Çatalca (1 facility), and Tuzla (0 facility). In an average 16 facilities are located in each district.

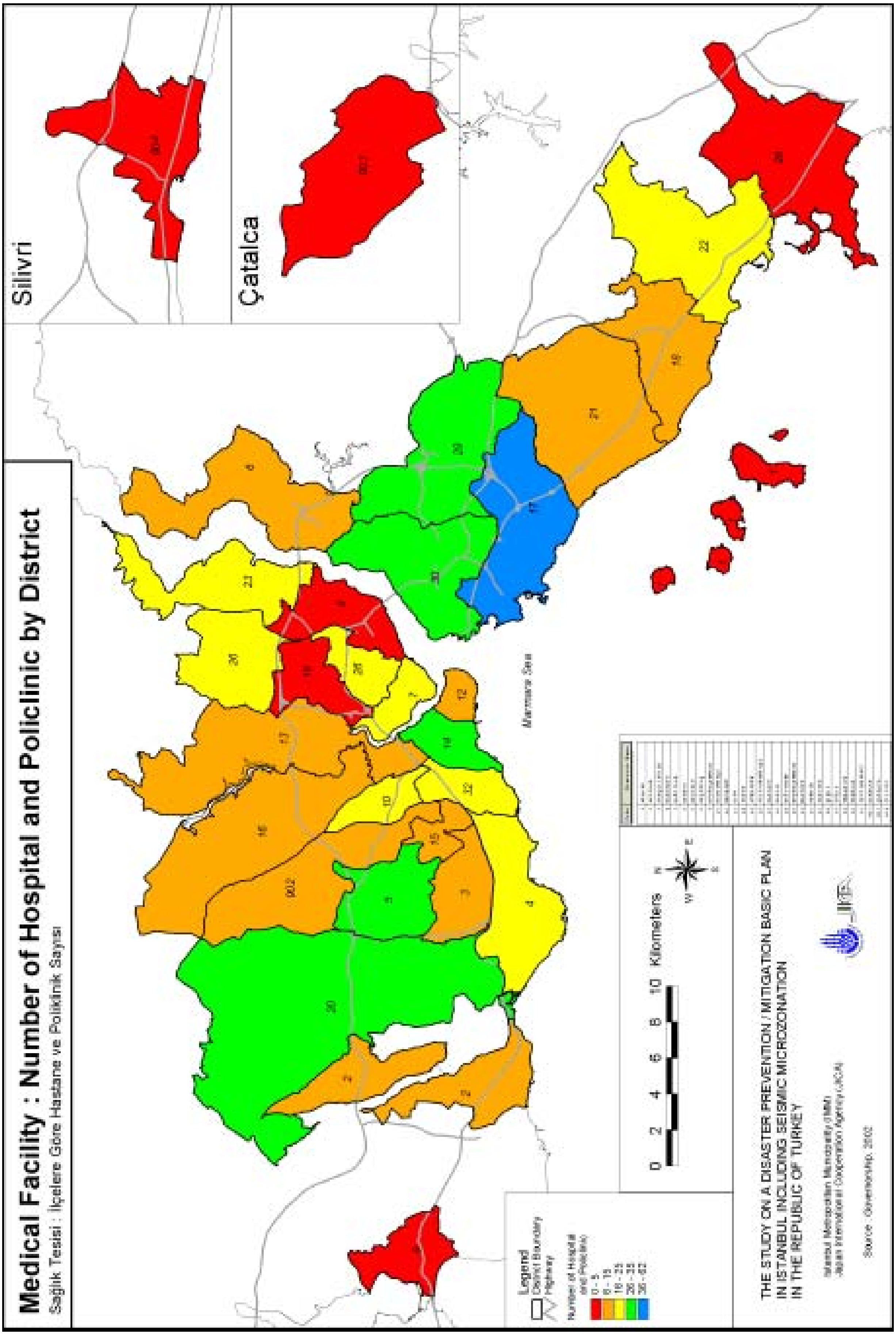

Figure 6.2.33 Medical Facility : Number of Hospital and Policlinic by District

More than 2,000 beds in the medical institution are located in Bakırköy (4,299 beds) and Üsküdar (2,036 beds). Districts with less than 100 beds are Ümraniye (87 beds), Maltepe(85 beds), Eyüp (75 beds), Çatalca (50 beds), Tuzla (0 bed). In an average 648 beds are located in each district.

More than 2,000 beds per 100,000 people are available in Adalar (3,862 beds) and Bakırköy (2,048 beds). Districts with less than 40 beds per 100,000 people are Esenler (38 beds), Bağcılar (32 beds), Eyüp (32 beds), Maltepe (25 beds), Ümraniye (20 beds), and Tuzla (0 bed).

On average 220 beds per 100,000 people are available in each district. Numbers of beds per 100,000 people for the districts are shown in Figure 6.2.35. According to the figure, there is a tendency that more numbers of beds per 100,000 people are available on the European side than on the Asian side. Many districts with less than 100 beds per 100,000 people are located in the inland areas of the European side.