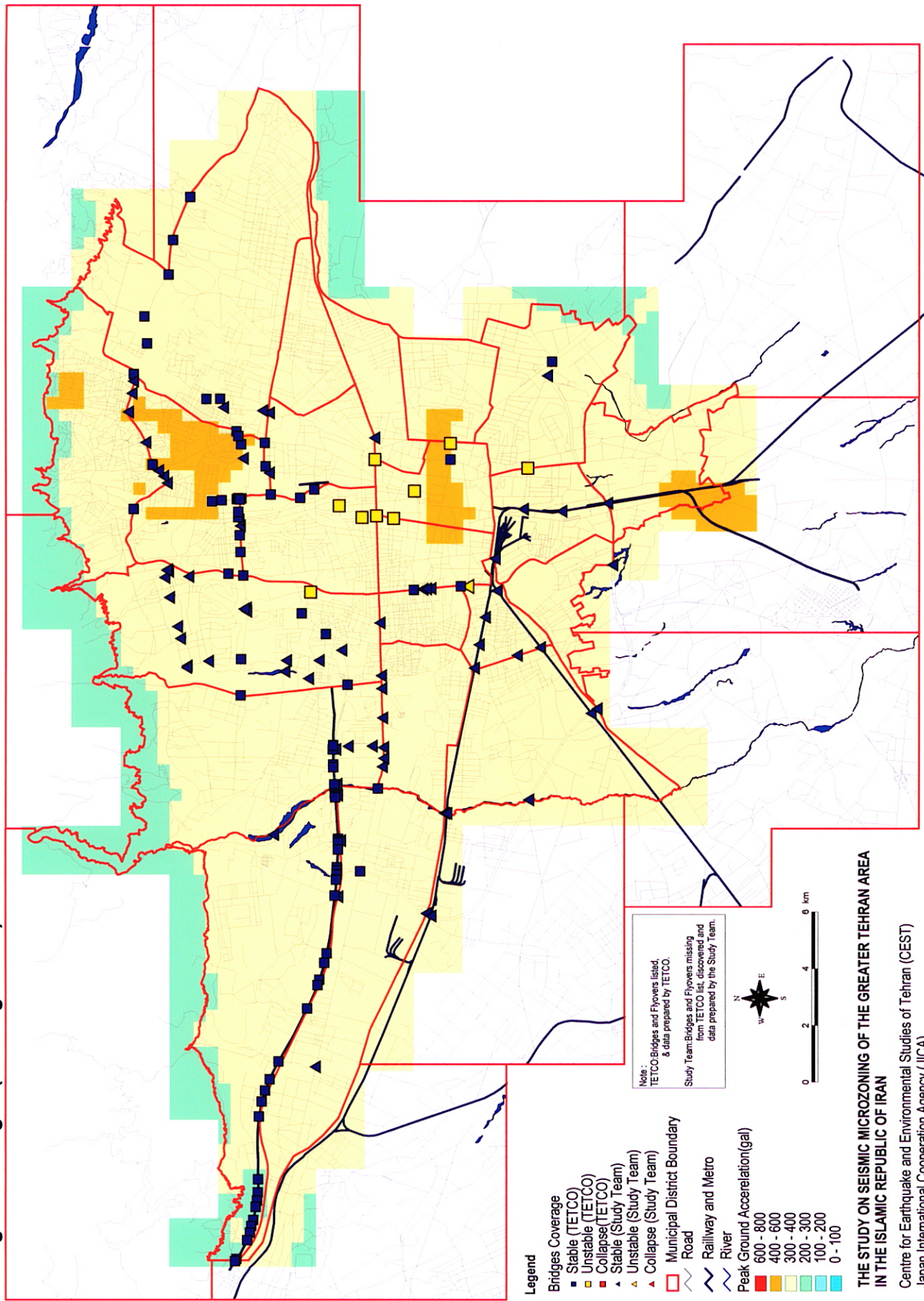


Figure 4.3.5

Damages of Bridges (Floating model)



References for section 4.3

Disaster Prevention Council of the Tokyo Metropolitan Area, 1978, Report on the Earthquake Damage Estimation of Central Area in Tokyo.

4.4. Others

4.4.1. Major Public Facilities

Information on seismic damage to major public facilities is very important for the preparation of a seismic disaster mitigation and management plan. In section 4.1, damages for only residential buildings were estimated. In this section, building damages for major public facilities are estimated. The following 9 types of facilities are considered:

- (1) Governmental offices
- (2) Police stations
- (3) Traffic police stations
- (4) Fire fighting stations
- (5) Hospitals
- (6) Primary schools
- (7) Intermediate schools
- (8) High schools
- (9) Higher Education Centers (Universities)

A database was set up with regard to the location, the structure, the year of construction and the number of stories for each facility. Details are explained in Chapter 2, Section 2.2.9. The database was used in this analysis. However, not all of the data was homogeneous, and data was missing for some districts.

(1) Method of Damage Estimation

The method of damage estimation for major public facilities is the same as the estimation made for damages of residential buildings. The number of damaged buildings is calculated by applying damage functions for earthquake motions to each type of building structure.

Through a statistical procedure that handles a large number of buildings as the sum total of structures, this method neglects damages incurred by such differences as wall ratio and plan views, etc. The damage for residential buildings was estimated based on census zones, whereas for public facilities, owing to their small number, the estimation was based on districts.

There are cases where, for some public facilities, only one building exists in a district. In such cases, the individual structural data of the building is not taken into account for the damage estimation. This means that the average properties of the building structure, based on its construction year and number of stories, etc. are accounted for in the damage estimation.

(2) Building Structure of the Facilities

The building structures of the public facilities are listed for each district in Table 4.4.1 to Table 4.4.9. Brick and block and adobe structures are highlighted in black. These are the most vulnerable structures. RC-1, RC-2, and all wood structures are highlighted in grey. These are relatively vulnerable structures.

Structure types that are not so vulnerable compared to the above, can be seen among governmental, fire fighting and university facilities.

The potential of the most serious danger is held by one police station, two traffic police stations and sixteen primary and intermediate schools that have adobe structures.

Table 4.4.1 Structure of Governmental Facility Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	1	8	0	0	0	0	0	0	1	10
2	0	0	2	0	0	0	0	0	0	0	2
3	0	0	1	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	1	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0	0	0
7	2	1	2	2	0	0	0	0	0	0	7
8	0	1	0	1	0	0	0	0	0	0	2
9	1	0	2	0	0	0	0	0	0	0	3
10	0	0	0	2	0	0	0	0	0	0	2
11	0	0	0	1	0	0	0	0	0	0	1
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0
14	0	0	2	3	0	0	0	0	0	0	5
15	6	1	2	0	0	0	0	0	0	0	9
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	1	0	0	0	0	0	0	0	1
18	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	3	3
20	1	1	0	0	0	0	0	0	0	0	2
21	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0
sum	10	5	21	9	0	0	0	0	0	4	49

weak structure = **0.0** %
weakest structure = **0.0** %

Table 4.4.2 Structure of Police Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	0	0	0	0	0	0	0	0	12	12
2	0	0	3	0	0	0	0	0	0	1	4
3	0	0	15	0	0	0	0	0	0	0	15
4	1	0	4	0	0	0	0	0	0	1	6
5	0	0	0	2	0	0	0	0	0	0	2
6	0	0	0	0	0	0	0	0	0	4	4
7	0	5	5	2	0	0	0	0	0	1	13
8	0	0	0	1	0	0	0	0	0	0	1
9	0	0	2	0	0	0	0	0	0	0	2
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	1	1	0	1	0	0	2	0	5
12	0	0	0	0	0	0	0	0	0	5	5
13	0	0	0	1	0	0	0	0	0	0	1
14	0	0	3	1	0	0	0	0	0	0	4
15	0	0	3	0	0	0	0	0	0	0	3
16	0	0	0	0	0	0	0	0	0	4	4
17	0	0	1	1	0	0	0	0	0	0	2
18	1	0	1	0	0	0	0	0	0	0	2
19	0	0	0	0	0	0	0	0	0	1	1
20	0	0	0	5	0	0	0	0	0	0	5
21	0	0	1	0	0	0	0	0	0	0	1
22	0	0	0	0	0	0	0	0	0	0	0
Sum	2	5	39	14	0	1	0	0	2	29	92

weak structure = **3.3** %
weakest structure = **2.2** %

Table 4.4.3 Structure of Traffic Police Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	1	1	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	1	1
7	0	0	0	1	0	0	0	0	0	1	2
8	0	0	0	1	0	0	0	0	0	1	2
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	2	0	0	0	0	0	0	2
11	0	0	1	0	0	0	0	0	0	0	1
12	0	0	0	0	0	0	0	0	1	0	1
13	0	0	0	0	0	0	0	0	0	0	0
14	0	0	1	0	0	0	0	0	0	0	1
15	0	0	2	0	0	0	0	0	0	0	2
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	6	5	1	0	0	0	1	3	16

weak structure = 12.5 %
 weakest structure = 6.3 %

Table 4.4.4 Structure of Fire Fighting Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	0	1	0	0	0	0	0	0	0	1
2	0	0	1	2	0	1	0	0	0	0	4
3	1	0	0	2	1	0	0	0	0	0	4
4	0	0	2	1	0	1	0	0	0	0	4
5	2	0	0	1	0	1	0	0	0	0	4
6	2	0	1	1	0	0	0	0	0	0	4
7	0	0	0	1	0	0	0	0	0	0	1
8	0	0	0	1	0	1	0	0	0	0	2
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	2	0	0	1	0	0	0	0	3
11	1	0	3	1	0	1	0	0	0	0	6
12	0	0	3	0	0	0	0	0	0	0	3
13	0	0	2	1	0	0	0	0	0	0	3
14	0	0	1	1	0	0	0	0	0	0	2
15	0	0	1	1	0	1	0	0	0	0	3
16	0	0	1	0	0	0	0	0	0	0	1
17	0	0	0	0	0	1	0	0	0	0	1
18	0	0	0	0	0	1	0	0	0	0	1
19	0	0	1	0	0	0	0	0	0	0	1
20	0	0	0	1	0	1	0	0	0	0	2
21	1	0	0	0	0	1	0	0	0	0	2
22	1	0	0	1	0	0	0	0	0	0	2
Sum	8	0	19	15	1	11	0	0	0	0	54

weak structure = 22.2 %
 weakest structure = 0.0 %

Table 4.4.5 Structure of Hospital Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	1	1	0	0	0	0	0	0	16	18
2	0	0	3	0	0	0	0	0	0	0	3
3	0	1	3	1	0	0	0	0	0	5	10
4	0	0	6	0	0	1	0	0	0	1	8
5	0	0	4	0	0	0	0	0	0	1	5
6	0	3	11	0	0	0	0	0	0	15	29
7	0	2	4	5	0	1	0	0	0	10	22
8	0	1	0	3	0	1	0	0	0	0	5
9	0	0	2	0	0	0	0	0	0	0	2
10	0	0	7	2	0	0	0	1	0	1	11
11	0	0	6	3	0	1	0	0	0	3	13
12	0	0	6	0	0	1	0	0	0	6	13
13	0	0	1	0	0	1	0	0	0	2	4
14	1	0	5	6	0	0	0	0	0	1	13
15	0	0	1	0	0	1	0	0	0	0	2
16	0	0	4	0	1	1	0	0	0	0	6
17	0	1	0	0	0	1	0	0	0	0	2
18	0	1	4	1	0	0	0	0	0	0	6
19	0	0	0	0	0	0	0	0	0	2	2
20	0	0	0	1	0	0	0	0	0	2	3
21	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0
Sum	1	10	68	22	1	9	0	1	0	65	177

weak structure = **6.2** %
 weakest structure = **0.6** %

Table 4.4.6 Structure of Elementary School Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	0	15	24	12	15	0	0	1	0	67
2	16	0	45	31	1	12	0	0	1	0	106
3	3	0	22	8	2	3	0	0	0	0	38
4	2	0	47	18	0	8	0	1	0	3	79
5	2	0	20	14	2	7	0	0	0	0	45
6	0	0	0	0	0	0	0	0	0	57	57
7	1	0	25	19	0	1	0	1	2	4	53
8	0	0	9	44	0	5	0	0	0	0	58
9	0	0	33	0	0	0	0	0	0	1	34
10	0	0	1	35	0	0	0	2	1	11	50
11	0	0	11	40	0	3	0	13	3	0	70
12	0	0	2	9	0	0	0	0	0	2	13
13	0	0	16	49	0	0	0	0	0	3	68
14	4	0	14	23	0	1	0	0	0	4	46
15	11	0	28	83	9	18	0	0	0	0	149
16	2	0	16	36	0	4	0	0	1	0	59
17	2	0	5	22	0	0	0	0	1	0	30
18	8	0	33	4	0	5	0	0	0	0	50
19	0	0	3	14	0	1	0	0	0	0	18
20	3	0	32	37	1	0	0	0	0	0	73
21	1	0	0	0	0	3	0	0	0	1	5
22	0	0	0	0	0	1	0	0	0	0	1
Sum	55	0	377	510	27	87	0	17	10	86	1,169

weak structure = **12.1** %
 weakest structure = **2.3** %

District 15: Elementary School + Intermediate School + High School

Table 4.4.7 Structure of Intermediate School Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	0	6	22	2	6	0	0	1	0	37
2	13	0	39	33	4	11	0	1	0	0	101
3	7	0	24	7	0	1	0	0	0	0	39
4	5	0	41	1	2	14	0	0	0	0	63
5	5	0	19	8	2	14	0	0	0	1	49
6	0	0	0	0	0	0	0	0	0	47	47
7	3	0	19	8	0	2	0	0	3	5	40
8	0	0	0	29	0	3	0	0	0	0	32
9	1	0	24	0	0	1	0	0	0	0	26
10	0	0	1	19	0	0	0	0	0	13	33
11	1	0	16	32	0	0	0	3	1	2	55
12	0	0	2	9	0	0	0	0	0	1	12
13	0	0	12	33	0	0	0	0	0	0	45
14	1	0	4	12	0	2	0	0	0	1	20
15	0	0	0	0	0	0	0	0	0	0	0
16	1	0	10	19	0	9	0	0	0	0	39
17	0	0	2	8	0	1	0	0	1	14	26
18	4	0	20	4	1	8	0	0	0	2	39
19	2	0	4	16	0	0	0	0	0	0	22
20	7	0	14	19	3	0	0	0	0	2	45
21	1	0	0	0	0	2	0	0	0	0	3
22	0	0	1	3	0	0	0	0	0	0	4
Sum	51	0	258	282	14	74	0	4	6	88	777

weak structure = 12.6 %
weakest structure = 1.3 %

Table 4.4.8 Structure of High School Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	0	3	20	3	18	0	0	0	0	44
2	21	0	37	16	7	15	0	0	0	0	96
3	5	0	35	2	0	6	0	0	0	0	48
4	11	0	31	8	1	8	0	0	0	0	59
5	4	0	25	9	1	9	0	0	0	1	49
6	0	0	3	0	0	0	0	0	0	35	38
7	0	0	21	9	0	3	0	0	0	2	35
8	0	0	2	28	0	9	0	0	0	0	39
9	0	0	24	1	0	0	0	0	0	2	27
10	0	0	1	15	0	1	1	0	0	16	34
11	2	0	15	21	1	0	0	3	0	2	44
12	1	0	6	8	0	0	1	0	0	0	16
13	0	0	5	17	0	0	0	0	0	4	26
14	0	0	0	0	0	0	0	0	0	42	42
15	0	0	1	0	0	0	0	0	0	0	1
16	0	0	11	19	1	4	0	0	0	2	37
17	6	0	3	13	0	1	0	0	0	0	23
18	11	0	5	2	4	6	0	0	0	0	28
19	4	0	3	2	0	0	0	0	0	0	9
20	8	0	9	27	4	4	0	0	0	1	53
21	3	0	1	0	1	3	0	0	0	0	8
22	0	0	0	0	0	0	0	0	0	0	0
Sum	76	0	241	217	23	87	2	3	0	107	756

weak structure = 15.2 %
weakest structure = 0.4 %

Table 4.4.9 Structure of Higher Education Center Buildings by District

District No	Structure										sum
	Steel-1	RC-0	Steel-2	S&B	RC-1	RC-2	Wood	B&B	Adobe	Unknown	
1	0	2	1	7	0	3	0	0	0	3	16
2	2	2	11	5	0	4	0	0	0	1	25
3	3	1	33	0	0	4	0	0	0	0	41
4	4	1	6	1	0	5	0	0	0	1	18
5	2	1	2	1	0	0	0	0	0	0	6
6	0	0	0	0	0	0	0	0	0	55	55
7	0	3	11	1	0	4	0	0	0	2	21
8	0	0	0	0	0	0	0	0	0	0	0
9	1	0	4	0	0	0	0	0	0	0	5
10	0	0	1	0	0	0	0	0	0	0	1
11	0	0	3	8	0	2	0	0	0	0	13
12	0	0	1	3	0	0	0	0	0	0	4
13	0	0	0	3	0	0	0	0	0	2	5
14	0	0	1	0	0	0	0	0	0	0	1
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	1	0	3	0	0	1	0	0	0	0	5
19	0	0	0	0	0	0	0	0	0	1	1
20	5	0	1	0	0	0	0	0	0	0	6
21	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0
Sum	18	10	78	29	0	23	0	0	0	65	223

Weak structure = 10.3%
 Weakest structure = 0.0%

(3) Damage Estimation

The definition of damages is as follows:

Damage of Public Facilities	Heavily damaged or collapsed, impossible to use without reconstruction or repair
Unit	Building If the facility has several different buildings, only the main building is considered.
Cause of Damage	Seismic vibration

The results of damage estimation are listed in Table 4.4.10 to Table 4.4.13. The number of damaged buildings and the damage ratios in the case of Ray Fault Model are shown in Figure 4.4.1. The distribution of damage ratios is shown in Figure 4.4.2 to Figure 4.4.7.

The damage ratio in the southern Districts 16 and 19 is relatively high. This damage distribution is similar to that of residential buildings. The results of the damage analysis show that all public facilities will suffer damages to the same extent as residential buildings.

Public facilities are important for the seismic disaster management plan. Governmental facilities will function as headquarters for the disaster management. Police stations and traffic police function as centres for maintaining public and traffic order. Fire fighting stations function as the main bodies for fire fighting and rescue operations. Hospitals are

essential facilities for the treatment of casualties and injuries. Schools will be used as refugee camps. Children who will lead the country in the future study in those schools. Therefore, all public facilities are required to have much more aseismic resistance than the residential buildings.

However, this study shows that public facilities will suffer damages as severe as those of residential buildings. This means the public facilities in Tehran will be difficult to use for disaster management in case of an earthquake.

Table 4.4.10 Number of Damage and Damage Ratio of Facilities – Ray Fault Model

District	Number of Damage and Damage Ratio (%)																	
	Govern-mental Facility		Police		Traffic Police		Fire Fighting		Hospital		Elementary School		Intermediate school		High School		University	
1	2	(18)					0	(15)	0	(13)	24	(36)	12	(34)	18	(42)	4	(33)
2	1	(28)	1	(24)	0	(22)	2	(37)	1	(21)	37	(35)	37	(37)	35	(37)	9	(36)
3	0	(23)	3	(22)			2	(43)	2	(30)	15	(39)	13	(34)	17	(35)	13	(32)
4			1	(20)			1	(32)	2	(27)	22	(29)	20	(32)	17	(28)	5	(30)
5	0	(23)	1	(39)	1	(58)	2	(40)	1	(23)	17	(38)	21	(44)	18	(37)	2	(24)
6							2	(40)	5	(35)					1	(22)		
7	3	(37)	4	(35)	1	(45)	1	(59)	6	(47)	24	(50)	17	(49)	16	(47)	9	(48)
8	1	(41)	1	(53)	0	(43)	2	(75)	3	(55)	33	(56)	19	(61)	25	(63)		
9	1	(43)	1	(43)					1	(43)	14	(41)	11	(41)	10	(42)	2	(46)
10	1	(62)			1	(61)	2	(50)	5	(53)	29	(75)	15	(77)	13	(74)	0	(38)
11	1	(69)	5	(91)	1	(61)	4	(66)	7	(70)	59	(84)	40	(76)	30	(71)	10	(74)
12					1	(100)	2	(61)	4	(61)	8	(73)	8	(69)	10	(65)	2	(57)
13			1	(52)			1	(38)	1	(64)	33	(50)	23	(51)	11	(52)	2	(56)
14	2	(49)	2	(48)	0	(39)	1	(51)	7	(55)	24	(57)	11	(60)			1	(46)
15	4	(47)	1	(39)	1	(55)	2	(73)	2	(81)		109			(73)			
16							1	(59)	4	(70)	45	(75)	31	(79)	27	(76)		
17	1	(65)	2	(77)			1	(100)	2	(81)	25	(82)	10	(87)	18	(77)		
18			1	(68)			1	(100)	4	(65)	33	(66)	27	(72)	21	(75)	3	(69)
19							1	(63)			15	(82)	17	(77)	6	(66)		
20	1	(64)	4	(83)			2	(90)	1	(86)	55	(76)	33	(76)	43	(82)	4	(67)
21			0	(41)			1	(45)			3	(81)	2	(75)	5	(64)		
22							1	(28)			1	(64)	1	(27)				
sum	18	(40)	27	(43)	7	(52)	28	(52)	56	(50)	623	(57)	369	(54)	340	(52)	66	(42)

Note: Blank space notifies lack of facility in the area.

Table 4.4.11 Number of Damage and Damage Ratio of Facilities – NTF Model

District	Number of Damage and Damage Ratio (%)																	
	Govern-mental Facility		Police		Traffic Police		Fire Fighting		Hospital		Elementary School		Intermediate school		High School		University	
1	4	(41)					0	(42)	1	(38)	48	(72)	25	(69)	34	(78)	9	(65)
2	1	(27)	1	(23)	1	(25)	2	(57)	1	(27)	41	(38)	41	(40)	38	(40)	9	(37)
3	0	(29)	5	(32)			2	(57)	2	(45)	21	(56)	19	(50)	24	(51)	18	(44)
4			1	(22)			2	(49)	3	(38)	27	(36)	25	(40)	22	(37)	8	(45)
5	0	(31)	1	(40)	1	(44)	2	(44)	1	(27)	19	(43)	23	(48)	20	(42)	2	(29)
6							1	(24)	3	(22)					1	(22)		
7	2	(27)	3	(24)	0	(39)	0	(35)	4	(32)	16	(33)	12	(35)	10	(31)	7	(34)
8	1	(29)	0	(38)	0	(38)	1	(55)	2	(41)	22	(38)	13	(41)	18	(45)		
9	1	(16)	0	(17)					0	(16)	5	(17)	5	(18)	4	(17)	1	(16)
10	1	(30)			1	(32)	1	(34)	3	(28)	14	(35)	6	(30)	6	(35)	0	(19)
11	0	(34)	3	(64)	0	(17)	2	(29)	3	(28)	32	(46)	17	(33)	13	(31)	5	(35)
12					1	(100)	1	(19)	2	(26)	3	(30)	3	(30)	5	(29)	1	(31)
13			0	(29)			1	(25)	1	(44)	18	(27)	12	(27)	6	(27)	1	(31)
14	1	(22)	1	(18)	0	(17)	0	(20)	3	(21)	10	(23)	5	(27)			0	(15)
15	1	(14)	0	(13)	0	(14)	1	(29)	1	(48)	43		(29)					
16							0	(18)	2	(30)	16	(27)	13	(33)	10	(28)		
17	0	(19)	1	(24)			1	(65)	1	(42)	9	(30)	5	(38)	6	(25)		
18			0	(18)			1	(68)	1	(18)	11	(23)	10	(26)	9	(30)	1	(28)
19							0	(13)			4	(24)	4	(20)	1	(16)		
20	0	(11)	1	(22)			1	(42)	0	(18)	13	(18)	8	(19)	12	(22)	1	(13)
21			0	(18)			1	(49)			2	(53)	2	(50)	3	(41)		
22							1	(34)			1	(87)	2	(42)				
sum	11	(25)	18	(28)	5	(35)	21	(38)	33	(29)	376	(35)	250	(36)	242	(37)	61	(39)

Note: Blank space notifies lack of facility in the area.

Table 4.4.12 Number of Damage and Damage Ratio of Facilities – Moshafault Model

District	Number of Damage and Damage Ratio (%)																	
	Govern-mental Facility		Police		Traffic Police		Fire Fighting		Hospital		Elementary School		Intermediate school		High School		University	
1	1	(10)					0	(9)	0	(7)	14	(21)	8	(20)	10	(24)	3	(20)
2	0	(6)	0	(6)	0	(5)	1	(13)	0	(6)	10	(9)	9	(9)	9	(10)	2	(9)
3	0	(8)	1	(8)			1	(15)	1	(10)	6	(15)	5	(12)	6	(13)	5	(13)
4			0	(8)			1	(16)	1	(11)	10	(13)	9	(14)	7	(12)	3	(16)
5	0	(4)	0	(9)	0	(13)	0	(9)	0	(5)	4	(8)	5	(10)	4	(8)	0	(5)
6							0	(7)	1	(7)					0	(7)		
7	1	(9)	1	(8)	0	(16)	0	(13)	1	(10)	7	(14)	6	(17)	4	(11)	2	(12)
8	0	(9)	0	(12)	0	(10)	0	(21)	1	(13)	7	(12)	4	(13)	6	(15)		
9	0	(5)	0	(5)					0	(4)	2	(5)	2	(6)	1	(5)	0	(5)
10	0	(9)			0	(8)	0	(12)	1	(9)	5	(12)	2	(9)	2	(11)	0	(5)
11	0	(8)	2	(48)	0	(6)	1	(9)	1	(9)	14	(21)	7	(13)	5	(12)	1	(11)
12					1	(93)	0	(9)	1	(10)	1	(13)	1	(11)	2	(12)	0	(9)
13			0	(12)			0	(8)	0	(17)	7	(10)	5	(11)	2	(11)	0	(11)
14	1	(9)	0	(8)	0	(7)	0	(9)	1	(9)	4	(10)	2	(12)			0	(7)
15	1	(6)	0	(6)	0	(5)	0	(13)	0	(22)	18		(12)					
16							0	(7)	1	(13)	7	(12)	6	(14)	4	(11)		
17	0	(8)	0	(9)			0	(35)	0	(18)	4	(14)	2	(19)	2	(10)		
18			0	(7)			0	(25)	0	(7)	5	(10)	4	(10)	3	(12)	1	(10)
19							0	(4)			1	(8)	2	(7)	1	(5)		
20	0	(6)	0	(9)			0	(22)	0	(7)	6	(8)	4	(8)	5	(10)	0	(7)
21			0	(6)			0	(9)			1	(20)	1	(18)	1	(13)		
22							0	(5)			0	(14)	0	(5)				
sum	4	(8)	7	(11)	2	(16)	7	(12)	11	(9)	133	(12)	81	(12)	75	(12)	18	(12)

Note: Blank space notifies lack of facility in the area.

Table 4.4.13 Number of Damage and Damage Ratio of Facilities – Floating Model

District	Number of Damage and Damage Ratio (%)																	
	Govern-mental Facility		Police		Traffic Police		Fire Fighting		Hospital		Elementary School		Intermediate school		High School		University	
1	3	(32)					0	(32)	1	(30)	41	(62)	22	(58)	31	(69)	7	(55)
2	1	(33)	1	(31)	1	(30)	2	(56)	1	(31)	47	(44)	47	(46)	45	(47)	11	(45)
3	0	(35)	6	(37)			3	(67)	3	(55)	24	(62)	22	(56)	27	(56)	21	(51)
4			2	(32)			2	(51)	3	(40)	33	(43)	29	(46)	25	(43)	8	(49)
5	0	(32)	1	(51)	1	(66)	2	(49)	1	(32)	22	(49)	26	(54)	23	(47)	2	(33)
6							1	(36)	4	(31)					1	(30)		
7	2	(35)	4	(34)	1	(48)	1	(50)	5	(45)	22	(45)	16	(46)	14	(43)	9	(45)
8	1	(41)	1	(53)	1	(54)	1	(71)	3	(55)	31	(53)	18	(56)	24	(60)		
9	1	(34)	1	(34)					1	(33)	12	(35)	9	(36)	9	(36)	2	(36)
10	1	(57)			1	(53)	2	(52)	5	(46)	24	(61)	12	(59)	11	(61)	0	(33)
11	1	(53)	4	(80)	0	(35)	3	(47)	5	(48)	47	(67)	29	(55)	22	(52)	7	(57)
12					1	(100)	1	(45)	3	(46)	7	(59)	6	(53)	8	(50)	2	(48)
13			1	(53)			1	(39)	1	(62)	31	(48)	21	(47)	11	(48)	2	(53)
14	2	(45)	2	(39)	0	(33)	1	(43)	6	(46)	20	(48)	10	(52)			0	(34)
15	3	(30)	1	(32)	1	(33)	2	(58)	1	(64)	81		(54)					
16							0	(38)	3	(54)	32	(54)	23	(60)	19	(56)		
17	0	(39)	1	(50)			1	(96)	1	(65)	17	(56)	8	(63)	12	(51)		
18			1	(38)			1	(96)	2	(40)	22	(44)	19	(52)	16	(56)	3	(50)
19							0	(30)			9	(49)	10	(43)	3	(34)		
20	1	(35)	3	(52)			2	(76)	1	(51)	33	(45)	20	(47)	28	(54)	2	(38)
21			0	(31)			1	(58)			3	(73)	2	(68)	5	(57)		
22							1	(38)			1	(89)	2	(45)				
sum	16	(36)	26	(41)	6	(48)	28	(53)	50	(44)	558	(51)	350	(51)	331	(51)	76	(48)

Note: Blank space notifies lack of facility in the area.

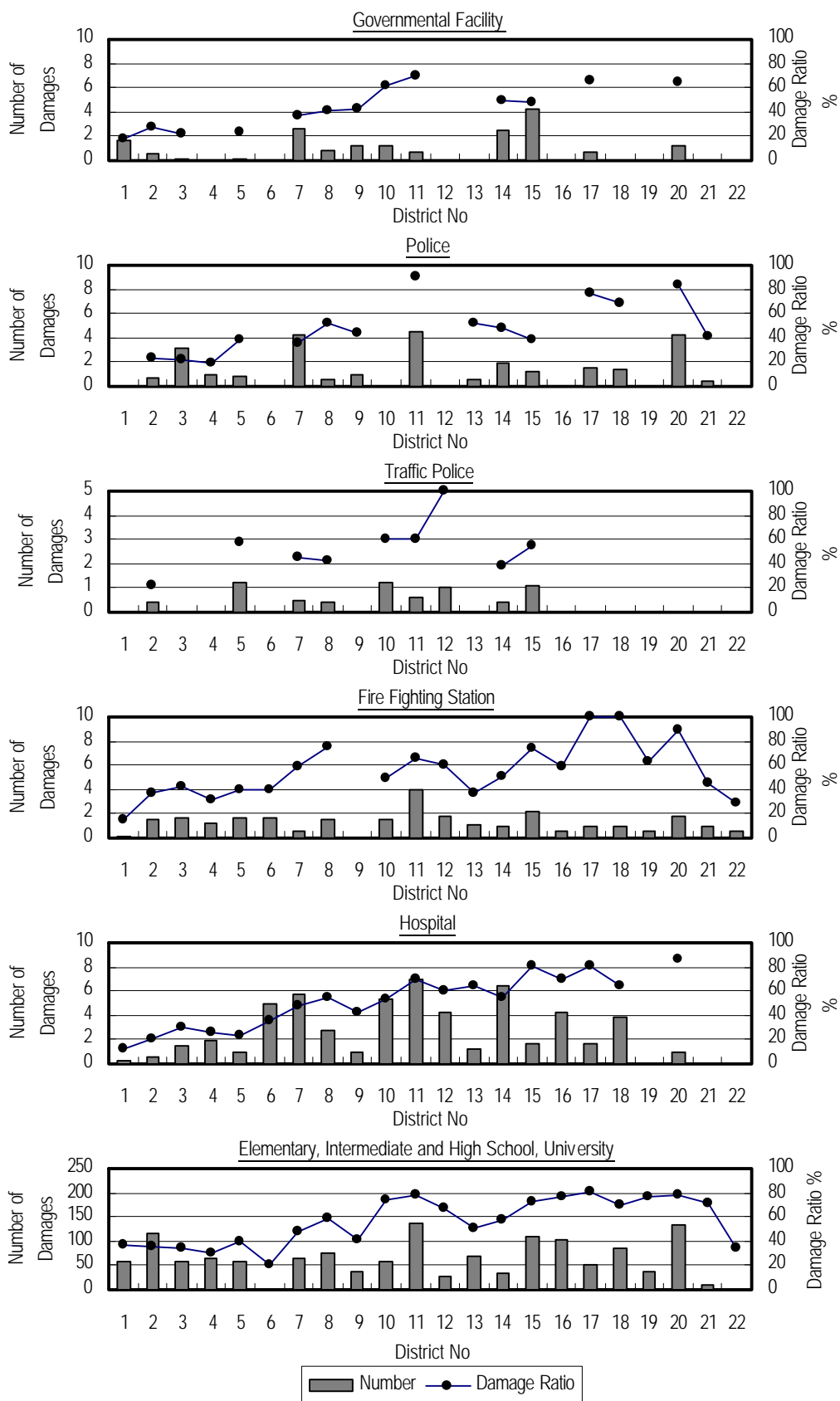


Figure 4.4.1 Damage and Damage Ratio of Major Public Facilities by District Ray Fault Model

Figure 4.4.2

Damage Ratio of Governmental Facilities(Ray Fault model)

