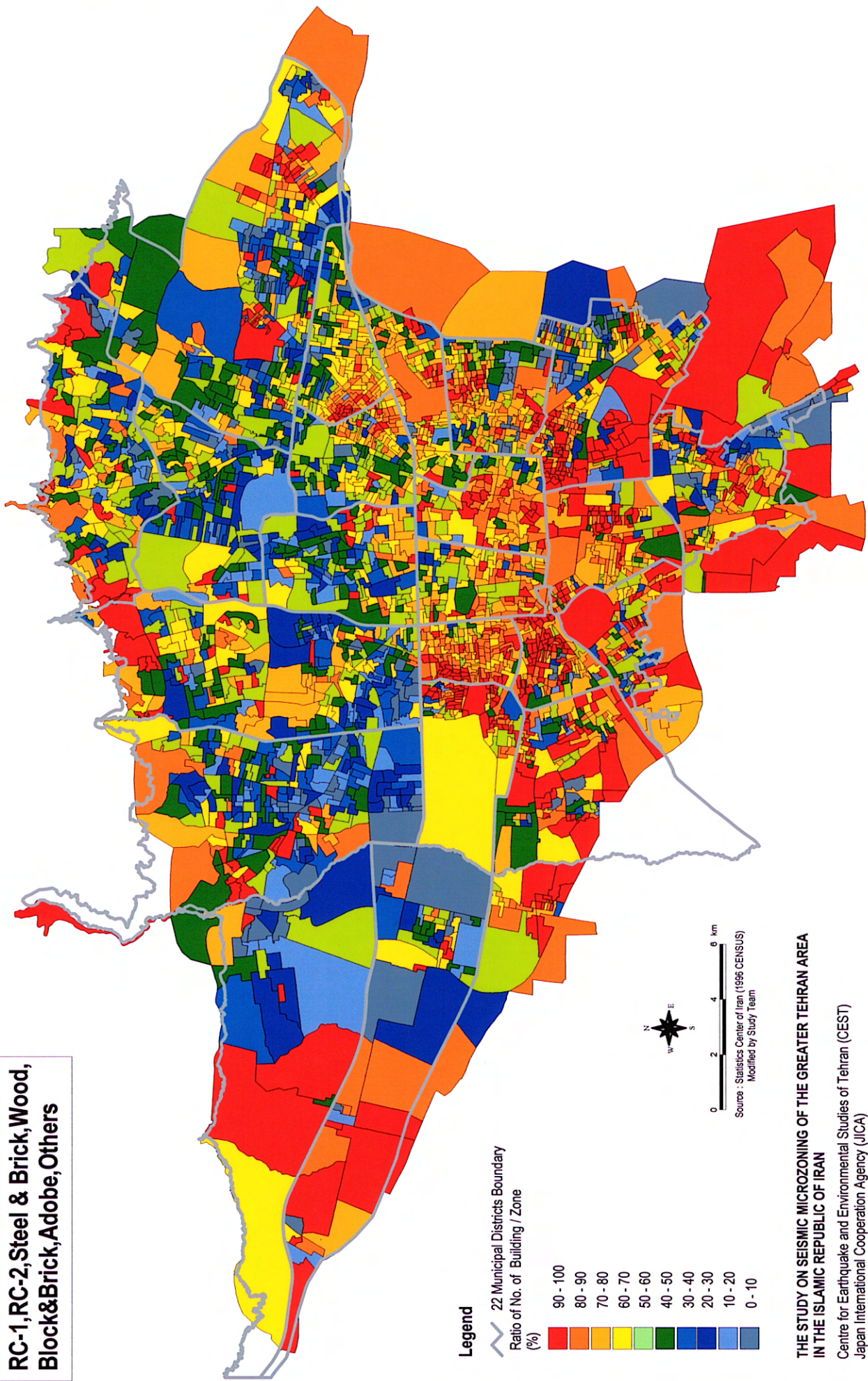


Figure 4.1.7

**"Weak" Building Distribution**

**RC-1, RC-2, Steel & Brick, Wood, Block & Brick, Adobe, Others**



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### **4.1.3. Damage estimation**

Characteristics of damage for the four earthquake models are as follows:

#### Ray Fault model

The total number of damaged buildings is estimated as 480,000 in entire city of Tehran. The total damage ratio is 55%. It should be noted that the number of damaged buildings in District 15 is the largest. The total number of the buildings is also largest in this district. The damage ratio in Districts 11, 12, 16 to 20 is a very high value of approximately 80%. The reason for this high damage ratio is the existence of many vulnerable buildings and the strong seismic motion,  $MMI = 9$ , in these Districts. The damage ratio in District 1 to 5, located in northern part of the Tehran, is relatively small, approximately 30%.

#### NTF model

The total number of damaged buildings is estimated as 310,000 in the entire city of Tehran. The total damage ratio is 36%. The damage ratio in Districts 1 to 5, located in the northern part of the city is approximately 50%. The damage ratio of the southern part of the city is less than 30%. The difference in damage between the south and the north is not as big as observed in the Ray Fault Model. In the case of the NTF model, seismic intensity is high in the northern area, where vulnerable buildings are not prevalent. In the case of Ray Fault Model, seismic intensity is high in the southern area, where vulnerable buildings are prevalent. This is the reason for difference in the damage ratios between northern part and southern part of the city.

#### Mosha Fault model

The damage ratio for most of the districts is almost 10% except in the case of District 12. The damage ratio of District 12 is approximately 30%. As shown in Table 4.1.1, the number of vulnerable ‘ adobe’ or ‘ wood and brick’ structures in District 12 is higher than in other districts and it is the reason for its high damage ratio. This tendency is also observed in the results of Floating Model.

#### Floating model

A uniform input motion on the seismic bedrock for the entire Study Area is hypothesised for the calculations of the Floating Model. Therefore, this calculation does not reflect a specific earthquake and the results indicate a relative vulnerability in the entire Study Area. The damage ratio of Districts 12 and 3 is relatively high. The major reason for the high damage ratio in these districts is that relatively soft soil is deposited in these areas and the seismic motion is amplified by this soil.

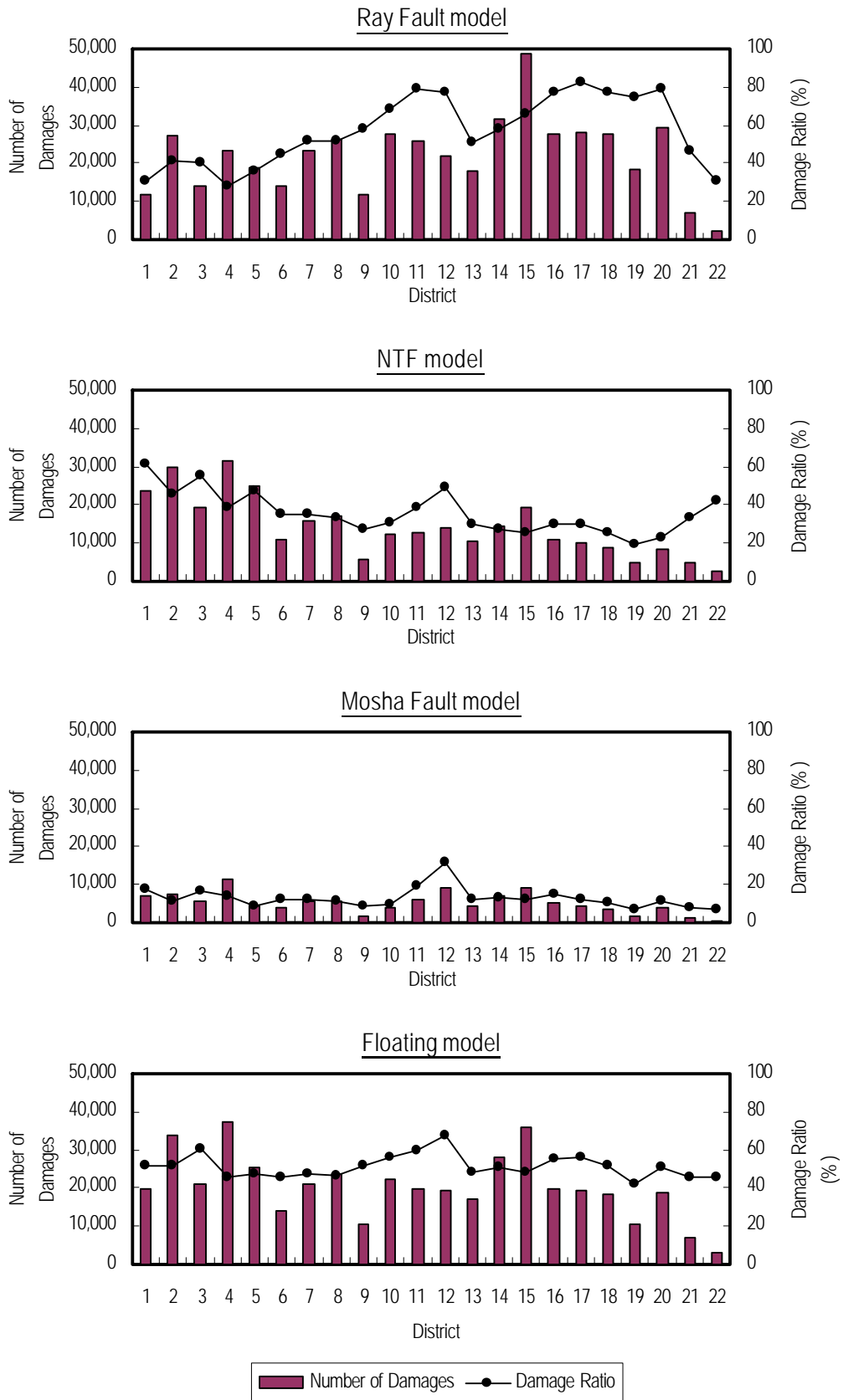
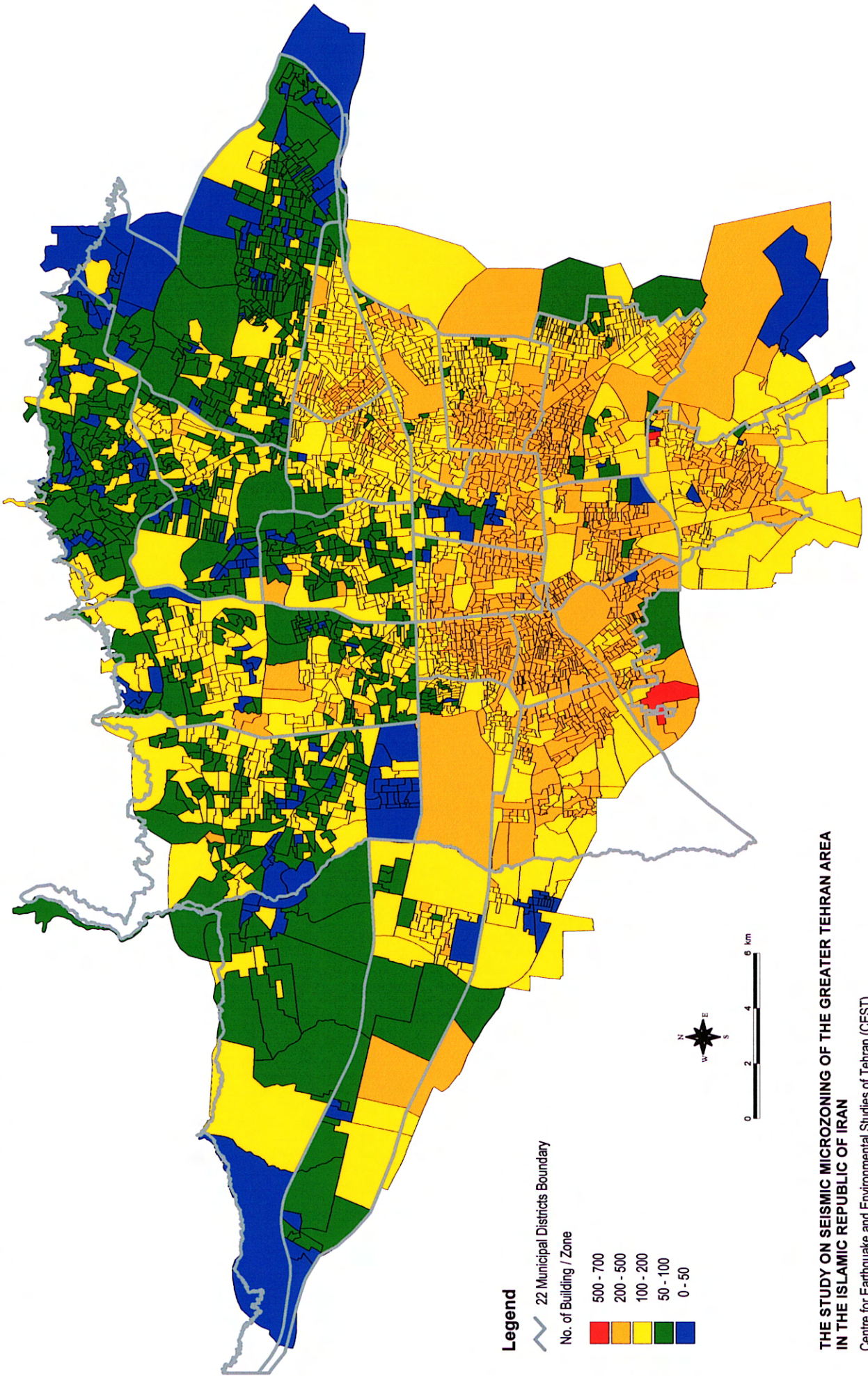


Figure 4.1.8 Damage of Residential Buildings by District



Figure 4.1.9

### Heavily Damaged or Collapsed Building Number Distribution (Ray Fault model)



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