

MULTISTAGE SEISMIC ASSESSMENT METHODS FOR EXISTING REINFORCED
CONCRETE BUILDINGS AND THEIR APPLICABILITY FOR RETROFITTING COST
ESTIMATION

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

ONUR DOĞAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
EARTHQUAKE STUDIES

JANUARY 2013

Approval of the thesis:

**MULTISTAGE SEISMIC ASSESSMENT METHODS FOR EXISTING REINFORCED
CONCRETE BUILDINGS AND THEIR APPLICABILITY FOR RETROFITTING COST
ESTIMATION**

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ABSTRACT

MULTISTAGE SEISMIC ASSESSMENT METHODS FOR EXISTING REINFORCED CONCRETE (RC) BUILDINGS AND THEIR APPLICABILITY FOR RETROFITTING COST ESTIMATION

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January 2013, 247 pages

When the huge building stock in Turkey is considered, it is practically impossible to carry out detailed structural analyses for all of the buildings. In order to cope with the seismic safety evaluation of a large number of existing buildings, it is necessary to use simplified techniques, which can predict the seismic vulnerability of the existing buildings in a relatively short time. The comprehensive structural data compiled for the 48 different reinforced concrete buildings contain full information on their structural characteristics before and after retrofitting and are used in this study.

The first basic goal of the study is to develop a procedure through which the building stock under consideration can be classified as “safe” or “unsafe” according to the current Turkish Seismic Code. The classification procedure is based on discriminant analysis. The cross-sectional area of the load-bearing members of a building and its preliminary assessment score are selected as the discriminator variables. The second and ultimate basic goal of the study is to propose a method through which the minimum retrofitting cost for satisfying the provisions of the Turkish Seismic Code can be estimated.

A quick and uncostly assessment of retrofitting cost estimates based on the procedure described in this thesis will provide a useful input for decisions concerning whether a seismically “unsafe” building should be rebuilt or retrofitted. Such a situation will save time, labor and money, when it is used for the evaluation of building stocks involving large number of buildings and also in urban transformation operations.

Keywords : Seismic Assessment methods, reinforced concrete, discriminant analysis, retrofitting cost.

ÖZ

MEVCUT BETONARME BİNALARA YÖNELİK KADEMELİ SİSMİK DEĞERLENDİRME YÖNTEMLERİ VE BU YÖNTEMLERİN GÜÇLENDİRME MALİYETİ TAHMİNLERİNDE KULLANILABİLİRLİĞİ

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Ocak 2013, 247 sayfa

Türkiye’deki büyük yapı stoku dikkate alındığında, bu binaların tümü için ayrıntılı yapısal analizlerin uygulanması mümkün değildir. Çok sayıdaki mevcut binanın sismik güvenliğinin değerlendirilmesi ile başa çıkılabilmesi için, sismik hasar görebilirliğin kısa bir zaman süresi içinde tahmin edilebilmesine olanak sağlayan basit tekniklerin kullanımı gerekmektedir. 48 farklı betonarme binanın mevcut ve güçlendirilmiş durumları hakkında bilgi veren kapsamlı yapısal veriler bu çalışmada kullanılmıştır.

Çalışmanın birinci temel amacı, göz önünde tutulan yapı stokunun, güncel deprem yönetmeliği hükümlerine göre güvenli ya da güvensiz olduğunun sınıflandırılmasına yönelik bir yöntemin önerilmesidir. Bu sınıflandırma yöntemi, diskriminant analizi istatistiksel tekniğine dayalı olarak geliştirilmiştir. Binaların taşıyıcı sistem eleman en-kesit alanları ve ön sismik değerlendirme skorları diskriminant analizinde ayırt edici değişkenler olarak kullanılmıştır. Çalışmamızın ikinci ve esas amacı ise, Türk Deprem Yönetmeliği hükümlerine göre güvensiz olarak değerlendirilen bir betonarme binanın, bu yönetmeliğin öngördüğü koşulları karşılayabilmesi için gerekli asgari güçlendirme maliyetinin tahmin edilebilmesine yönelik bir yöntemin geliştirilmesidir.

Güçlendirme maliyetinin hızlı ve ucuz bir değerlendirme yöntemi kullanılarak tahmin edilebilmesi, sismik açıdan güvensiz binaların yeniden inşa edilmesi, ya da güçlendirilmesi gerektiği kararları için yararlı bir girdi sağlayacaktır. Böyle bir ön bilgi çok sayıda bina içeren yapı stoklarının değerlendirilmesinde ve kentsel dönüşüm hizmetlerinde zaman, emek ve parasal tasarruf sağlayacaktır.

Anahtar Kelimeler: Sismik Değerlendirme Yöntemleri, Betonarme, Diskriminant Analizi, Güçlendirme Maliyeti.

To my Princess...

ACKNOWLEDGEMENTS

Prof. Dr. M. Semih Yüccmen patiently supervised the thesis, contributed a lot to reach to the current situation. He has not only guided my thesis research work as a supervisor, but he always trusted in me, motivated me to go further and also tried to teach the academic discipline. I would like to present my sincere gratitude for his efforts.

My family always supported me, I appreciate their efforts.

Finally, I would like to thank Özlem Doğan who has made and hopefully will make the rest of my life wonderful.

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CHAPTER 1

INTRODUCTION

1.1. Motivation

Turkey is situated on an active earthquake zone. Strong earthquakes in Turkey revealed that the existing building stocks in urban regions are significantly vulnerable to earthquakes. Methods for detailed seismic safety evaluation of the existing buildings in Turkey are defined in a technical code which is “Specification for Buildings to be Built in Seismic Zones”(Turkish Seismic Code, 2007) which was published on the Official Gazette dated 06.03.2007, numbered 26454. Chapter 7 of this code defines methods of examination and assessment of existing buildings and methods of retrofitting of buildings whose current seismic performances are found insufficient. These methods will be discussed in the third chapter of this study.

When the huge existing stock of buildings in Turkey is considered, it is clear that it is practically impossible to carry out detailed structural analysis for all of the structures. Detailed assessment of existing buildings takes a considerable time, and results in a huge cost. With the general letter of the Ministry of Environment and Urbanization dated 11.11.2004, numbered 900, calculation of the estimated cost of vulnerability assessment, especially of public buildings, can be achieved. According to the provisions of this general letter, estimated cost of assessment, determination and construction for determining earthquake safety of public buildings and if necessary, estimated cost of preparing retrofitting projects are calculated based on a method described in “Specifications for the Construction Architectural and Engineering Services”, which came into force with the decision of the Turkish Council of Ministers dated 16.07.1985, numbered 85/9707 (Akçalı, 2012). According to this method, based on the unit costs of construction of the year 2012 (Akçalı, 2012), the cost of assessment of a public building having a usage area of 1,000 m² and if necessary, preparing the appropriate retrofitting project is 21678.75 TL, and for a building having 5,000 m² usage area, the corresponding cost is 67573.12 TL, and for a building having 10,000 m² usage area, the cost is 107777.50 TL. Another negative aspect of this issue, besides the high costs, is that the process and the procedure outlined in the code takes a long time and requires intensive labour. Besides, in cases where the cost of implementing the retrofitting projects are considered to be high, demolishing and reconstructing those buildings can be more favourable rather than retrofitting them against earthquakes. In such cases, detailed studies conducted for buildings will become useless.

In order to prevent these kinds of obstacles and to provide the building owners or institutions savings in time and cost where there are large number of building stocks, examining the buildings based on simple methods is quite useful before carrying out a detailed assessment. Simple evaluation methods to be used should be able to sufficiently estimate retrofitting requirements of buildings which can be obtained by detailed examinations and will also help to estimate the minimum cost of retrofitting with simple methods and to assess buildings efficiently before conducting expensive analyses.

With this background information, in our study we discuss the feasibility of simple assessment methods to be implemented before a seismic evaluation is conducted for retrofitting requirements of buildings. We also discuss the feasibility of simple assessment methods in estimating the minimum retrofitting cost which may be required for buildings. For this purpose, buildings whose detailed analysis were made in accordance with current earthquake code and whose retrofitting projects have been prepared to satisfy the retrofitting necessity are utilized in this study. In these buildings, multistage seismic assessment methods, which are developed in our country, were applied, and different results were obtained for each building according to both existing designs and to retrofitting designs. With the scores obtained by means of each multi-stage seismic assessment method and with the graphs obtained by using existing and reinforced state supporting systems areas, we could determine changes in multi-stage seismic assessment scores before and after reinforcement. Using these graphs, limit values were introduced for classifying buildings as safe or unsafe in terms of their earthquake performances. Based on these limits, minimum cost of retrofitting of a building which is rated unsafe according to the current earthquake code, can be calculated, and thereby required minimum retrofitting cost for buildings can also be estimated. After the building owners or institutions compare these costs with the reconstruction costs of the buildings, they can decide whether it would be economic to retrofit the buildings or not. Also, before proceeding to detailed analysis of buildings which exhibit relatively high retrofitting implementation costs, current assessments and plans for their future usage can be made.

1.2 Scope of the Study

In the second chapter of this study, multi-stage seismic assessment methods are explained. In chapter three, examination and assessment methods which are included in current earthquake code are presented. In the fourth chapter, structural features of the building stock which was examined in this study are presented. In the fifth chapter, seismicity of Istanbul and its surrounding areas where the examined building stock is located are discussed. In chapter six, multistage seismic assessment methods and the results obtained according to both current states of buildings and their retrofitted states are presented. Also in this chapter, results of analysis of current and retrofitted states conducted by means of detailed analysis together with calculated retrofitting costs are discussed, the issues of comparison of the results obtained by both simple (multistage seismic assessment methods) and detailed (current earthquake code assessment criteria) methods, and estimability of retrofitting cost by means of these comparisons are elaborated. Chapter 7 includes the summary and main conclusions of this thesis.

CHAPTER 2

MULTISTAGE SEISMIC ASSESSMENTS OF EXISTING REINFORCED CONCRETE BUILDINGS

2.1. Introduction

Multistage seismic assessment methods, which are a sequence of screening methods, are defined as a body of studies for the assessment of earthquake performances of buildings from simple to complex ones which are stated as empirical methods within seismic vulnerability assessment methodology (Calvi *et al.*, 2006). In these studies, by identifying damage-generating factors on buildings, the earthquake resistances of existing buildings are assessed. There are two basic reasons for using multistage seismic assessment methods before detailed analysis, which were especially introduced after Marmara earthquake of 1999: The first reason is that there may be a great number of buildings to be examined. This circumstance makes it impossible to use detailed examination methods because of lack of time and funds. The other reason is that considering current building stock in Turkey, majority of these buildings do not have a design project and they were not provided with engineering services. For such buildings, where there are some simple planning and/or construction defects, it would not be suitable to apply detailed calculation methods directly. For this reason, it is important to make the assessment by starting with simple methods in order to examine earthquake safety of buildings, and to define priorities for retrofitting these building against earthquake loads and then take up more detailed examination studies in the light of these studies.

Seismic vulnerability evaluation methods classified into three main stages (Özcebe *et al.*, 2004). These stages are namely; first stage (walk-down) evaluation, second stage (preliminary) evaluation and third stage (final) evaluation. At the first stage of the assessment procedure, buildings are arranged according to simple parameters that affect the seismic safety. At this stage, evaluation requires no analysis, relying on the past performance of similar buildings. First stage assessments aim at determining the level of priority of buildings that require immediate intervention. The second stage, on the other hand, is in fact a simplified method of evaluation. In this procedure, the evaluation is performed depending on a variety of methods. At this stage, buildings are documented according to their seismic risk levels. Having done this, it would be possible to identify those buildings which possess a certain level of seismic structural safety as well as buildings that are entirely devoid of seismic safety. The final assessment of the structure is mainly based on further and in-detail analysis of seismic performance.

Methods which are explained in detail below have been devised by study groups in different universities in Turkey and therefore it is not possible to assert a single method for each assessment level.

2.2. First Stage Seismic Assessment of Existing Reinforced Concrete Buildings

The procedures developed by Sucuoğlu and Yazgan (2003) and Aydınoğlu *et al.* (2003) are the two examples of the first stage (walk-down) assessment procedures developed mainly for reinforced concrete (RC) buildings in Turkey.

2.2.1 Assessment Procedure Proposed by Sucuoğlu and Yazgan (2003)

Sucuoğlu and Yazgan (2003) developed a walk-down procedure to determine the priority levels of 1-7 storey reinforced concrete buildings. This procedure incorporates the following structural and geotechnical parameters that have to be observed during field surveys; number of storeys, soft storey, heavy overhangs, apparent building quality, short columns, pounding effect, topographic effects and local soil conditions. The scores given to each parameter are explained below.

The vulnerability parameters of a building are obtained through walk-down surveys. These parameters together with their weights are presented in Table 2.1a. The seismic performance score is calculated via Table 2.1b.

Table 2.1a. Vulnerability parameters.

Soft Storey	No 0	Yes 1	
Heavy Overhangs	No 0	Yes 1	
Apperent Building Quality	Good 0	Moderate 1	Poor 2
Short Columns	No 0	Yes 1	
Pounding Effect	No 0	Yes 1	
Topographic Effects	No 0	Yes 1	

Table 2.1b. Initial scores for concrete buildings.

Number of Storeys	Local Soil Conditions		
	ZONE I 60<PGV<80	ZONE II 40<PGV<60	ZONE III 20<PGV<40
1-2	90	125	160
3	90	125	160
4	80	100	130
5	80	90	115
6-7	70	80	95

In this table, firstly an initial score is assigned with respect to the intensity zone and the number of storeys. Then, this initial score is reduced for every observed or calculated vulnerability parameter. PGV values are selected from the JICA ground velocity map of Istanbul. Table 2.2 shows the vulnerability scores for reinforced concrete buildings.

Table 2.2. Vulnerability scores for concrete buildings.

Number of Storeys	Vulnerability Scores					
	Soft Storey	Heavy Overhang	Apperent Quality	Short Column	Pounding Effect	Topographic Effects
1-2	0	-5	-5	-5	0	0
3	-10	-10	-10	-5	-2	0
4	-15	-10	-10	-5	-3	-2
5	-15	-15	-15	-5	-3	-2
6-7	-20	-15	-15	-5	-3	-2

A general equation for calculating the seismic performance score (PS) is formulated as follows.

$$PS = (\text{Initial Score}) - \sum(\text{Vulnerability Parameter}) \times (\text{Vulnerability Score}) \quad (2.1)$$

The weight of each building vulnerability parameter is evaluated by statistical procedures, based on Düzce Earthquake Database (Sucuoğlu, 2007).

2.2.2 Assessment Procedure Proposed by Aydınoğlu *et al.* (2003)

Aydınoğlu *et al.* (2003) developed a walk-down procedure to compare the seismic demands estimated for earthquakes for which the seismic hazard is assessed based on deterministic and probabilistic procedures. Here the demand is defined in terms of roof displacements and roof displacement capacities for each building type according to “life safety” and “collapse prevention” performance criteria. In this procedure the ratio of roof displacement capacity to the roof displacement demand of buildings is used for the seismic risk priority level classifications of reinforced concrete buildings.

The procedure developed by Aydınoğlu *et al.* (2003) begins with the estimation of earthquake displacement demand. Utilizing “spectral acceleration” specified in deterministic and probabilistic seismic hazard maps for small cell-regions and associated “spectral displacements”, it is possible to estimate the seismic demand in terms of roof displacement of each type of classified buildings. In those maps, short period spectral accelerations S_s and one-second spectral acceleration S_1 are specified according to NEHRP (1997) definition on the

basis of small cell regions. Utilizing these data, standard “elastic” acceleration spectrum with 5 % damping could be defined based on the formula given in FEMA 302 (1997) and FEMA 356 (2000).

$$S_{ae} = (1 + 1.5T / T_0) S_s / 2.5 \quad T < T_0 \quad (2.2)$$

$$S_{ae} = S_s \quad T_0 \leq T \leq T_s \quad (2.3)$$

$$S_{ae} = S_1 / T \quad T > T_s \quad (2.4)$$

In which,

$$T_s = S_1 / S_s \quad (2.5)$$

$$T_o = 0.2T_s \quad (2.6)$$

The elastic displacement spectrum can be defined in terms of the above-defined elastic acceleration spectrum as,

$$S_{de} = (T / 2\pi)^2 S_{ae} \quad (2.7)$$

where, the effective fundamental period of the building T can be estimated by considering the non-linear deformations in reinforced concrete buildings as,

$$T = 0.15n \quad (2.8)$$

where, n represents the number of storeys of a building excluding the basement (Aydinoğlu *et al.*, 2002). Inelastic (non – linear) displacement spectrum can be defined as,

$$S_{di} = C_d S_{de} \quad (2.9)$$

where, C_d is an empirical factor which depends on the number of storeys (n) of the building. This coefficient is aimed to replace all three coefficients given in FEMA 356 (2000) namely C_1 , C_2 , C_3 as similar to FEMA 310 (1998). Table 2.3 shows the C_d coefficients (Aydinoğlu *et al.*, 2003).

Table 2.3 C_d coefficients.

Number of Storeys (n)	1	2	3	>4
C_d Coefficient	1.5	1.3	1.1	1.0

Inelastic (non-linear) spectral displacement can be associated with non-linear roof displacement of the building that is governed by the fundamental vibration mode whereas the roof displacement demand can be calculated by using Eq.2.10 (Aydinoğlu *et al.*, 2003).

$$u_n = \phi_n \Gamma S_{di} \quad (2.10)$$

where,

- u_n : Roof displacement
 ϕ_n : Fundamental mode shape amplitude at the roof
 r : Participation factor of the fundamental mode

Assuming that the mode shape in 5-6 storey buildings to be linear and considering storey masses to be equal, the roof displacement demand could simply be expressed as:

$$u_n = [3n/(2n+1)]S_{di} \quad (2.11)$$

The procedure assumes the average storey height to be 3 m (Aydınoğlu *et al.*, 2003). The building drift ratio demand “ D_d ”, which is defined as the roof displacement divided by the total height of the building “ H_n ” is obtained as,

$$D_d = u_n / H_n = S_{di} / (2n+1) \quad (2.12)$$

where, S_{di} is in meter.

The second part of the procedure involves the estimation of displacement capacities of buildings. Displacement capacity of a building can be computed by using Eq. 2.13.

$$D_c = D_{co} C_c \quad (2.13)$$

where,

- D_c : Buildings drift ratio capacity
 D_{co} : Basic drift ratio capacity
 C_c : Capacity reduction factor.

Basic drift ratio capacities “ D_{co} ” are given in Table 2.4 and capacity reduction factors are given in Table 2.5.

Table 2.4. Basic drift ratio capacities.

Basic Drift Ratio Capacities (D_{co})	Life Safety Performance Criterion	Collapse Prevention Performance Criterion
	0.008	0.014

Table 2.5. Capacity reduction factors.

Apparent Building Quality	Good 1.0	Fair 0.9	Bad 0.8
Pounding Susceptible	in the middle 1.0	at the corner 0.9	
	floor level are the same 0.8	floor level are not the same 0.9	
Weak Storeys	with weak storeys 0.8	without weak storeys 1.0	
Short Columns	with short columns 0.8	without short columns 1.0	
Façade Columns Rest on Cantilevers at the Ground Floor Level	Yes 0.8	No 1.0	

The ratio of the above-defined roof displacement capacity to roof displacement demand will be the basis of prioritization (capacity/demand ratio = D_c/D_d).

The estimations that are defined in terms of roof displacements and roof displacement capacities for each building type according to “life safety” as well as “collapse prevention” performance criteria could be used to make a rational preliminary prioritization for buildings.

2.3. Second Stage (Preliminary) Seismic Assessment of Existing Reinforced Concrete Buildings

The procedures developed by Yakut (2004), Hassan and Sözen (1997), Özcebe, Yüçemen and Yakut (2003) and Gülay *et al.* (2008) are some examples of the second stage (preliminary) assessment procedures developed mainly for reinforced concrete buildings in Turkey.

2.3.1 Assessment Procedure Proposed by Yakut (2004)

Yakut (2004) developed a preliminary assessment procedure to evaluate seismic performance of low to mid rise reinforced concrete buildings. This procedure includes a “capacity index” which takes into account the orientation, size and material properties of the lateral load resistance capacity of the structural system as well as the quality of workmanship, materials and architectural properties such as short columns and irregularities in the plan. Buildings are classified either under the category of low risk (severe damage is unexpected) or high risk (which would probably be unable to meet the life safety performance level of the latest seismic code). Procedure of this method is shown in Fig. 2.1.

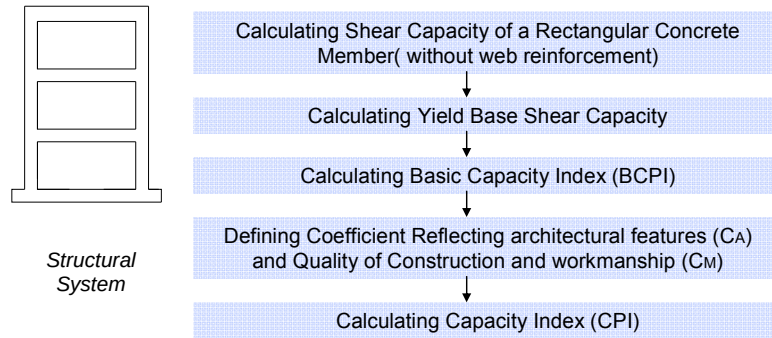


Fig. 2.1. Assessment procedure proposed by Yakut (2004)

The shear capacity of each structural member is computed by considering only the contribution of concrete through the following equation (Yakut, 2004).

$$V_{ci} = c\alpha f_{ctk} b_w h \quad (2.14)$$

where,

V_{ci} : Shear capacity of a rectangular concrete member (without web reinforcement)

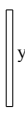
b_w, h : Dimensions of the member

f_{ctk} : Direct concrete tensile strength

α : Combined effect of strength reduction factor

c : Member orientation factor. It is defined in Table 2.6.

Table 2.6. Member orientation factors “c”.

Columns	Shear Walls
for square and circular columns  $C_x = 1/2$	for shear walls in the x direction  $C_x = 1$
for rectangular columns with $b_x > b_y$  $C_x = 2/3$	for shear walls in the y direction  $C_x = 0$
for rectangular columns with $b_x < b_y$  $C_x = 1/3$	
$C_y = 1 - C_x$	$C_y = 1 - C_x$

The total shear capacity is calculated by adding the member capacities along the principal axis. Then, the yield base shear capacity, V_y is to be obtained from Eq. 2.15 for buildings without infill walls (Yakut, 2004).

$$V_y = \frac{\sum V_c}{0.95e^{0.125n}} \quad (2.15)$$

where,

V_y : Yield base shear capacity
 n : Number of storeys

Taking the impact of infill walls into account, the yield base shear capacity is calculated through Eq. 2.16 for buildings with infill walls (Yakut, 2004).

$$V_{yw} = V_y \left(46 \frac{A_w}{A_{tf}} + 1 \right) \quad (2.16)$$

where,

A_w : Total area of the filler walls
 A_{tf} : Total floor area of the building

Using yield base shear capacity values, the basic capacity index (BCPI), which is called yield over-strength ratio in the literature, is calculated through Eq. 2.17.

$$BCPI = \frac{V_y}{V_{code}} \quad (2.17)$$

where,

V_{code} : Code base shear value, which can be computed according to the design criteria in the seismic code

V_y : Yield base shear capacity value

Then, the basic capacity index is modified with some other factors having adverse effects including architectural features and the quality of construction. The resulting value is called “Capacity Index” (CPI) which could be obtained through Eq. 2.18.

$$CPI = C_A C_M BCPI \quad (2.18)$$

where,

C_A : Coefficient reflecting the architectural features

C_M : Coefficient reflecting the construction quality

$BCPI$: Basic capacity index

Coefficient reflecting the architectural features is obtained from Eq. 2.19.

$$C_A = 1 - 1.5(C_{AS} + C_{ASC} + C_{AP} + C_{AF}) \quad (2.19)$$

where,

C_A : Coefficient reflecting the architectural features

C_{AS} : Coefficient reflecting the soft storey features

C_{ASC} : Coefficient reflecting the short column features

C_{AP} : Coefficient reflecting the effect of plan irregularities

C_{AF} : Coefficient reflecting the vertical and in-plan discontinuities of frames

It is somewhat challenging to assign realistic values to the components of C_A in Eq. 2.19 due to incomplete data. So far, analytical and empirical investigations have been conducted for these coefficients, focusing on the adverse effects of irregularities on the response of buildings to earthquakes. Yakut (2004) presented several recommended alternative values for C_A by using FEMA 154, Güllkan and Yakut (1994) and Sucuoğlu and Yazgan (2003). Both studies provide alternative values for C_A : 0.9, 0.85 and 0.8. However, based on the examination of analytical results, Yakut (2004) recommended $C_{AS} = 0.135$, $C_{AP} = 0.055$, $C_{AF} = 0.035$ and $C_{ASC} = 0.052$. These coefficients yield $C_A = 0.723$. Recommended values for C_M are presented in Table 2.7.

Table 2.7. Recommended values of C_M

Quality of construction and workmanship	Coefficient reflecting the construction quality (C_M)
Poor	$1 - Q_r (1 - C_A)$
Average	$1 - Q_r (1 - C_A)/3$
Good	1

In using the values listed for C_M in Table 2.7, Q_r ratios 0.44 or 0.55 are recommended for Turkey. Based on field data and extensive experience with flawed construction (Yakut, 2004) the value of 0.44 value is adopted in this study.

The calculated capacity index value (CI) is compared with the proposed cut-off values in order to reach a final decision concerning building safety. In this regard, the reasonable limit value is recommended as 1.2 (Yakut, 2004).

2.3.2 Assessment Procedure Proposed by Hassan and Sözen (1997)

Hassan and Sözen (1997) have proposed a procedure to define priority index for low rise monolithic reinforced concrete buildings, which is a function of a wall index (cross-sectional area of walls and infill panels divided by total floor area) and a column index (cross-sectional area of columns divided by total floor area). Damage data can be used to calibrate the priority index and define the level of vulnerability of the building. Procedure of this method is shown in Fig. 2.2.

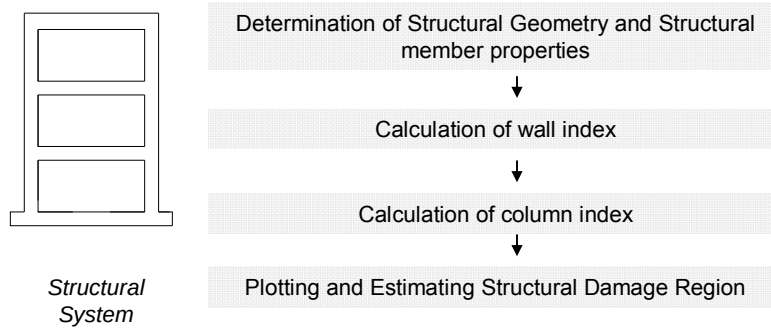


Fig. 2.2. Assessment procedure proposed by Hassan and Sözen (1997)

This procedure requires the dimensions and locations of structural members as well as the floor area. It is based on wall index (WI) and column index (CI). Wall index is obtained through Eq. 2.20.

$$WI = \frac{A_{cw} + (A_{mw}/10)}{A_{ft}} \times 100 \quad (2.20)$$

where,

- A_{cw} : Total cross sectional area of reinforced concrete walls in one horizontal direction at base
- A_{mw} : Total cross sectional area of non-reinforced masonry filler walls in one horizontal direction at base
- A_{ft} : Total floor area above base

Column index (CI) is obtained by using Eqs. 2.21 and 2.22.

$$CI = \left(\frac{A_{ce}}{A_{ft}} \right) \times 100 \quad (2.21)$$

$$A_{ce} = A_{col} / 2 \quad (2.22)$$

where,

A_{ce} : Effective cross sectional area of columns at the base
 A_{col} : Total cross-sectional area of columns above the base
 A_{ft} : Total floor area above the base

A plot of these indices is prepared in a way that y-axis represents the wall index (WI) whereas the x-axis represents the column index (CI) as shown in Fig. 2.3. In this figure, there are two boundary lines. In the proposed method, in case the column and wall indices define a point within a triangle formed by Boundary 1 (B1) together with the two axes of the graph, that particular building is considered to be more vulnerable than a building for which the indices intersect at a position, say, outside Boundary 2 (B2) (Hassan and Sözen, 1997).

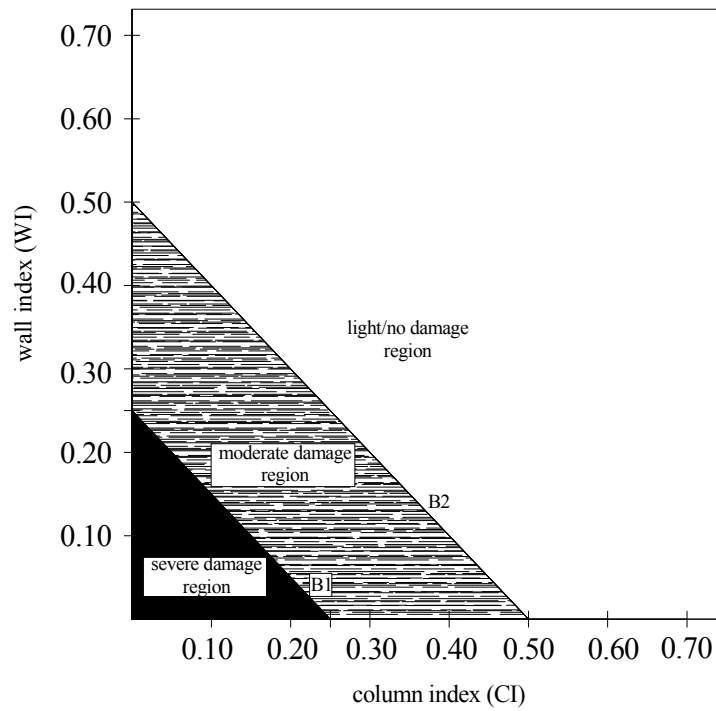


Fig. 2.3. Graph showing the damage levels based on wall and column indices

This plot shows the relative seismic vulnerability of buildings with respect to each other in a given region. Priority index is defined in order to identify those buildings that require immediate rehabilitation (Hassan and Sözen, 1997). The priority index is calculated by using the following relationship.

$$PI = WI + CI \quad (2.23)$$

2.3.3 Assessment Procedure Proposed by Özcebe, Yüçemen and Yakut (2003)

Considering the fact that construction practices in Turkey are far below displaying the designed structural system, a statistical analysis based on observed damage and significant building attributes would provide reliable and accurate results for regional seismic vulnerability assessments. In this context, discriminant analysis technique was employed in order to develop a preliminary evaluation methodology for the assessment of seismic vulnerability of low to mid rise reinforced concrete buildings by Özcebe, Yüçemen and Yakut (2003). The main objective of this method is to identify those buildings that are highly vulnerable to earthquakes. Hence the damage scores obtained from derived discriminant functions are used to classify existing buildings as “safe”, “unsafe” and “intermediate”. Procedure of this method is shown in Fig. 2.4.

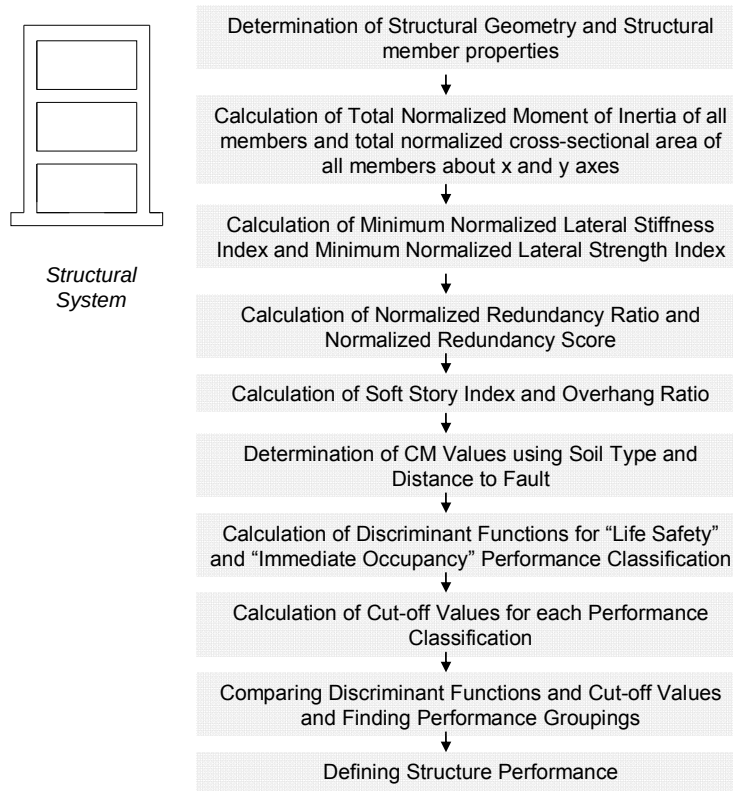


Fig. 2.4. Assessment procedure proposed by Özcebe, Yüçemen and Yakut (2003)

The discriminant functions are based on the basic damage including parameters namely number of storeys (n), minimum normalized lateral stiffness index ($mnlstfi$), minimum normalized lateral strength index ($mnlsi$), normalized redundancy score (nrs), soft storey index (ssi) and overhang ratio (or) (Özcebe *et al.*, 2003).

Number of storeys (n) consists of the total number of individual floor systems above the ground level. Minimum lateral stiffness index ($mnlstfi$) indicates the lateral rigidity of the ground storey, which is usually the most critical one. If the storey height, boundary conditions of the individual columns and properties of the materials used are kept constant, this index would also represent the stiffness of the ground storey. This index is calculated by considering

the columns and the structural walls that belong to the critical storey. While doing this, all vertical reinforced concrete members presenting a maximum cross-sectional dimension/minimum cross sectional dimension ratio less than 7 are considered as columns (Özcebe *et al.*, 2003). All other reinforced concrete members are considered to be structural walls. The $mnlsfi$ parameter is to be computed on the basis of the following relationship:

$$mnlsfi = \min(I_{nx} , I_{ny}) \quad (2.24)$$

where,

I_{nx} and I_{ny} : Total normalized moment of inertia of all members about x and y axes, respectively

I_{nx} and I_{ny} values are to be calculated by using Eq. 2.25 and Eq. 2.26.

$$I_{nx} = \frac{\sum (I_{col})_x + \sum (I_{sw})_x}{\sum A_f} \times 1000 \quad (2.25)$$

$$I_{ny} = \frac{\sum (I_{col})_y + \sum (I_{sw})_y}{\sum A_f} \times 1000 \quad (2.26)$$

where,

$\Sigma(I_{col})_x$ and $\Sigma(I_{col})_y$: Summation of the moment of inertias of all columns about the centroidal x and y axes, respectively
 $\Sigma(I_{sw})_x$ and $\Sigma(I_{sw})_y$: Summation of the moment of inertias of all structural walls about their centroidal x and y axes, respectively
 ΣA_f : Total storey area above ground level

Minimum normalized lateral strength index ($mnlsi$) indicates the base shear capacity of the critical storey. While calculating this index, in addition to the present columns and structural walls, the presence of unreinforced masonry filler walls are also considered (Özcebe *et al.*, 2003). While doing this, unreinforced masonry filler walls are assumed to bear 10 % of the shear force that could be carried by a structural wall having the same cross-sectional area (Gülkan and Sözen, 1999) (Tankut and Ersoy, 1996) As in $mnlsfi$ calculation, the vertical reinforced members with a cross-sectional aspect ratio of 7 or above are classified as structural walls. The $mnlsi$ parameter can be calculated using Eq. 2.27.

$$mnlsi = \min(A_{nx} , A_{ny}) \quad (2.27)$$

where,

A_{nx} and A_{ny} : Total normalized cross-sectional areas of all members about x and y axes, respectively

A_{nx} and A_{ny} can be calculated by using Eq. 2.28 and Eq. 2.29.

$$A_{nx} = \frac{\Sigma(A_{col})_x + \Sigma(A_{sw})_x + 0.1\Sigma(A_{mw})_x}{\Sigma A_f} \times 1000 \quad (2.28)$$

$$A_{ny} = \frac{\Sigma(A_{col})_y + \Sigma(A_{sw})_y + 0.1\Sigma(A_{mw})_y}{\Sigma A_f} \times 1000 \quad (2.29)$$

where,

$\Sigma(A_{col})_x, \Sigma(A_{col})_y$: Total effective cross-sectional areas of column
 $\Sigma(A_{sw})_x, \Sigma(A_{sw})_y$: Total effective cross-sectional area of structural walls
 $\Sigma(A_{mw})_x, \Sigma(A_{mw})_y$: Total effective cross-sectional area of unreinforced masonry walls with no window or door openings, respectively

For each column with a cross-sectional area denoted by A_{col} , effective cross-sectional areas of columns can be calculated by using Eq. 2.30 and Eq. 2.31.

$$(A_{col})_x = k_x \times A_{col} \quad (2.30)$$

$$(A_{col})_y = k_y \times A_{col} \quad (2.31)$$

For each structural wall with a cross-sectional area denoted by A_{sw} , effective cross-sectional areas of structural walls can be calculated by using Eq. 2.32 and Eq. 2.33.

$$(A_{sw})_x = k_x \times A_{sw} \quad (2.32)$$

$$(A_{sw})_y = k_y \times A_{sw} \quad (2.33)$$

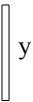
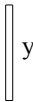
Also for each unreinforced masonry infill wall with a cross-sectional area denoted by A_{mw} , effective cross-sectional areas of unreinforced masonry infill wall can be calculated by using Eq. 2.34 and Eq. 2.35.

$$(A_{mw})_x = k_x \times A_{mw} \quad (2.34)$$

$$(A_{mw})_y = k_y \times A_{mw} \quad (2.35)$$

In these equations, “ k ” is a strength partitioning factor. Considering that all columns, structural walls and unreinforced masonry walls will contribute to the base shear capacity of the structure over two dimensional planes (x and y), their contribution would be more significant along their major axes. According to Tankut and Ersoy (1996) “ k ” parameter values are presented in Table 2.8.

Table 2.8. k values for columns, structural walls and masonry filler walls.

$(A_{col})_x = k_x \times A_{col}$ $(A_{col})_y = k_y \times A_{col}$	$(A_{sw})_x = k_x \times A_{sw}$ $(A_{sw})_y = k_y \times A_{sw}$	$(A_{mw})_x = k_x \times A_{mw}$ $(A_{mw})_y = k_y \times A_{mw}$
for square and circular column  $k_x = 1/2$	for shear walls in the direction of x  $k_x = 1$	for masonry wall in the direction of x  $k_x = 1$
for rectangular columns with $b_x > b_y$  $k_x = 2/3$	for shear walls in the direction of y  $k_x = 0$	for masonry wall in the direction of y  $k_x = 0$
for rectangular columns with $b_x < b_y$  $k_x = 1/3$		
$k_y = 1 - k_x$	$k_y = 1 - k_x$	$k_y = 1 - k_x$

Normalized redundancy score (*nrs*) indicates the degree of continuity of multiple frame lines that distribute lateral forces throughout the structural system. The normalized redundancy ratio (*nrr*) of a frame structure is calculated by using Eq. 2.36.

$$nrr = \frac{A_{tr}(nf_x - 1)(nf_y - 1)}{A_{gf}} \quad (2.36)$$

where,

- A_{tr} : Tributary area for a typical column. It shall be taken as 25 m² if nf_x and nf_y are both greater than and equal to 3. In all other cases A_{tr} shall be taken as 12.5 m²
- nf_x and nf_y : Number of continuous frame lines in the critical storey (usually ground storey) in x and y direction, respectively
- A_{gf} : Area of the ground storey

Depending on the value of *nrr* computed from Eq. 2.36, the following discrete values are assigned to the normalized redundancy score (*nrs*) (Table 2.9).

Table 2.9. *nrs* values.

<i>nrs</i> =1	$0 < nrr < 0.5$
<i>nrs</i> =2	$0.5 < nrr < 1.0$
<i>nrs</i> =3	$1.0 < nrr$

Soft storey index (*ssi*) is defined as the ratio of the height of first storey (i.e. ground storey) (H_1) to the height of the second storey (H_2).

$$ssi = \frac{H_1}{H_2} \quad (2.37)$$

In a typical floor plan, the area beyond the outermost frame lines on all sides is defined as the overhang area. Overhang ratio (*or*) shall be defined as the summation of the overhang area of each storey, $A_{overhang}$, divided by the area of the ground storey, A_{gf} .

$$or = \frac{A_{overhang}}{A_{gf}} \quad (2.38)$$

The damage index or the damage score corresponding to the life safety performance classification (DI_{LS}) shall be computed from the discriminant function given in Eq. 2.39.

$$DI_{LS} = 0.620n - 0.246mnlstfi - 0.182mnl si - 0.699nrs + 3.269ssi + 2.728or - 4.905 \quad (2.39)$$

In the case of immediate occupancy performance classification, the discriminant function (DI_{IO}) shall be computed from the discriminant function given in Eq. 2.40.

$$DI_{IO} = 0.808n - 0.334mnlstfi - 0.107mnl si - 0.687nrs + 0.508ssi + 3.884or - 2.868 \quad (2.40)$$

For an evaluation of buildings according to both performance levels,

- Calculate DI_{LS} and DI_{IO} scores of the building by using Eq.2.39 and Eq.2.40, respectively.
- Determine the cut-off values for each performance classification by using the relationships presented in Eq. 2.41 and Eq. 2.42.

$$CV_{LS} = CM (-0.090n^3 + 1.498n^2 - 7.518n + 11.885) \quad (2.41)$$

$$CV_{IO} = CM (-0.085n^3 + 1.416n^2 - 6.951n + 9.979) \quad (2.42)$$

In these equations n signifies the number of storeys of the building and CM values are adjustment factors, introducing the spatial variation of the ground motion. These values could be obtained from Table (2.10). The location of building in relation to the fault and soil properties of the site could be obtained from JICA Report (2002).

Table 2.10. CM values.

JICA Soil Classification	Shear Wave Velocity (m/s)	Distance to Fault				
		0-4 km	5-8 km	9-15 km	16-25 km	>26 km
B	>760	0.778	0.824	0.928	1.128	1.538
C	360 - 760	0.864	1.000	1.240	1.642	2.414
D	180 - 360	0.970	1.180	1.530	2.099	3.177
E	< 180	1.082	1.360	1.810	2.534	3.900

By comparing cutoff values (CV) to the associated DI value, calculate performance classification of the buildings with respect to “Life Safety” and “Immediate Occupancy” performance levels are carried out as follows.

$$\begin{aligned} DI_{LS} > CV_{LS} & \quad PG_{LS} = 1 \\ DI_{LS} < CV_{LS} & \quad PG_{LS} = 0 \\ DI_{IO} > CV_{IO} & \quad PG_{IO} = 1 \\ DI_{IO} < CV_{IO} & \quad PG_{IO} = 0 \end{aligned}$$

where, PG_{LS} and PG_{IO} are performance groupings of a building. By examining the performance classification of the building for “Life Safety” and “Immediate Occupancy” performance classification, a decision is made on the probable expected performance level of the building. In this process, following reasoning will be adopted (Özcebe *et al.*, 2003).

Table 2.11. Classification of building seismic safety levels according to the method proposed by Özcebe *et al.*(2003)

$PG_{LS} = 1$	X	X		
$PG_{LS} = 0$			X	X
$PG_{IO} = 1$	X		X	
$PG_{IO} = 0$		X		X

Building is UNSAFE

Building is in INTERMEDIATE ZONE

Building is SAFE

With this procedure it is possible to classify the building under three groups. These groups are called “*Safe*,” “*Unsafe*” and “*Intermediate*” (the final decision on the seismic safety of the building is left for a more comprehensive detailed seismic evaluation) (Yakut *et al.*, 2004).

2.3.4 Assessment Procedure Proposed by P25 Scoring Method (Gülay *et al.*, 2008)

P25 Scoring method (Gülay *et al.*, 2008) is mainly based on observing and listing the most important parameters that affect the seismic response of the building. These parameters are then scored according to the relevant weighting factors in relation to their relative importance. In this method, there are seven different scores for corresponding failure modes, when P_1 and P_7 and their interactions are considered. The final performance score “P” of the building is an amalgamation of these seven scores graded between 0 and 100 varying from the worst to the best, respectively.

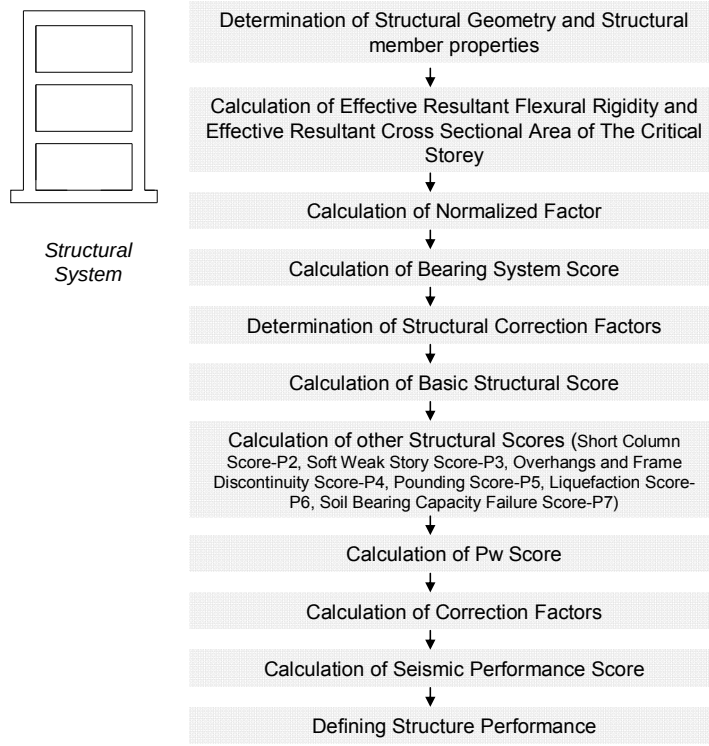


Fig. 2.5. Assessment procedure proposed by Gülay *et al.* (2008)

This assessment procedure begins with the calculation of seven different scores. The first one is P_1 score. It is related to the basic structural characteristics (i.e. column and wall area and inertia ratios, material properties and structural irregularities etc.). The fundamental structural score P_1 can be calculated by using Eq. 2.43 and Eq. 2.44.

$$P_1 = P_0 \left(\prod_{i=1}^{14} f_i \right) \quad (2.43)$$

$$P_0 = (C_{Ar} + C_{Ir}) / h_o \quad (2.44)$$

where,

- P_0 : The bearing system score
- C_{Ar} : The effective resultant cross-sectional area of critical storey (mostly ground storey)
- C_{Ir} : The effective resultant flexural rigidity of the critical storey
- h_o : The height correction factor

The resultant rigidity parameter $C_A + C_I$, is calculated independently from the total building height. Considering this, suitable correction factor “ h_o ” is suggested in P_0 calculation, which represents the effect of the building height. According to the parametric studies for different concrete and steel type buildings, the final correction factor h_o is given as,

$$h_o = -0.6H^2 + 39.6H - 13.4 \quad (2.45)$$

where, H is the total building height in meters.

In Eq. 2.43, f_i represents 14 different structural correction factors related to various possible deficiencies of the building. Effective resultant cross-sectional area and effective resultant flexural rigidity can be calculated by using Eqs. 2.46 and 2.47, respectively.

$$C_{A_R} = \left[(\cos(\Theta) C_{A,\min})^2 + (\sin(\Theta) C_{A,\max})^2 \right]^{0.5} \quad (2.46)$$

$$C_{I_R} = \left[(\cos(\Theta) C_{I,\min})^2 + (\sin(\Theta) C_{I,\max})^2 \right]^{0.5} \quad (2.47)$$

where,

$$C_{A,\min} = \min(C_{Ax}, C_{Ay}) \quad (2.48)$$

$$C_{A,\max} = \max(C_{Ax}, C_{Ay}) \quad (2.49)$$

$$C_{I,\min} = \min(C_{Ix}, C_{Iy}) \quad (2.50)$$

$$C_{I,\max} = \max(C_{Ix}, C_{Iy}) \quad (2.51)$$

Θ is the smallest angle between the dominant direction of the expected earthquake and the weakest direction of the examined building. According to Gülay *et al.* (2008) it can be assumed as 30° .

$C_{A,x}$ and $C_{A,y}$ can be calculated using Eq. 2.52 and Eq. 2.53.

$$C_{Ax} = 2(10^{-5})(A_{ef,x}) / A_e \quad (2.52)$$

$$C_{Ay} = 2(10^{-5})(A_{ef,y}) / A_e \quad (2.53)$$

$A_{ef,x}$ and $A_{ef,y}$ signify the sum of the cross-sectional areas along both x and y directions.

They can be calculated by using Eq. 2.54 and Eq. 2.55. A_e is the gross floor area of critical storey (mostly ground storey). It can be calculated by using plan directions Lx and Ly . They constitute x and y sides of the smallest rectangle into which the plan of the critical storey may be placed as shown in Fig. 2.6.

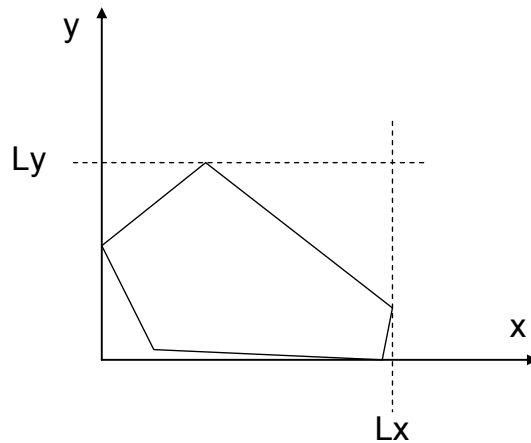


Fig. 2.6. Illustration of Ly and Lx values

$$A_{ef,x} = A_c + A_{sx} + (E_m / E_c) A_{wx} \quad (2.54)$$

$$A_{ef,y} = A_c + A_{sy} + (E_m / E_c) A_{wy} \quad (2.55)$$

where,

- A_c : Cross-sectional area of columns
- A_{sx} and A_{sy} : Cross-sectional area of RC shear walls both in x and y directions
- A_{wx} and A_{wy} : Cross-sectional area of infill masonry walls both in x and y directions
- E_m / E_c : Ratio of the masonry modulus of elasticity to that of concrete. The authors suggested 0.08 for adobe, 0.15 for clay brick with void, 0.20 for solid clay bricks and 0.30 for concrete briquette (Gülkan and Sözen, 1999)

For Eqs. 2.50 and 2.51, C_{Ix} and C_{Iy} can be calculated by using Eqs. 2.56 and 2.57.

$$C_{Ix} = 2(10^5)(I_{ef,x} / I_x)^{0.2} \quad (2.56)$$

$$C_{Iy} = 2(10^5)(I_{ef,y} / I_y)^{0.2} \quad (2.57)$$

where,

- $I_{ef,x}$ and $I_{ef,y}$: The sum of moment of inertias of columns
- I_x and I_y : The gross moment of inertia values

$I_{ef,x}$ and $I_{ef,y}$ values also can be calculated by using Eqs. 2.58 and 2.59.

$$I_{ef,x} = I_{cx} + I_{sx} + (E_m / E_c) I_{wx} \quad (2.58)$$

$$I_{ef,y} = I_{cy} + I_{sy} + (E_m / E_c) I_{wy} \quad (2.59)$$

where,

- I_{cx} and I_{cy} : The moment of inertia of a column about y and x axes
- I_{sx} and I_{sy} : The moment of inertias of the RC shear walls
- I_{mx} and I_{my} : The moment of inertia of the infill masonry walls about y and x axes, respectively
- E_m / E_c : The ratio of the masonry modulus of elasticity to that of concrete as explained below

In P25 score method, the correction factors f_i including various structural irregularities, such as torsion, vertical discontinuity, slab discontinuity, staggered floors and structural details, materials and soil properties etc. are used by taking into account 14 different parameters which are assumed to affect the seismic response of a structure. Table 2.12 shows the correction factors f_i . Details of the calibration and verification of these values can be found in Gülay *et al.*, (2008).

Table 2.12. Structural correction factors (f_i).

Coefficient	Definition of Coefficient	Structural Correction Factors (f_i)		
f_1	Torsional Irregularity	High 0.90	Low 0.95	N/A 1.00
f_2	Slab Irregularity	High 0.90	Low 0.95	N/A 1.00
f_3	Vertical Irregularity	High 0.65-0.70	Low 0.90	N/A 1.00
f_4	Mass Irregularity	High 0.75	Low 0.85	N/A 1.00
f_5	Corrosion	High 0.80	Low 0.90	N/A 1.00
f_6	Heavy Facade Element	High 0.90	Low 0.95	N/A 1.00
f_7	Sub-floors (Y =Sub-floor area / Floor Area)	$Y \geq 0.25$ 0.90	$0 < Y < 0.25$ 0.95	$Y = 0$ 1.00
f_8	Staggered Floors or Partial Basement	High 0.80	Low 0.90	N/A 1.00
f_9	Concrete Quality	$f_9 = (f_c / 20)^{0.5}$ fc = Compressive Concrete Strength (MPa)		
f_{10}	Weak Column-Strong Beam	$f_{10} = [(I_x + I_y) / 2 I_b]^{0.15} \leq 1.0$		
f_{11}	Stirrup Spacing	$f_{11} = 0.60 \leq (10/s)^{0.25} \leq 1.0$		
f_{12}	Soil Type	alluvium 0.90	firm soil 0.95	rock or stiff soil 1.00
f_{13}	Foundation Type	pad-footing 0.90	strip foun. 0.95	other type 1.00
f_{14}	Foundation Depth	<1 m 0.90	1 - 4 m 0.95	> 4 m 1.00

The second score ($P2$) is related to short column induced mechanism, which is decided according to the short column length and the level of occurrence of short columns at the critical storey. There are 16 different scores for $P2$, varying between 15 and 70 according to the free column height/storey height ratios and the ratio of the number of short columns to the total number of columns in a critical storey. Table 2.13 shows the different scores for $P2$.

Table 2.13. P2 scores.

Ratio of the number of short columns to the total number of columns in a critical storey	Free column height / Storey height ratios			
	(0.75-1.00)h	(0.40-0.75)h	(0.15-0.40)h	(0.00-0.15)h
< 5%	70	64	57	50
5 % - 15 %	60	50	44	37
15 % - 30 %	50	40	30	24
> 30 %	40	30	20	10

The third score (P_3) is related to soft-and/or weak storey mechanism determined by the difference in successive storey heights and strengths (Bal *et al.*, 2008). P25 score method uses an equation for P3 score. The soft storey score (P_3) is calculated from Eq. 2.60.

$$P_3 = 100 \left[r_a r_r (h_{i+1} / h_i)^3 \right]^{0.60} \leq 100 \quad (2.60)$$

where,

h_i and h_{i+1} are the heights of the critical storey i and the upper storey $i+1$.

r_a and r_r are the cross-sectional area and flexural rigidity parameters, respectively (Eq.2.61 and 2.62).

$$r_a = (\sum A_{ef})_i / (\sum A_{ef})_{i+1} \leq 1.0 \quad (2.61)$$

$$r_r = (\sum I_{ef})_i / (\sum I_{ef})_{i+1} \leq 1.0 \quad (2.62)$$

The fourth score (P_4) signifies overhang and frame discontinuity score. P_4 includes possible weaknesses that occur due to over-hung upper floors and the lack of perimeter beams resulting in frame discontinuity (Gülay *et al.*, 2008). P_4 score is defined based on the existence of the perimeter beams and on the onset of the overhang (i.e. at one side of building, at two sides or more etc.) varying between 50 and 90 (Gülay *et al.*, 2008). Table 2.14 illustrates the variation of P_4 scores.

Table 2.14. P4 scores.

Existence of the perimeter beams	Onset of the overhang		
	at one side of the building	at two sides	more than two sides
Existing	90	80	70
N/A	70	60	50

The fifth score is pounding score (P5). It is based on the pounding effect induced by the adjacent structures (Gülay *et al.*, 2008). The suggested pounding scores P5 are change from 25 to 75 for possible combinations of 6 different types of pounding schemes, like concentric or eccentric pounding, with having same or different storey level, including also the difference at the building heights and masses (Gülay *et al.*, 2008). Table 2.15 shows the variation of P5 scores.

Table 2.15. P5 scores.

Position of Buildings	Pounding Type			
	Concentric		Eccentric	
	Same Storey Level	Different Storey Level	Same Storey Level	Different Storey Level
At the corner	60	30	40	25
One of the building is more rigid and heavy	55	30	35	25
Different building heights	75	40	50	35
Same building heights	75	50	65	45
The gap between the subject building and the adjacent building must be less than 1% of the total height of the shorter building in order to use the pounding scoring given in P25 Method; otherwise the pounding score P5=100 will be assumed				

In P25 method, P6 and P7 scores are related to soil failure (Gülay *et al.*, 2008). These are liquefaction and other types of soil failures. The liquefaction score, P6, varies between 10 and 60, depending on the level of ground water table (GWT) and the calculated liquefaction potential classified as “low”, “medium” or “high”. P7 is soil bearing capacity failure score and it varies between 10 and 100 depending on the soil type and depth of GWT (Gülay *et al.*, 2008). P6 and P7 values are summarized in Tables 2.16 and 2.17, respectively.

Table 2.16. P6-Liquefaction failure scores.

GWT (m)	Liquefaction Potential		
	low	medium	high
> 10.0	60	45	30
2.0 - 10.0	45	33	20
< 2.0	30	20	10

Table 2.17. P7-Soil bearing capacity failure scores.

Local Soil Type	GWT (m)	P7 Score
Z1 - Z2	-	100
Z3	< 5	25
	> 5	35
Z4	< 5	10
	> 5	20

In the calculation of the final score according to the P25 scoring method, correction factors are used (Bal *et al.*, 2008). Correction factor “ α ” can be calculated by using Eq. 2.63.

$$\alpha = (1 / I)(1.4 - A_0) [1 / (0.4n + 0.88)] \times t \quad (2.63)$$

where,

- A_0 : Effective ground acceleration (varies between 0.1g and 0.4 g for four different earthquake zones in Turkish Seismic Zoning Map (1996))
- n : The live load participation factor as defined in Turkish Seismic Code (TSC-2007) (0.3 for residential buildings, 0.6 for school, dormitory sport facility etc. and 0.80 for depot, warehouses)
- t : Correction factor for topographic effects. It is assumed as 0.7 if the building is on top of a hill, while 0.85 is used if the building is on a steep slope and $t = 1.0$ for buildings on relatively flat regions (Bal *et al.*, 2008)
- I : Building importance factor as defined in Turkish Seismic Code (2007). $I = 1.5$ for buildings to be utilized after the earthquake and buildings containing hazardous materials. $I = 1.4$ for intensively and long term occupied building, $I = 1.2$ for intensively but short-term occupied buildings and $I = 1.0$ for residential and office buildings

Table 2.18. Values of correction factor t for topographic effect.

Topographic condition	t
Building on a relatively flat region	1.0
Building on top of a hill	0.7
Building on a steep slope	0.8

Another correction factor “ β ” is calculated by considering the weighted interaction among seven score parameters from P1 to P7. The minimum of these seven scores is considered as P_{min} and the weighting factor is assumed $w = 4$ for this minimum score (Gülay *et al.*, 2008). Suggested weighting factors for other scores are shown in Table 2.19. The weighted score P_w can be calculated by using Eq. 2.64.

$$P_w = \sum (w_i P_i) / \sum w_i \quad (2.64)$$

Table 2.19. The suggested weighting factors for scores.

Score type	P1	P2	P3	P4	P5	P6	P7	P_{min}
weighting factor (w)	4	1	3	2	1	3	2	4

The interaction correction factor, β represents the degree of interaction and the possibility of triggering an interactive failure. It is also recommended based on the value of the weighted score (Gülay *et al.*, 2008). The interaction correction factor values are summarized in Fig. 2.7.

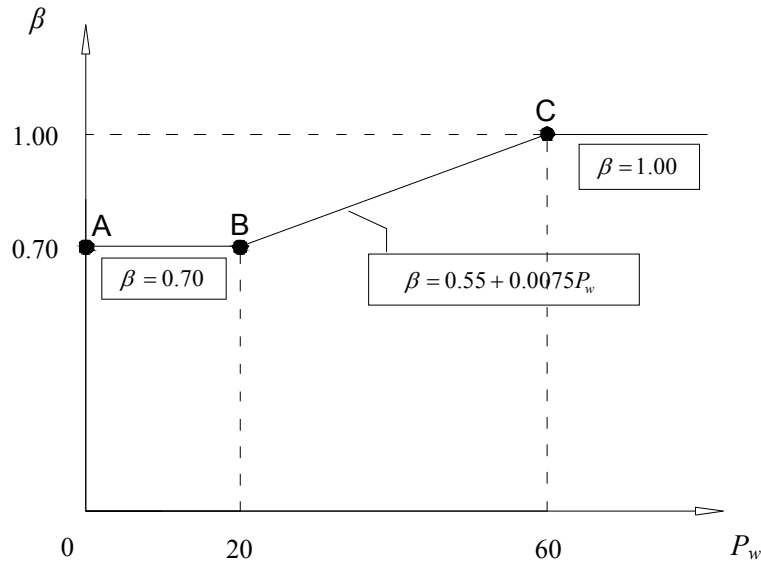


Figure 2.7. Values of the interaction correction factor

The final score P , is then calculated by using Eq. 2.65.

$$P = \alpha \beta P_{\min} \quad (2.65)$$

where, $P_{\min}$ is the smallest score among $P1$ to $P7$.

The final performance scores of buildings are graded between 0 and 100, varying between the worst to the best. Recent studies on several hundreds of buildings show that the high risk band lies between the scores of 15 and 40; in this regard, the performance score of 30 can then be considered as the safety limit (Bal *et al.*, 2008).

CHAPTER 3

SEISMIC PERFORMANCE ASSESSMENT AND RETROFITTING METHODS FOR EXISTING BUILDINGS IN THE 2007 TURKISH SEISMIC CODE

3.1. Introduction

Turkish Seismic Code (TSC-2007) recommends two performance-based evaluation methodologies to be used for seismic performance assessment of existing buildings. These procedures are based on linear and non-linear analyses of the structure to be assessed. According to Sucuoğlu (2006), in linear procedures, performance expectance criteria depend on the demand to capacity ratios at critical sections. However, in non-linear procedures, performance acceptance criteria depend on material strains. The application procedures of the linear and non-linear assessment methods can be categorized as follows (Celep, 2007).

Linear elastic analysis (force based analysis)

- Equivalent seismic load procedure
- Mode superposition procedure

Nonlinear analysis (deformation/displacement based analysis)

- Incremental equivalent seismic load procedure (single mode pushover analysis)
- Incremental modal superposition procedure (multimode pushover analysis)
- Incremental dynamic procedure (non-linear time domain analysis)

All procedures are static analysis procedures except the last one. In all of these methods, structural members are classified as ductile and according to the damage regions of their end sections. Damage region of a ductile member is governed by the region that presents the severest damage at its end section. The damage section is defined as a region that lies between certain specific inelastic deformation limits. The term damage defines controlled inelastic deformation, but not a full failure (Celep, 2007). Unlike ductile members, brittle structural members found beyond the minimum damage region are not accepted at any performance level and it is essential that a strengthening intervention should be carried out for such members (Celep, 2007).

3.2. Linear Assessment Procedures

Linear elastic analysis is a strength (force) based performance analysis. The linear analysis has two main application procedures. The first one is called equivalent seismic load procedure. It is limited to 25 m total height from ground level and there should not be torsional irregularity in a building. This method is based on only the first mode of the structural system and adopts its total mass. For buildings with more than two storeys, 85 % of the total mass is taken into account when the base shear force is being calculated.

Mode superposition procedure can be applied to all buildings without any restrictions. This procedure considers more than one mode and adopts the effective modal mass as well as the dominant mode shape in the assessment of total seismic force.

Okur (2007) summarized Turkish Seismic Code (TSC-2007) linear elastic analysis procedures for existing buildings. This summary is shown in Fig. 3.1.

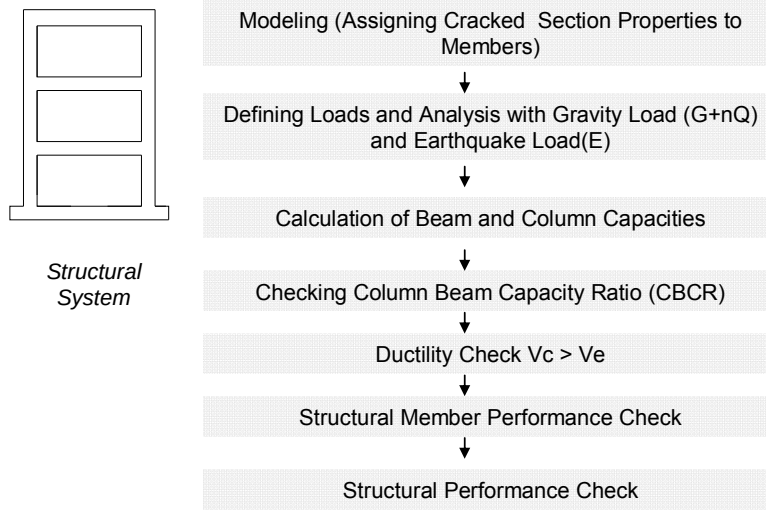


Fig. 3.1. Linear elastic assessment procedures, according to TSC-2007

In linear elastic analysis the first step is modelling. Structural members are modelled by existing building drawings or field surveys which are defined in Turkish Seismic Code (2007), section 7.2.5 with respect to building knowledge levels. Members are assumed to have cracked cross-sections; hence their rigidities should be reduced according to the gravity load level, cross sectional area and strength of the concrete.

Turkish Seismic Code (TSC-2007) requires that checked stiffness of the members should satisfy the requirements stated by Eq. 3.1 for beams and Eq. 3.2 for columns and shear walls.

$$(EI)_c = 0.4(EI)_0 \quad (3.1)$$

$$N_d / (A_c f_{cm}) \leq 0.1 \quad \longrightarrow \quad (EI)_c = 0.4(EI)_0 \quad (3.2a)$$

$$N_d / (A_c f_{cm}) \geq 0.4 \quad \longrightarrow \quad (EI)_c = 0.8(EI)_0 \quad (3.2b)$$

where,

$(EI)_c$: Stiffness of cracked section

$(EI)_0$: Stiffness of uncracked section

N_d : Axial load computed from gravity loads ($G + nQ$)

A_c : Cross sectional area of members

f_{cm} : Concrete strength

For $N_d/(Af_{cm})$ values between 0.1 and 0.2 interpolation can be used. Having modelled and assigned cracked section properties to the members of the structural system, the earthquake load to be applied is calculated. The most common procedure for calculation of earthquake load is equivalent static load method which is defined in the second chapter of the current Turkish Seismic Code. In this method, as mentioned previously, the first mode is the dominant response mode of the structure and according to first mode; the base shear force can be calculated by using Eq. 3.3 and Eq. 3.4.

$$V_t = \lambda \frac{WA(T_1)}{R_a(T_1)} \quad (3.3)$$

$$A(T) = A_0 I S(T) \quad (3.4)$$

where,

- A_0 : Effective ground acceleration coefficient
- I : Building importance factor
- $R_a(T_1)$: Seismic load reduction factor
- $A(T_1)$: Spectral acceleration coefficient
- $S(T)$: Spectrum coefficient (It will be determined depending on local site conditions and the building natural period)
- T_1 : First natural vibration period of building
- W : Total weight of building
- λ : Equivalent earthquake load derogation factor (it is taken as 1.0 in one and two storey buildings and 0.85 in others)

Turkish Seismic Code (TSC-2007) states that, in conducting the linear elastic analysis for an existing building it is important that building importance factor (I) and the earthquake load reduction factor are to be assumed as 1. These assumptions indicate that the estimated earthquake load is applied to the building without any reduction.

Earthquake forces are distributed to the floors in proportion to floor heights and floor masses by using Eq. 3.5 and Eq. 3.6.

$$\Delta F_N = 0.0075 N V_t \quad (3.5)$$

$$F_i = (V_t - \Delta F_N) \frac{w_i H_i}{\sum_{j=1}^N w_j H_j} \quad (3.6)$$

where,

- ΔF_N : Additional equivalent seismic load acting on the N'th storey (top) of building
- N : Total number of storeys of building from the foundation level (In buildings with rigid peripheral basement walls, total number of storeys from the ground floor level)
- V_t : Total equivalent seismic load acting on the building (base shear) in the earthquake direction considered
- F_i : Design seismic load acting at i^{th} storey
- w_i : i^{th} floor weight
- H_i : Height of i^{th} storey of building measured from the top foundation level. (In buildings with rigid peripheral basement walls height of i^{th} storey of building measured from the top of ground level)

After calculating the gravity and earthquake forces, the model can be analysed with respect to these forces by applying them to the building separately from each direction. Demands are recorded to be used for calculating member capacities. In Turkish Seismic Code (TSC-2007), the seismic moment capacity of a structural member is defined as the residual moment capacity, which is the remaining amount of bending moment capacity after the exclusion of the moment arising from gravity loads. Based on this definition, member capacity can be calculated through the following equation.

$$M_c = M_p - M_d \quad (3.7)$$

where:

- M_c : Residual moment capacity
- M_p : Positive or negative bending moment capacity
- M_d : Positive or negative moment computed from gravity load analysis

For beams, the ultimate capacity of the member is firstly calculated based on section analyses. After this step, the bending moment demand computed from the gravity loads is subtracted so as to determine the residual moment capacity.

For columns, first of all, the moment interaction diagram is plotted. Then, moments and axial loads $[N_D, M_D$ and $N_E, M_E]$ are obtained from vertical and earthquake load analyses, respectively. Later, (N_D, M_D) and $(N_D + N_E, M_D + M_E)$ points are plotted on the moment interaction diagram.

The straight line which can be plotted between (N_D, M_D) and (N_E, M_E) points, and interaction diagram boundary provide the capacity of the column (N_K, M_K) . This methodology is illustrated in Fig. 3.2.

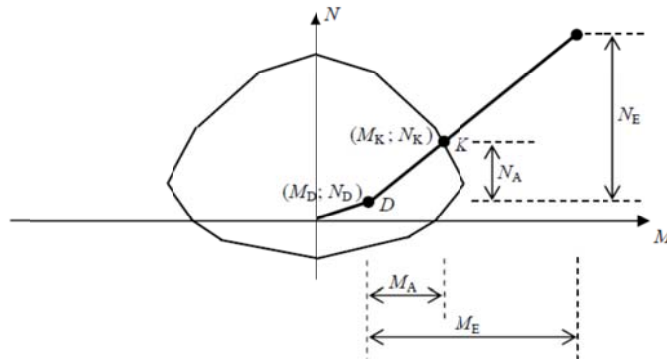


Fig. 3.2. Calculation of column capacity (TSC, 2007)

where,

- M_D : Moment resulting from vertical loads
- M_E : Moment due to earthquake loads
- M_K : Moment capacity calculated in accordance with existing material strength

Axial load capacities of vertical members are constrained by an upper limit in the code.

Ductility control of the structure constitutes a step in the linear elastic procedure. Ductility is a behaviour which allows a material to go beyond large plastic deformations without a significant change in strength. Ductility is checked by comparing the shear force demand with the shear force capacity of a structural member (Okur, 2007).

For beams, shear force demand can be estimated by Eq. 3.8.

$$V_e = V_{dy} \mp (M_{pi} + M_{pj}) / l_n \quad (3.8)$$

Calculation according to Eq. 3.8 is detailed as shown in Fig. 3.3.

where;

- V_e : Shear force carried by beam
- V_{dy} : Shear force calculated by beam analysis
- M_{pi} : Ultimate moment capacity of a beam at the “i” end;
unless a detailed analysis is conducted it can be assumed as $(1.4M_{ri})$
- M_{pj} : Ultimate moment capacity of a beam at the “j” end;
unless a detailed analysis is conducted it can be assumed as $(1.4M_{rj})$
- M_{ri} : Bending moment capacity of a beam at the “i” end
- M_{rj} : Bending moment capacity of a beam at the “j” end
- l_n : Net length of a beam

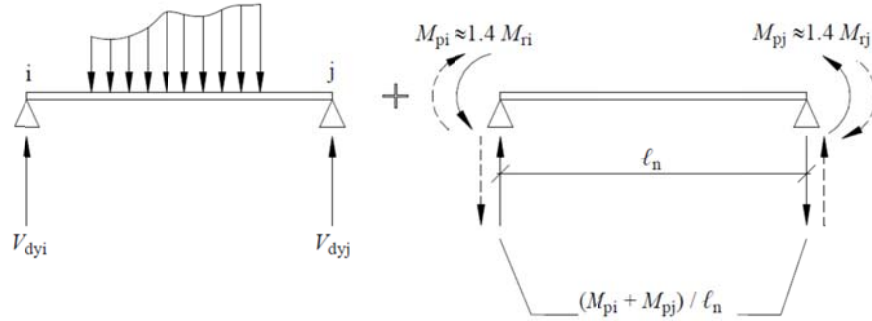


Fig. 3.3. Calculation of shear force carried by a beam (TSC, 2007)

For columns, shear demand calculation begins with the estimation of upper and lower end of a column's ultimate moment capacities. The total shear demand can be estimated based on these moments as follows:

$$V_e = (M_a + M_u) / l_n \quad (3.9)$$

where;

- M_a : Lower end moment capacity of a column
- M_u : Upper end moment capacity of a column
- l_n : Net length of a column

Column capacity, which is calculated as illustrated in Fig. 3.4 should be controlled by applying column beam capacity ratio (CBCR) to the column-beam joint. CBCR is a ratio that checks the weak beam state of the strong column. In TSC-2007, the total moment capacity of columns should be at least 20 % more than the moment capacity of beams at the given joint.

$$(M_{ra} + M_{ru}) \geq 1.2(M_{ri} + M_{rj}) \quad (3.10)$$

where;

M_{ra} : Bending moment capacity of a column at lower end

M_{ru} : Bending moment capacity of a column at upper end

M_{ri} : Bending moment capacity of a beam at the “i” end

M_{rj} : Bending moment capacity of a beam at the “j” end

CBCR can be calculated by using Eq. 3.11.

$$CBCR = \frac{M_{ri} + M_{rj}}{M_{ra} + M_{ru}} \quad (3.11)$$

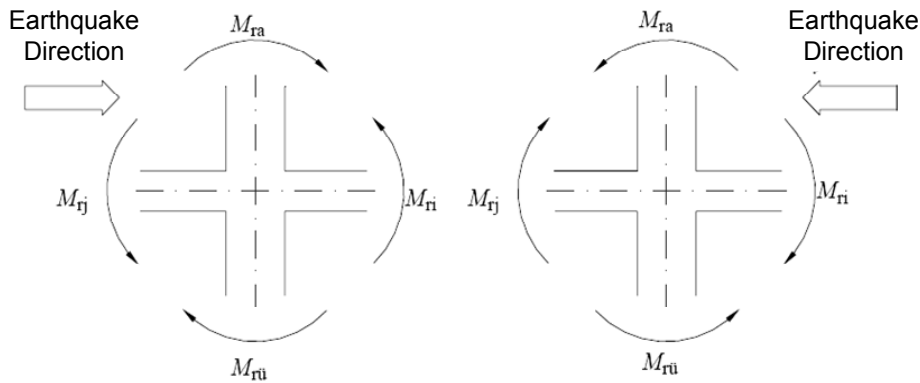


Fig. 3.4. Moment capacities of beams and columns at a joint (TSC, 2007)

By using the calculated CBCR values, end moments of the beam are refined. In case the CBCR value at any joint is less than 1, those moments that are calculated by multiplying the capacity moments with CBCR and reduced accordingly are used as refined end moments at the ends of the beams that surround that joint. In case the CBCR moment is more than 1, the capacities are kept as the refined end moments.

After calculating shear demands of the members, those demands are compared with shear capacities. Shear capacity of a concrete beam and column are calculated by using TS 500 (2000) formulation. They are Eqs. 3.12, 3.13 and 3.14, given below:

$$V_r = 0.8V_{cr} + V_w \quad (3.12)$$

$$V_w = \frac{A_{sw}}{s} f_{yw} d \quad (3.13)$$

$$V_{cr} = 0.65 f_{ctk} + k.b_w.d(1 + \gamma \frac{N_d}{A_c}) \quad (3.14)$$

where,

- V_r : Shear capacity of a member (column or beam)
- V_w : Contribution of stirrups to shear capacity
- A_{sw} : Total reinforcement area resisting shear force
- A_c : Cross sectional area of a member
- f_{yw} : Yield strength of shear reinforcement
- f_{ctk} : Tensile strength of concrete
- N_d : Axial load in a member
- b_w : Width of cross section of a member
- d : Depth of cross section
- s : Stirrup spacing
- γ : 0.07 if member is under compression, -0.3 if it is under tension and 0 if $f_{ctk} < 0.5$ (TS 500, 2000)

For shear walls, shear demand can be calculated by using the following equation:

$$V_e = \beta_v \frac{(M_p)_t}{(M_d)_t} V_d \quad (3.15)$$

where;

- V_e : Shear demand of shear wall
- V_d : Shear force calculated from gravity and earthquake load analyses
- $(M_p)_t$: Ultimate moment capacity of shear wall
- $(M_d)_t$: Moment calculated from gravity and earthquake load analyses
- β_v : Dynamic magnification coefficient

Shear wall capacities can be calculated by using Eq. 3.16.

$$V_r = A_{ch} (0.65 f_{ctd} + \rho_{sh} f_{ywd}) \quad (3.16)$$

where;

- V_r : Shear wall capacity of a shear wall
- A_{ch} : Total cross-sectional area of a shear wall
- f_{ctd} : Tensile strength of concrete
- ρ_{sh} : Steel ratio of shear wall
- f_{ywd} : Yield strength of steel

A comparison of the shear demand (V_e) and capacity of structural members presents the expected behaviour mode of the member, as stated below:

If $V_r > V_e$ structural member is ductile

If $V_r < V_e$ structural member is brittle

Performance of Members

Expected performance of the members in an earthquake can be estimated by comparing their demands with their capacities since the TSC-2007 tolerates controlled inelastic deformations in the structural system. Taking this information into account, a nonlinear analysis should be conducted. Regarding the linear elasticity of an existing building, the non-linear behaviour of the structure is taken into account by obtaining an “expected seismic load reduction factor” (r), for each structural member cross-section.

For beams,

$$r = \frac{M_E}{M_P - M_D} = \frac{\text{seismic demand}}{\text{remaining capacity}} \quad (3.17)$$

where,

M_E : Elastic seismic demand
 M_D : Design loading moment capacity of the section
 M_P : Bending moment capacity of the section

For columns and shear walls,

$$r = \frac{M_E}{M_K - M_D} \quad (3.18)$$

The ratios given by Eqs. 3.17 and 3.18 are checked against the limits given in TSC-2007 to determine the expected damage states of the members. As shown in Fig. 3.5 three limits can be defined for structural members in TSC-2007. Also damage states are given on the same figure.

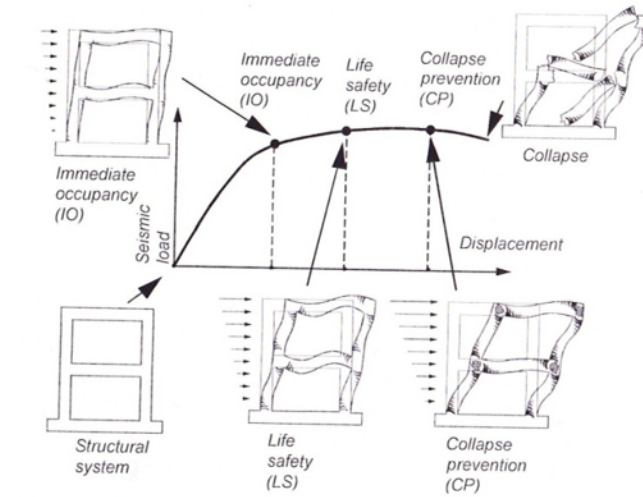


Fig 3.5. TSC-2007 seismic assessment limits and damage states (Celep, 2010)

The performance based limit “r” values for beams; column and shear walls that are proposed in TSC-2007 are shown together in Table 3.1.

Table 3.1. r values for beams, columns and shear walls.

 BEAM	Ductile Beams			Damage Limits		
	$\frac{\rho - \rho'}{\rho_b}$	Confinement	$\frac{V_e}{b_w d f_{cm}}$	Immediate Occupancy (IO)	Life Safety (LS)	Collapse Prevention (CP)
	≤ 0.0	Yes	≤ 0.65	3.0	7.0	10.0
			≥ 1.30	2.5	5.0	8.0
		No	≤ 0.65	2.5	4.0	6.0
			≥ 1.30	2.0	3.0	5.0
	≥ 0.5	Yes	≤ 0.65	3.0	5.0	7.0
			≥ 1.30	2.5	4.0	5.0
		No	≤ 0.65	2.0	3.0	5.0
			≥ 1.30	1.5	2.5	4.0
Brittle Structural Element			1.0	1.0	1.0	
 COLUMN	Ductile Columns			Damage Limits		
	$\frac{N_k}{A_c f_{cm}}$	Confinement	$\frac{V_e}{b_w d f_{cm}}$	Immediate Occupancy (IO)	Life Safety (LS)	Collapse Prevention (CP)
	≤ 0.1	Yes	≤ 0.65	3.0	6.0	8.0
			≥ 1.30	2.5	5.0	6.0
		No	≤ 0.65	2.0	3.5	5.0
			≥ 1.30	1.5	2.5	3.5
	≥ 0.4 and ≤ 0.7	Yes	≤ 0.65	2.0	4.0	6.0
			≥ 1.30	1.5	2.5	3.5
		No	≤ 0.65	1.5	2.0	3.0
			≥ 1.30	1.0	1.5	2.0
	≥ 0.7	-	-	1.0	1.0	1.0
Brittle Columns			1.0	1.0	1.0	
 SHEAR WALL	Ductile Shear Walls			Damage Limits		
	Confinement			Immediate Occupancy (IO)	Life Safety (LS)	Collapse Prevention (CP)
	Yes			3.0	6.0	8.0
	No			2.0	4.0	6.0

After estimating the limit value for each member by using Table 3.1, r/r_{limit} values are calculated for each member. For different cases, relevant acceptance criteria are shown as follows.

$r/r_{limit} < 1$ member is acceptable for the desired performance level.

$r/r_{limit} > 1$ member is not acceptable for the desired performance level.

Each structural member is checked for its both ends. The worst case, highest r/r_{limit} ratio, is assumed as the r/r_{limit} of that member.

3.3 Non-Linear Assessment Procedures

Another assessment procedure to estimate performance level of an existing structure as defined in Turkish Seismic Code is the non-linear assessment method. In this method deformation

capacities of each member are calculated and a nonlinear analysis is performed after this plastic deformation is monitored. Each member is assessed according to its deformation, compared with the relevant limits and finally the global performance of a structure is obtained (Okur, 2007).

As mentioned before, in Seismic Code (TSC, 2007) three different non-linear methods are described. Incremental equivalent seismic load method (single pushover procedure) applies to the buildings whose number of storeys above the basement does not exceed 8 and which does not have torsional irregularity. Briefly, in this method, non-linear pushover analysis is conducted under the effect of equivalent seismic loads which are increased step by step up to the earthquake demand limit (performance point). In the analyses, in each of pushover step between two sequential plastic hinge deformations, displacement and plastic deformation, which have occurred on reinforced concrete structural system, internal force increments along with incremental values belonging to these magnitudes and maximum values corresponding to earthquake demand at the latest pushover step are calculated (Özer, 2007).

In the “*incremental modal superposition procedure*”(multimode pushover procedure) which can be applied to all buildings without exception, modal superposition procedure is applied in each of pushover step between two sequential plastic hinge formations according to “modal displacement” increased up to the earthquake demand limit (Özer, 2007).

In the analysis, which is non-linear and conducted in the time domain, equation of motion of structural system is integrated in increments, and at each time increment, displacement and plastic deformation which have occurred on the system, internal forces along with maximum values of these magnitudes which correspond to earthquake demand are calculated (Özer, 2007).

Okur (2007) summarized the non-linear elastic analysis procedure described in the Turkish Seismic Code (TSC-2007) for existing buildings. His summary is schematized as shown in Fig. 3.6.

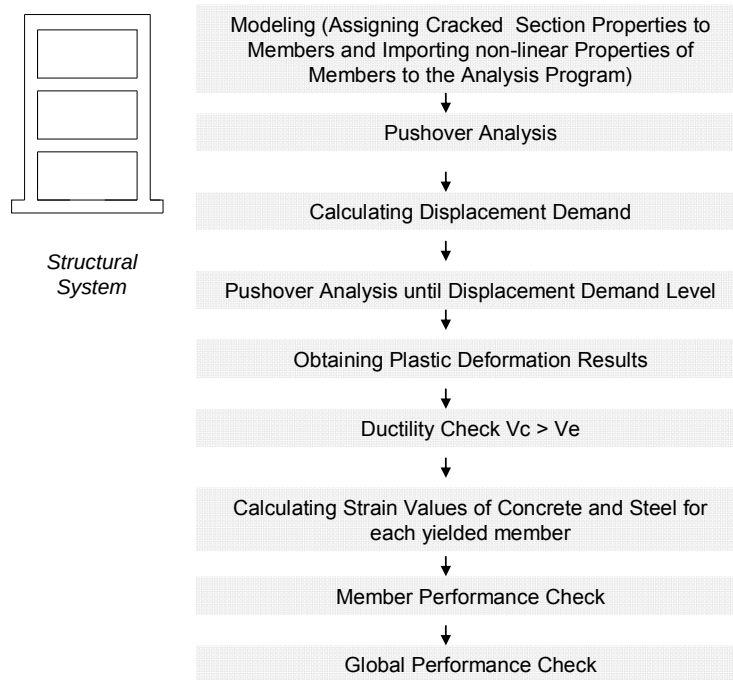


Fig. 3.6. Non-linear assessment procedure as described in TSC-2007

Modelling for non-linear assessment is almost the same as the modelling for linear assessment. Similar structural members are modelled by using existing building drawings or field surveys, and then structural members are assumed to have cracked cross-sections. Eq. 3.1 and Eq. 3.2 can be used to estimate the properties of cracked sections. Though moment interaction diagram is required for columns and shear walls, nonlinear assessment also needs moment rotation diagrams for beams, columns and shear walls. In order to obtain an idealized moment rotation diagram, firstly moment curvature diagram of a member should be obtained, and after this step, it should be bilinearized so as to estimate the yield and final points. Fig. 3.7 presents this procedure (Okur, 2007).

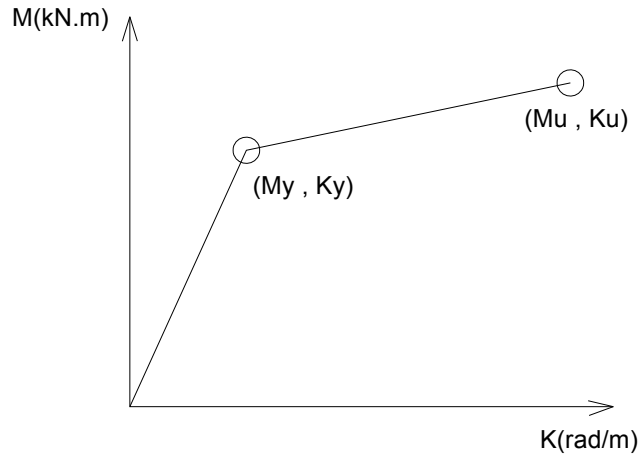


Fig. 3.7. Typical moment curvature diagram

Yield moment (M_y), yield curvature (K_y), ultimate moment (M_u) and ultimate curvature (K_u) values are taken from the graph. Yield and ultimate rotations (θ_y and θ_u) can be obtained from these parameters based on Eqs. 3.19 and 3.20, respectively.

$$\theta_y = \frac{\varphi_y l_n}{6} \quad (3.19)$$

$$\theta_u = (\varphi_u - \varphi_y) L_p + \theta_y \quad (3.20)$$

where,

- θ_y : Yield rotation
- θ_u : Ultimate rotation
- φ_y : Yield curvature
- φ_u : Ultimate curvature
- L_p : Plastic hinge length of section (it can be taken as half of the cross section depth)
- l_n : Net length of the member

The axial load in a column or a shear wall changes during the nonlinear analysis. Each axial load level corresponds to a different yield point in the interaction diagram. Therefore 3-D interaction diagram is necessary for columns and shear walls (Okur, 2007).

To illustrate an idealized 3-D moment interaction diagram Eq. 3.21, proposed by Parma *et al.* (1966), can be used:

$$\left(\frac{M_{ux}}{M_{uxo}} \right)^{\left(\frac{\log 0.5}{\log \beta} \right)} + \left(\frac{M_{uy}}{M_{uyo}} \right)^{\left(\frac{\log 0.5}{\log \beta} \right)} = 1 \quad (3.21)$$

where;

M_{uxo} : Uniaxial flexural strength about x axis

M_{uyo} : Uniaxial flexural strength about y axis

M_{ux} : Component of biaxial flexural strength on the x axis at required inclination

M_{uy} : Component of biaxial flexural strength on the y axis at required inclination

β : Parameter dictating the shape of interaction surface (it can be taken as 0.6 or 0.7)

Nonlinear static analysis consists of two steps. In the first step, gravity loads are applied to the structure and the other one is pushover application under a lateral earthquake load pattern. The structure behaves linearly until the first yield. After this, the building is pushed again to obtain more member yield. After giving way to too many plastic hinges, the building behaves as a mechanism (unstable) and the analysis comes to an end (Okur, 2007).

As shown in Fig. 3.8, after nonlinear analysis, a pushover curve is obtained which shows the relationship between the base shear and roof displacement.

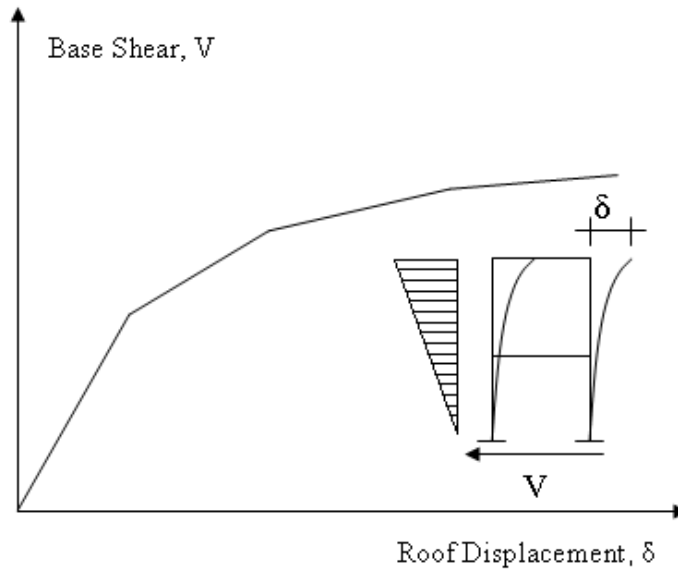


Fig. 3.8. A typical pushover curve

According to Turkish Seismic Code (2007), to calculate the displacement demand of a structure, pushover curve is converted to the modal capacity diagram by using Eqs. 3.22 and 3.23.

$$a_1^{(i)} = \frac{V_{x1}^{(i)}}{M_{x1}} \quad (3.22)$$

$$d_1^{(i)} = \frac{u_{xN1}^{(i)}}{\phi_{xN1} \Gamma_{x1}} \quad (3.23)$$

where;

- $a_1^{(i)}$: Modal acceleration at the end of i^{th} step
- $d_1^{(i)}$: Modal displacement at the end of i^{th} step
- $V_{x1}^{(i)}$: Base shear in x direction after i^{th} step
- M_{x1} : Modal mass for first mode in x direction
- $u_{xN1}^{(i)}$: First mode roof displacement in x direction at the end of i^{th} step
- ϕ_{xN1} : First mode shape amplitude of the top storey in x direction
- Γ_{x1} : Participation factor of the first mode

Spectrum diagram is also converted to the modal capacity diagram. Linear elastic spectral displacement is calculated from elastic spectral acceleration and frequency of the corresponding period.

$$S_{de} = \frac{S_{ae}}{(\omega^{(1)})^2} \quad (3.24)$$

where,

- S_{de} : Elastic spectral displacement of the corresponding period at first step of pushover analysis
- S_{ae} : Elastic spectral acceleration of the corresponding period at first step of pushover analysis
- $\omega^{(1)}$: Frequency of the corresponding period

Inelastic spectral displacement can be calculated by using Eq. 3.25.

$$S_{di} = C_R S_{de} \quad (3.25)$$

- S_{di} : Non-linear spectral displacement of the corresponding mode
- C_R : Spectral displacement ratio of the corresponding mode

In case the corresponding period (T) is equal or greater than the characteristic period of acceleration spectrum (T_B), the inelastic spectral displacement is equal to elastic spectral displacement or $C_R=1$.

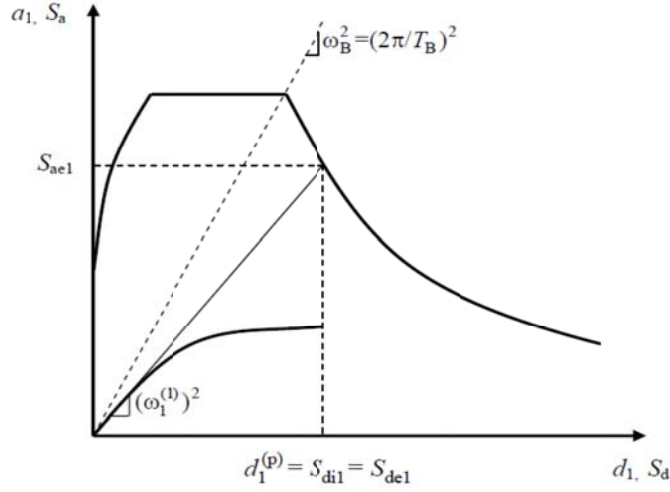


Fig. 3.9. Calculation of the displacement demand ($T \geq T_B$) (TSC, 2007)

If $T < T_B$, C_R is calculated by an iteration based on Eq. 3.26. According to the Turkish Seismic Code (2007), iteration steps can be summarized as follows:

Before starting the iteration, the modal capacity curve is bi-linearized as shown in Fig. 3.10. The slope of the first line is considered to be equal to the square of the angular frequency of the first mode $(\omega_1^{(1)})^2$.

The first step is assigning $C_R=1$, in other words by using $C_R=1$ coordinates of equivalent yield point is determined with equal areas rule. C_{R1} is defined as follows, based on a_{y1}^0 seen in Fig. 3.10.

$$C_{R1} = \frac{1 + (R_{y1} - 1) T_B / T_1^{(1)}}{R_{y1}} \geq 1 \quad (3.26)$$

In this correction R_{y1} indicates resistance reduction factor pertaining to the first mode. (Eq. 3.27).

$$R_{y1} = \frac{S_{ae1}}{a_{y1}} \quad (3.27)$$

where, R_{y1} is resistance reduction factor.

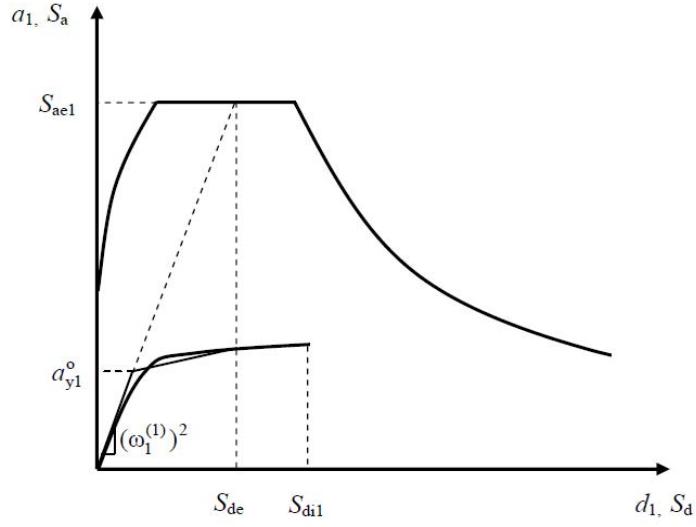


Fig. 3.10. Bi-linearization of modal capacity curve (TSC, 2007)

By using C_{R1} in Eq. 3.26, coordinates of equivalent yield point are re-determined with equal areas rule by taking S_{di1} calculated according to Eq. 3.25 as basis, as shown in Fig. 3.11 and accordingly, a_{y1} , R_{y1} and C_{R1} are calculated again. When the results obtained from two successive steps are reasonably close to each other than the iteration processes is concluded.

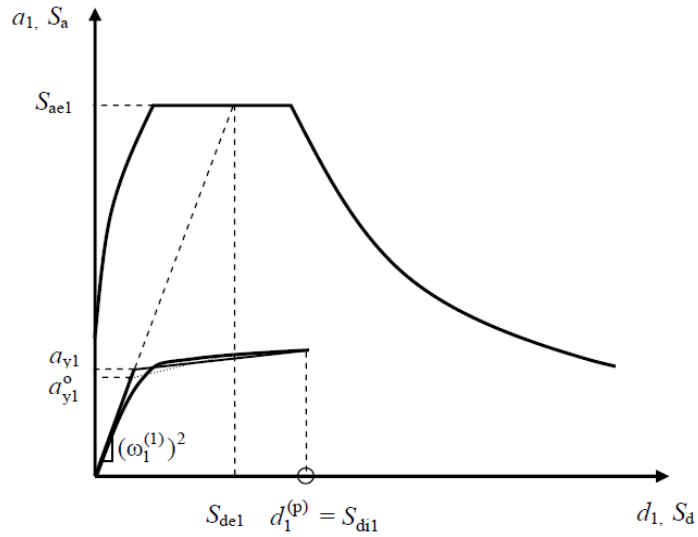


Fig. 3.11. Calculating displacement demand when ($T < T_B$) (TSC, 2007)

After the calculation of inelastic spectral displacement demand, it is converted to inelastic displacement demand as follows:

$$u_{xN1}^{(i)} = \phi_{xN1} \Gamma_{x1} d_1^{(p)} \quad (3.28)$$

where,

- $u_{xN1}^{(i)}$: Target displacement
- $d_1^{(p)}$: Inelastic spectral displacement (S_{di})
- Γ_{x1} : Participation factor of the first mode

In checking the performance level of a building, Turkish Seismic Code checks the performance limits with respect to strain. In this regard, recorded rotations for target displacement need to be converted into curvatures first, and then to strain through cross sectional analysis.

Plastic curvatures are obtained from rotations by using Eq. 3.29 and Eq. 3.30.

$$\phi_p = \frac{\theta_p}{L_p} \quad (3.29)$$

$$\phi_t = \phi_p + \phi_y \quad (3.30)$$

Through cross-sectional analyses, strains at the level of concrete and steel are computed so as to obtain the total curvature calculated by Eq. 3.30. Comparison of these values with the concrete and steel strain limits specified in the Turkish Seismic Code, the performance levels are obtained. These limits are shown in Table 3.2.

Table 3.2. Strain (ε) limits values according to the Turkish Seismic Code (TSC, 2007).

Performance level	Strain values
Immediate occupancy performance level (IO)	$(\varepsilon_{cg})_{MN} = 0.0035$ $(\varepsilon_s)_{MN} = 0.01$ $(\varepsilon_s)_{MN}$: <i>outer most fiber strain of concrete</i>
Life safety performance level (LS)	$(\varepsilon_{cg})_{GV} = 0.0035 + 0.01(\rho_s / \rho_{sm}) \leq 0.0135$ $(\varepsilon_s)_{GV} = 0.04$ where; $(\varepsilon_{cg})_{GV}$: <i>concrete cover strain</i> $(\varepsilon_s)_{GV}$: <i>steel strain</i> ρ_s : <i>volumetric ratio of transverse reinforcement</i> ρ_{sm} : <i>minimum design volumetric ratio of transverse reinforcement</i>
Collapse prevention Performance level (CP)	$(\varepsilon_{cg})_{GC} = 0.004 + 0.004(\rho_s / \rho_{sm}) \leq 0.018$ $(\varepsilon_s)_{GC} = 0.06$

$\varepsilon / \varepsilon_{limit}$ is calculated for each member for the assessment.

If $\varepsilon / \varepsilon_{limit} < 1$ member is acceptable for the target performance level.

If $\varepsilon / \varepsilon_{limit} > 1$ member is not acceptable for the target performance level.

Each limit is checked for its two ends. The worst of two $\varepsilon / \varepsilon_{limit}$ ratios is assumed as the $\varepsilon / \varepsilon_{limit}$ of that structural member.

Global Performance Check of a Building

In the previous sections, both linear and non-linear assessment procedures are explained for structural member performance. In this section global performance check of a building is to be explained.

Structural performance level consists of the combination of performance levels of structural reinforced concrete (RC) members. In the Turkish Seismic Code (TSC, 2007), there are four performance levels, namely: immediate occupancy (IO), life safety (LS), collapse prevention (CP) and collapse (C) levels.

Immediate Occupancy (IO) Performance Level

At any storey, in the direction considered at most 10 % of the beams are allowed to go beyond the immediate occupancy limit and all other members should be below the immediate occupancy limit.

Life Safety (LS) Performance Level

a) At any storey, in the considered direction, except secondary (which are not in the considered direction) beams, at most 30 % of the beams are allowed to go beyond “life safety performance limit” (TSC, 2007).

b) At any storey, column in collapse prevention level should carry at most 20 % of the total storey shear. At the top storey, column in collapse prevention level may carry 40 % of the total storey shear (TSC, 2007).

c) All other members should be in immediate occupancy level or life safety level. However, at any storey, columns that exceed immediate occupancy limit from top and bottom ends together should carry at most 30 % of total storey shear (TSC, 2007).

Collapse Prevention (CP) Performance Level

At any storey, in the considered direction, except secondary (which are not in considered direction) beams, at most 30 % of the beams are allowed to go beyond collapse prevention limit (TSC, 2007).

All other members should be in immediate occupancy level, life safety level or collapse prevention level. However at any storey, columns that exceed immediate occupancy limit from top and bottom ends together should carry at most 30 % of total storey shear (TSC, 2007).

Collapse (C) Performance Level

If the building does not satisfy the collapse prevention performance level, it is considered to be in the collapse level. Occupancy should be avoided and the decision concerning the retrofitting or demolishing the building depends on the feasibility of retrofitting (TSC, 2007).

Structural performance level foreseen for a building under certain earthquake effect is defined as “performance target”. According to Turkish Seismic Code (TSC, 2007), buildings are assessed for different levels of earthquake forces. Target performance levels can be defined according to type and usage of building. In addition to this, different performance targets may be foreseen for a building under different earthquake intensities. This is called multilevel performance target (TSC, 2007).

The Code defines three levels of earthquake exceedance probabilities of 50, 10 and 2 % in 50 years, which are used to define multiplication factors for the spectrum. (0.5 for 50 %, 1.0 for 10 % and 1.5 for 2% exceeding probabilities). Table 3.3 shows the required performance levels for different building types and usages (TSC, 2007).

Table 3.3. Target performance levels for buildings under different earthquake intensities (TSC, 2007).

Type of Building Use	Probability of Exceeding		
	50 % in 50 years	10 % in 50 years	5 % in 50 years
Buildings that should be used after earthquakes (Hospitals, health facilities, fire stations, communication and energy facilities, transportation stations, provincial or district administrative buildings, disaster management centers, etc.)		Immediate Occupancy (IO)	Life Safety (LS)
Buildings with long duration occupancy (Schools, dormitories, pensions, military buildings, prisons, museums, etc.)		Immediate Occupancy (IO)	Life Safety (LS)
Buildings with short duration occupancy (Cinemas, theatres, concert halls, culture centers, sports facilities, etc.)	Immediate Occupancy (IO)	Life Safety (LS)	
Buildings containing hazardous materials (Buildings containing toxic, flammable and explosive materials and buildings in which the mentioned materials are stored, etc.)		Life Safety (LS)	Collapse Prevention (CP)
Other Buildings (Houses, offices, hotels, industrial buildings, etc.)		Life Safety (LS)	

In addition to the assessment based on member damage levels, storey displacements should also be checked. Storey displacement limits according to Turkish Seismic Code are displayed in Table 3.4 for each acceptable performance level.

Table 3.4. Storey displacement limits (TSC, 2007).

Storey displacement limits δ_{ji} / h_{ji}	Performance level		
	<i>IO</i>	<i>LS</i>	<i>CP</i>
	0.01	0.03	0.04

In Table 3.4:

δ_{ji} : Displacement between upper and lower ends of j^{th} column at i^{th} storey
 h_{ji} : Height of that column

3.4 Retrofitting of Buildings

3.4.1 Introduction

Retrofitting of buildings can be described as a body of procedures such as correction of seismic weaknesses, adding new members for the purpose of increasing seismic resistance, reducing mass, improving behavior of existing members under earthquake excitation and providing continuity in force transmission (Özer, 2007).

The first stage for retrofitting of existing buildings, as specified in the Seismic Code is to conduct a pre-design of reinforced concrete and steel structural members which are to be added to the building for retrofitting in compliance with the principles stated in the Code. The second stage is the performance analyses of construction system which has been retrofitted with the design made on the first stage are conducted per performance criteria set forth under Chapter 7 of the Turkish Seismic Code just as the way it is conducted during determination of earthquake performance of existing buildings. At the end of these analyses, earthquake performance of retrofitted structural system is determined, and this determined performance is then compared with target performance explained in the Seismic Code. The performance of retrofitted buildings can be evaluated by both linear and non-linear methods (Özer, 2007).

In Fig. 3.12, a retrofitting procedure based on the linear method is illustrated. As can be seen in the figure, demand/capacity ratios between earthquake effects calculated by using elastic acceleration spectrum and the capacity values which refer to elastic excess capacity of the structural system decrease with the retrofitting procedure and thereby desired capacity level can be obtained (Özer, 2007).

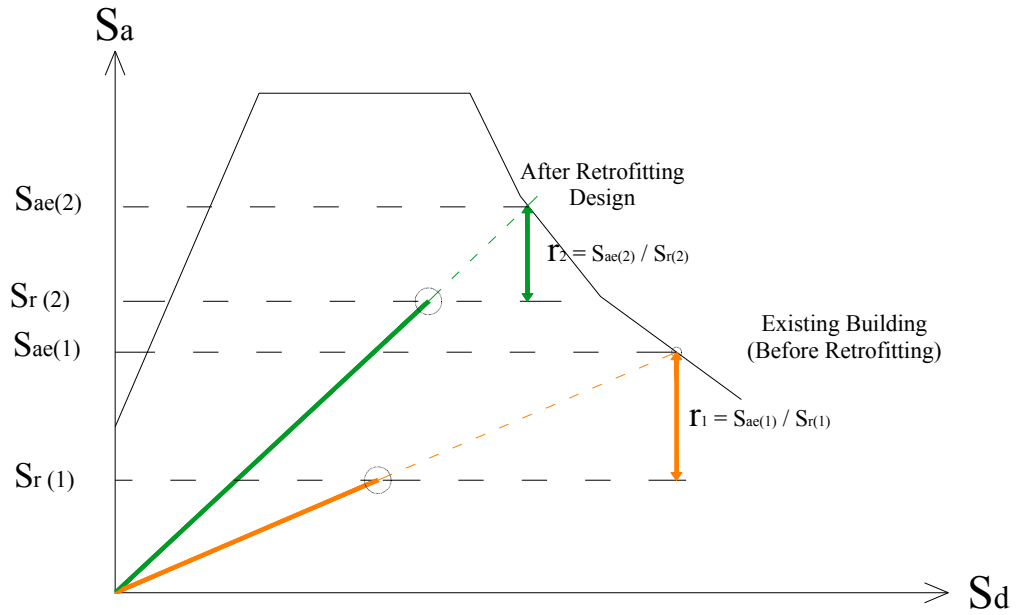


Fig. 3.12. Retrofitting procedure based on the linear method (Özer, 2007)

In Fig. 3.13, a retrofitting procedure based on the non-linear method is illustrated. In this figure, response spectrum whose coordinates are spectral displacement and spectral acceleration, and the modal capacity diagram whose coordinates belonging to the construction system analyzed are modal displacement and modal pseudo acceleration are illustrated. As can be seen in this figure, plastic displacement demand of the system decreases at the end of the retrofitting procedure and depending on this, its earthquake performance level increases (Özer, 2007).

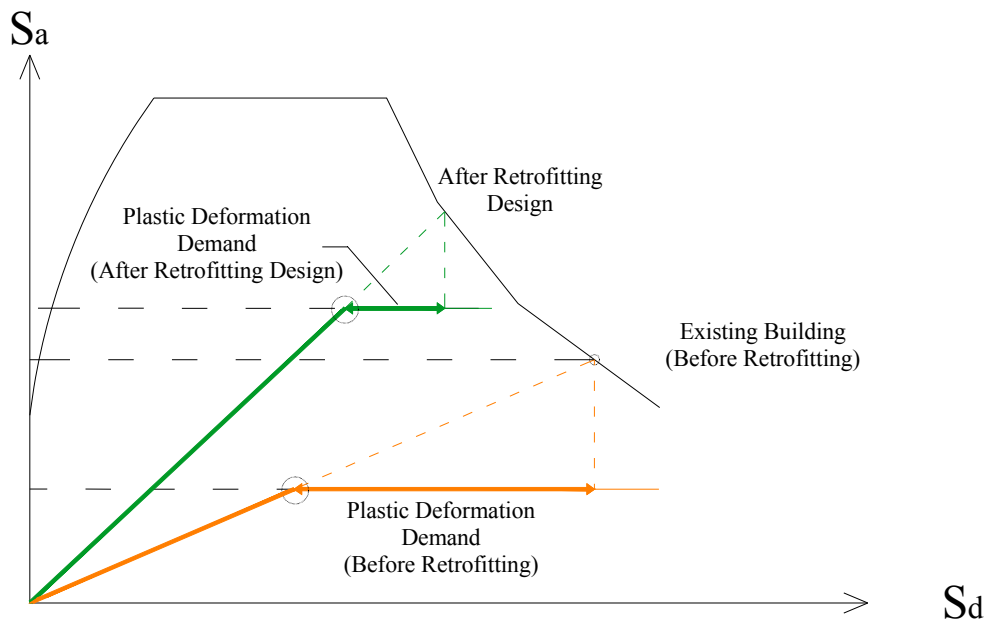


Fig. 3.13. Retrofitting procedure based on the non-linear method (Özer, 2007)

3.4.2 Types of Retrofitting

According to Turkish Seismic Code, retrofitting practices are examined under two levels: namely, based on a member and based on the whole building (system) levels.

Retrofitting practices at the member level comprise practices for increasing capacities of members which support earthquake loads such as columns, beams and shear walls of the building and increase the overall seismic performance of a structure (Özer, 2007). The purpose of these practices is to correct member inadequacies of the building instead of general strength and rigidity features (TSC, 2007).

Retrofitting methods at member level are stated below.

- Jacketing of columns
- Increasing section (or flexural capacity) of columns
- Wrapping of beams
- Strengthening of existing unreinforced masonry infill walls

The method for retrofitting the whole structural system can be described as holistic (for the whole structure) retrofitting practices for those systems which do not have a sufficient strength capacity under earthquake effects or whose deformation and displacement exceed the limit values specified for performance level which is explained in the Code (TSC, 2007). For this purpose, new members are generally added to the existing structural system.

Methods which are used for retrofitting the whole structural system as described in the Turkish Seismic Code (TSC-2007) are listed below:

- Adding concentric infill shear walls
- Adding eccentric shear walls to exterior frames
- Adding concentric and eccentric steel crossed frames or deflection frames

In this section, we will explain some of the retrofitting methods within the scope of our study. These are also defined in the Turkish Seismic Code (TSC-2007) and the most frequently used retrofitting practices in Turkey. There are other methods described in the Code besides these methods. Furthermore, the Code notes that retrofitting types which are not covered by the Code can be used on condition that they comply with the general approaches and principles of the Code.

3.4.3 Jacketing of a Column

In the Turkish Seismic Code (TSC-2007), the application purpose of jacketing is described as increasing ductility, shear and axial strength and reducing the shear and compressive stresses and correction of lap splice deficiencies in columns. As Sucuoğlu (2006) stated, it is not possible to increase the flexural capacity of columns by jacketing.

Furthermore, in TSC-2007 it is noted that concrete jacketing is to be applied with a minimum cover thickness of 100 mm. Sucuoğlu (2006) notes that 100 mm above the bottom slab, jackets start and they end at a distance 100 mm to the top slab or beam.

Both TSC-2007 and Sucuoğlu (2006) mention that while calculating shear and axial capacities, gross cross-sectional area of the jacketed column and new concrete strength are taken into account, but a reduction of 0.9 takes place in the capacities.

TSC-2007 further states that wrapping by fiber reinforced polymers (FRP) is a choice to be used to confine defective columns for the purpose of increasing their ductility, shear and axial force capacities and for increasing strength of insufficient splices. It is also mentioned in the Code that for the purpose of increasing shear strength and ductility of beams at critical (potential plastic hinge) regions, FRP wrapping may be applied to them.

In our study, the application of FRP wrapping to beams aims to retrofit beams which lack sufficient capacity. The Code notes that, FRP band spaces must not exceed the value $(w_f + d/4)$. Another application detail in the Code, among others described, is that FRP will be applied by rounding the corner of beams at least 30 mm in radius and at the end FRP wrappings must be superposed at least in 200 mm.

3.4.4 Retrofitting of Reinforced Concrete Structural System with Infill Shear Walls

This retrofitting method, which is among the most frequently used ones in Turkey, is based on the principle of retrofitting reinforced concrete structural systems, which lack lateral rigidity and strength, with infill shear walls built on site. The goal with such retrofitting method is adding infill shear wall to support all earthquake effects on the building in both directions and thereby bringing lateral rigidity up to the desired level. In this way, as the earthquake effect will be supported by the newly infill shear walls, the present reinforced concrete (RC) frame system will be exposed to lesser earthquake action and they will have the desired member performance.

These types of retrofitting practices are described in TSC-2007 as two different types as “adding concentric infill shear walls” and “adding eccentric shear walls to exterior frames”.

The first type which is “adding concentric infill shear walls” is arranged within an existing frame axis and rendered continuous from the foundation up to its top elevation. Sufficient number of anchorages provides the completeness of existing frame and of the added concrete infill. In TSC-2007, it is emphasized that anchorages must have enough strength to take shear stresses which occur under earthquake forces on contact faces between existing reinforced concrete frame members and added reinforced concrete members. The Code describes the diameter of smallest anchorage bar as 16 mm, minimum anchorage depth as 10 folds of the diameter of the anchorage bar and the widest anchorage bar space as 40 cm.

Sucuoğlu (2006) indicated that there are two ways to form confined end regions for the integral shear wall, which are namely using or modifying existing peripheral columns. In practice, if the concrete strength of columns to which infill shear wall will join are too low, concrete jacketing of these columns is recommended. As Sucuoğlu (2006) recommended, there must be a sufficient foundation under the added shear wall and the foundation beam can be extended to include the adjacent column axes which will produce an opportunity to use their vertical forces in order to reduce uplift.

Canbay *et al.* (2008), stressed that in adding shear walls, the ratio of total shear wall area to be formed in both directions to the total floor area of building in each direction must not be less than 0.0025. Moreover total shear wall cross-sectional area in any direction must not be less than 0.01 of cross sectional area of the ground floor of the building:

$$\sum A_w \geq 0.0025 \sum A_{pi} \quad (3.31)$$

$$\sum A_w \geq 0.01 A_{pt} \quad (3.32)$$

where,

ΣA_w : Total shear wall cross-sectional area
 ΣA_{pi} : Total floor area of building
 A_{pt} : Area of ground floor

Besides, in the event that there are irregularities in the building (soft or weak storey, short column etc.) it is recommended that the condition in Eq. 3.33 should be considered instead of the one in Eq. 3.31.

$$\sum A_w \geq 0.003 \sum A_{pi} \quad (3.33)$$

Canbay *et al.* (2008) emphasized also the importance of placing infill shear walls in both directions in a way not to spoil the symmetry, as much as possible, in both directions. Reinforced concrete detailing of infill shear walls are conducted with respect to the conditions set forth in TSC-2007.

CHAPTER 4

STRUCTURAL CHARACTERISTICS OF THE BUILDING STOCK

4.1. Introduction

In this chapter, we will describe the existing structural characteristics and retrofitting designs of the buildings which are taken into consideration in our study. Within the scope of the study, we examined 48 different reinforced concrete buildings located in different districts of the Istanbul province. Inspections of these buildings with respect to the provisions under Chapter 7 of Seismic Code (TSC-2007) were carried out previously by two different engineering firms. We benefited from the data of these studies for our study. In this respect, material and geometrical characteristics of buildings, soil investigation studies, survey projects and retrofitting projects were obtained from the project archive of Security General Directorate. We have revised some of these technical studies based on data control and additional in-situ assessments. We also re-calculated approximate costs of retrofitting the buildings based on the construction quantities determined from the retrofitting projects and the current unit prices.

4.2. Information on the Building Stock and Retrofitting Design of Buildings

All of the buildings considered in our study were constructed before 2000s and they are 1-7 storeys with or without basement, and are either service or lodging buildings used in security services (by police). For security concerns, each building is represented by a code assigned to it rather than giving its actual address. Structural properties of buildings are summarized in Appendix A.

In the light of these data, distribution of number of building storeys, building ground floor areas, building basements and total floor areas, ground (mostly the critical) floor heights and total height of buildings are illustrated on the graphs below, in the form of histograms.

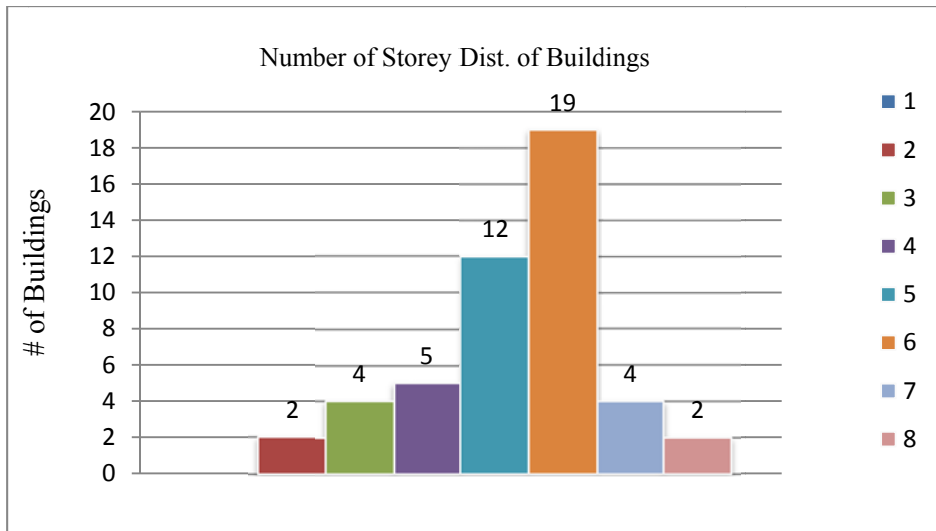


Fig. 4.1. Barchart showing the number of storey distribution of buildings

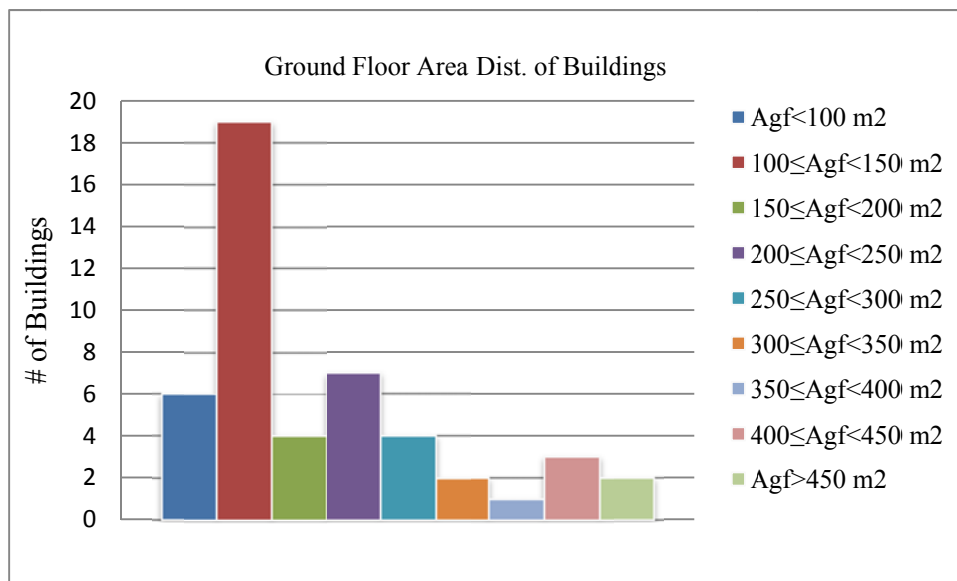


Fig. 4.2. Histogram showing the ground floor area distribution of buildings

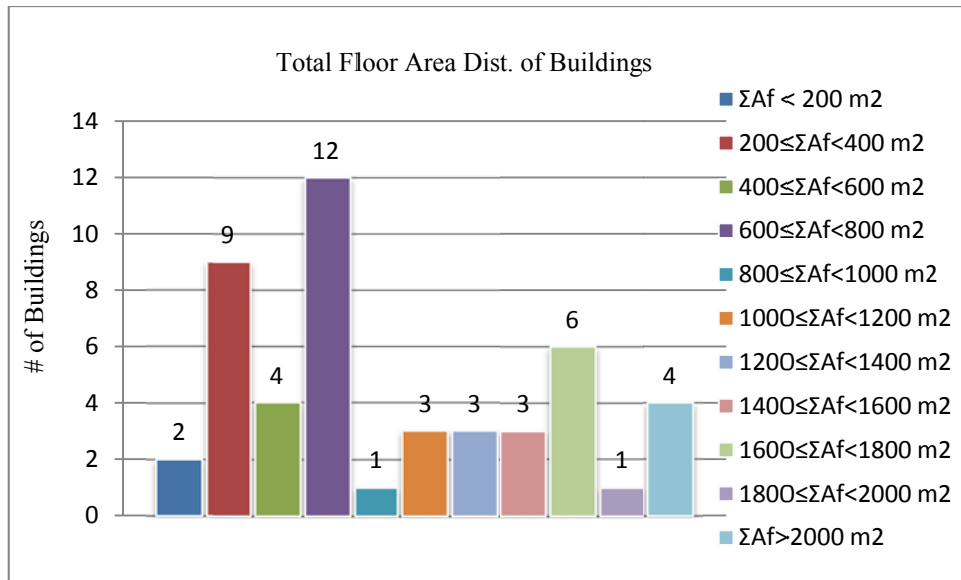


Fig. 4.3. Histogram showing the total floor area distribution of buildings

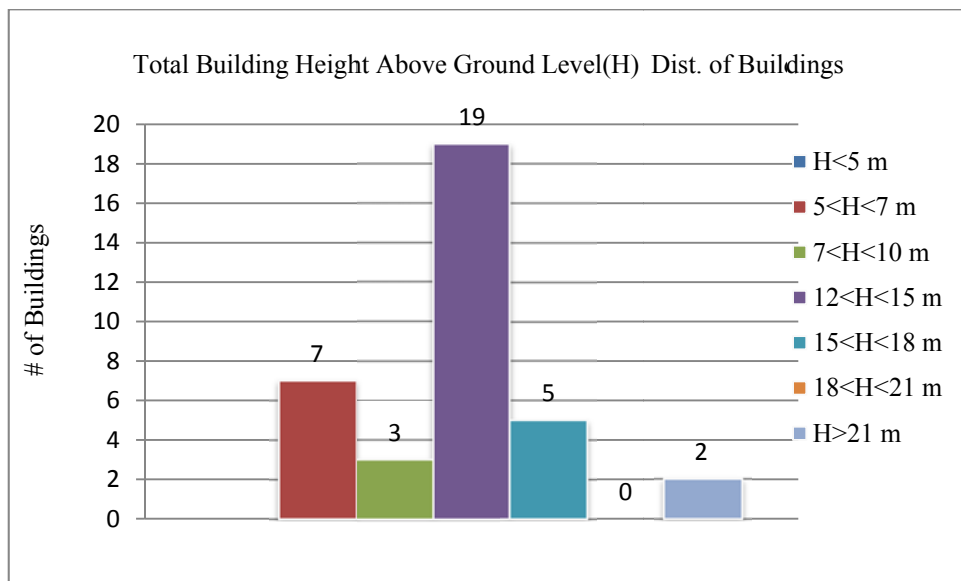


Fig. 4.4. Histogram showing the total building height (above ground level) distribution of buildings

The ratios of total structural system members cross-sectional areas of existing buildings in x and y directions to the ground storey area are shown in Appendix A together with the ratios of total area of structural system on a storey to the total area of ground storeys. Distributions of the ratios for buildings are illustrated on the graphs below.

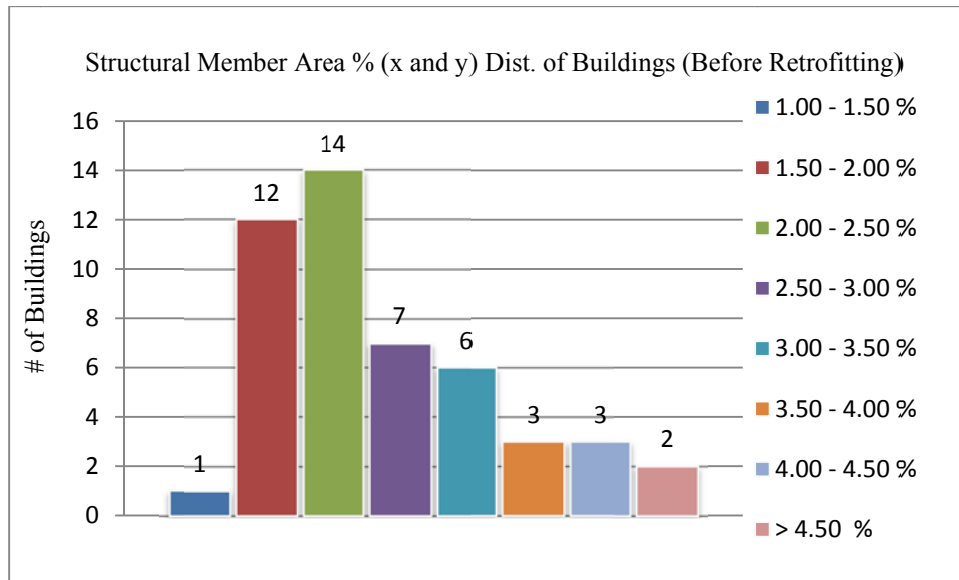


Fig. 4.5. Histogram showing the distribution of ground floor structural system members' cross-sectional area % (both in x and y directions) of buildings (Before retrofitting)

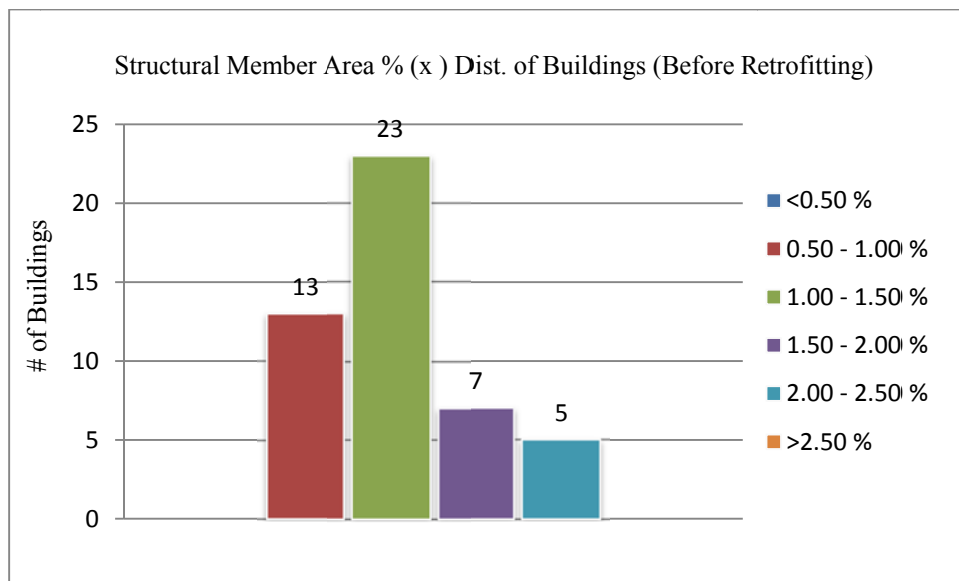


Fig. 4.6. Histogram showing the distribution of ground floor structural system members' cross-sectional area % (in x direction) of buildings (Before retrofitting)

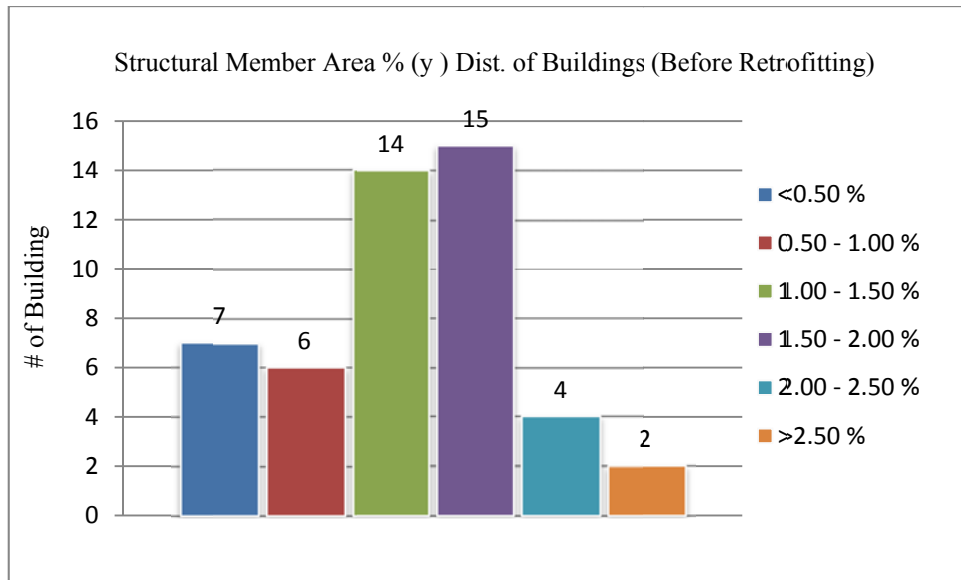


Fig. 4.7. Histogram showing the distribution of ground floor structural system members' cross-sectional area % (in y direction) of buildings (Before retrofitting)

The distribution of building stock in our study according to existing concrete compressive strength is illustrated below. It should be noted that the majority of the concrete samples were taken from buildings which were constructed by mixed-on-site concrete. Extensive use of ready mix concrete started after 2000 whilst before that, when ready mix concrete was used, the quality was poor (Bal *et al.*, 2011).

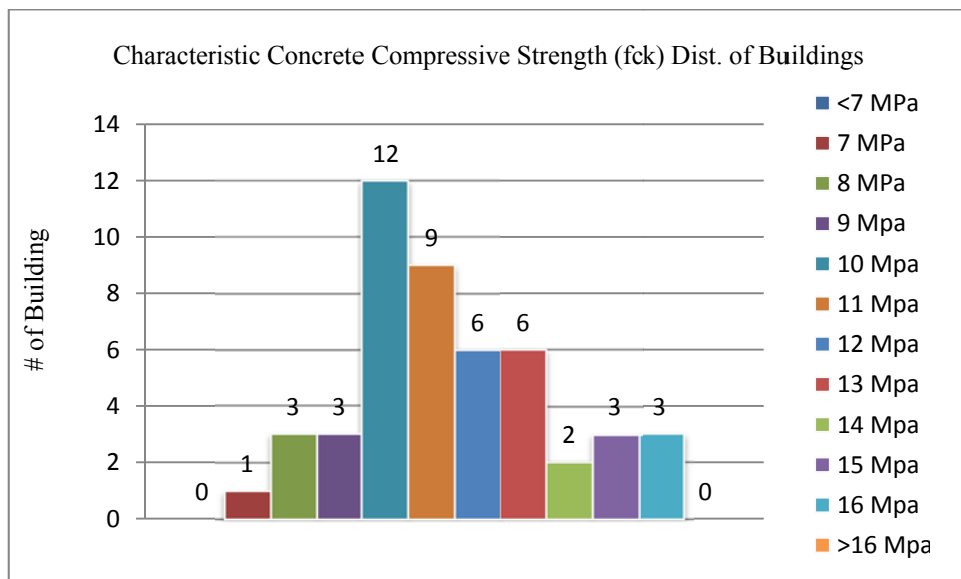


Fig. 4.8. Histogram showing the distribution of characteristic concrete compressive strength distribution of buildings

In the retrofitting designs prepared for the buildings concentric infill shear walls were added, and in addition to this, concrete jacketing was applied to columns whose capacities were insufficient. Besides, FRP wrapping was applied to a small number of beams whose capacities were observed to be insufficient based on the analysis carried out. In the implementation of placing concentric infill shear walls, which is used as the primary method, provisions of Turkish Seismic Code (TSC-2007) were implemented. Designs which do not disarrange the placement of symmetrical structural system in both directions (x and y) were applied as much as the existing architectural details of the buildings permitted.

As the current concrete compressive strength of buildings were particularly very low, concrete jacketing was applied in 15 cm thickness on both columns where additional shear walls would join together. Shear wall thickness used in the designs were detailed as 30 cm. In the analysis, conducted according to the Seismic Code, some of the columns were jacketed. Column jacketing thickness for the buildings was chosen as 15 cm in the designs. Ground storey RC floor plans for the existing (original) buildings and retrofitting design ground storey RC floor plans are shown in Figs. 4.9a, 4.9b and 4.9c. As can be seen in these figures, additional retrofitting shear wall distributions for the buildings were provided in a balanced way in both directions.

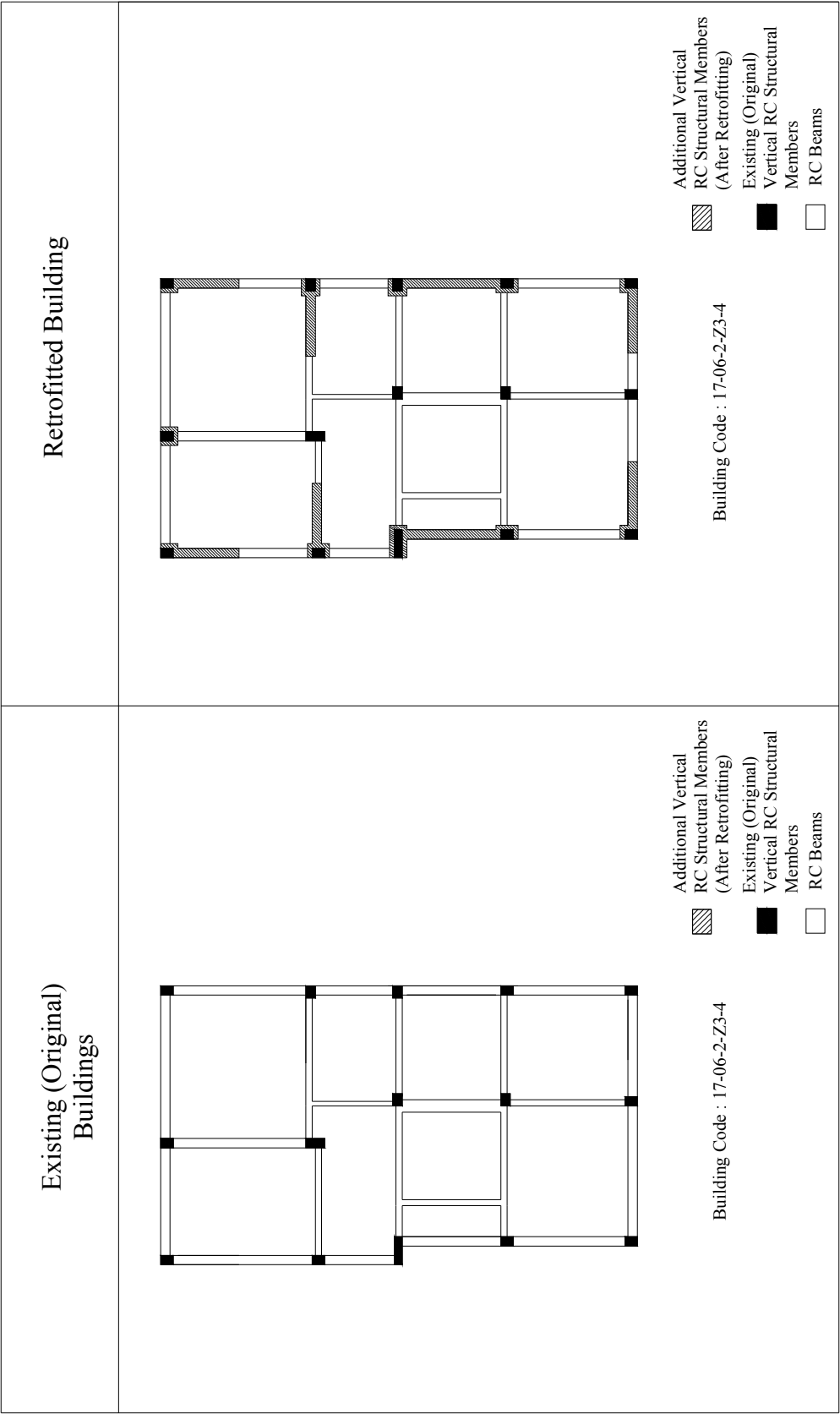


Fig. 4.9a. Sample showing existing (original) building and retrofitting design ground storey RC floor plans (Building Code: 17-06-2-Z3-4)

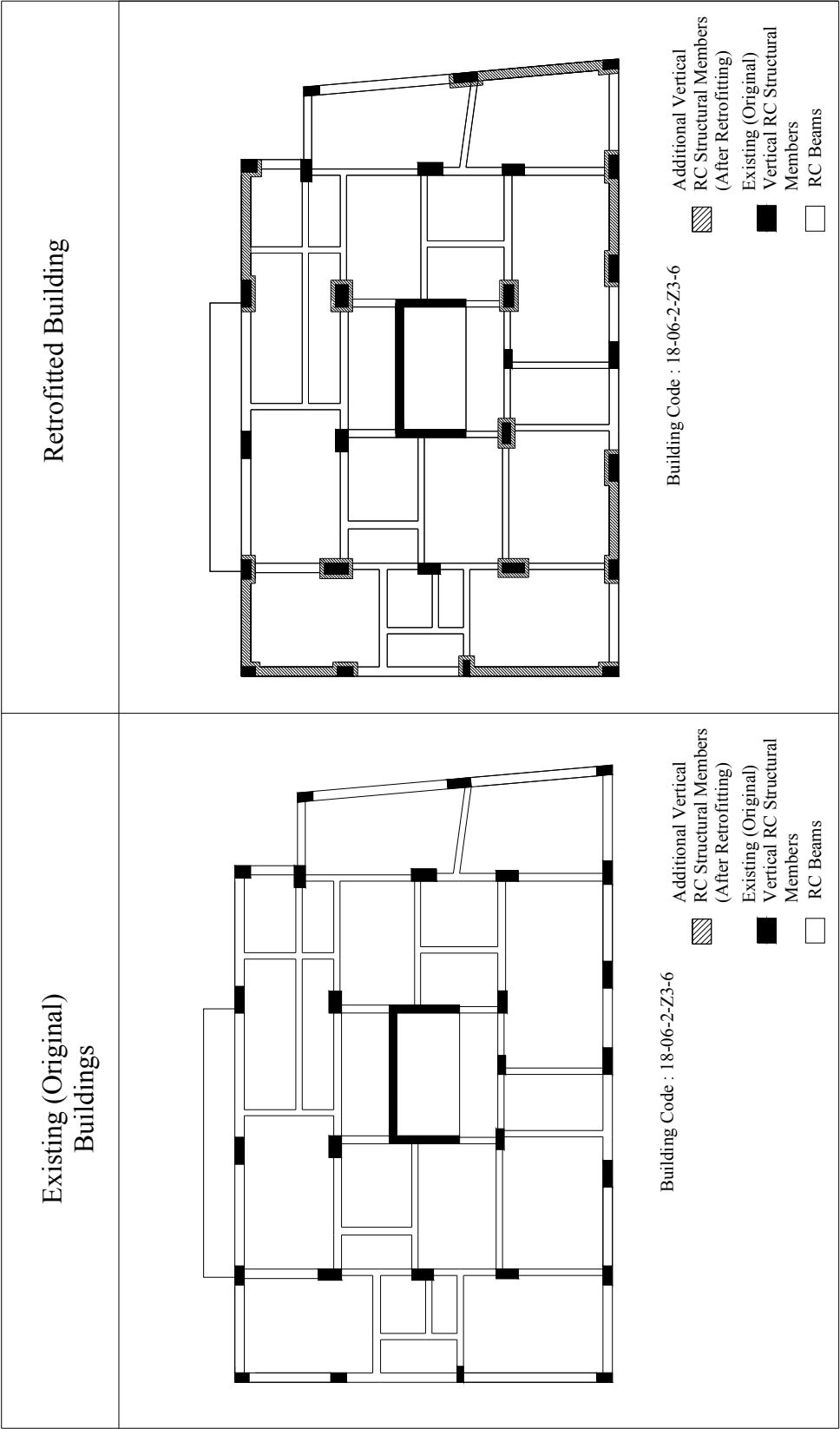


Fig. 4.9b. Sample showing existing (original) building and retrofitting design ground storey RC floor plans (Building Code: 18-06-2-Z3-6)

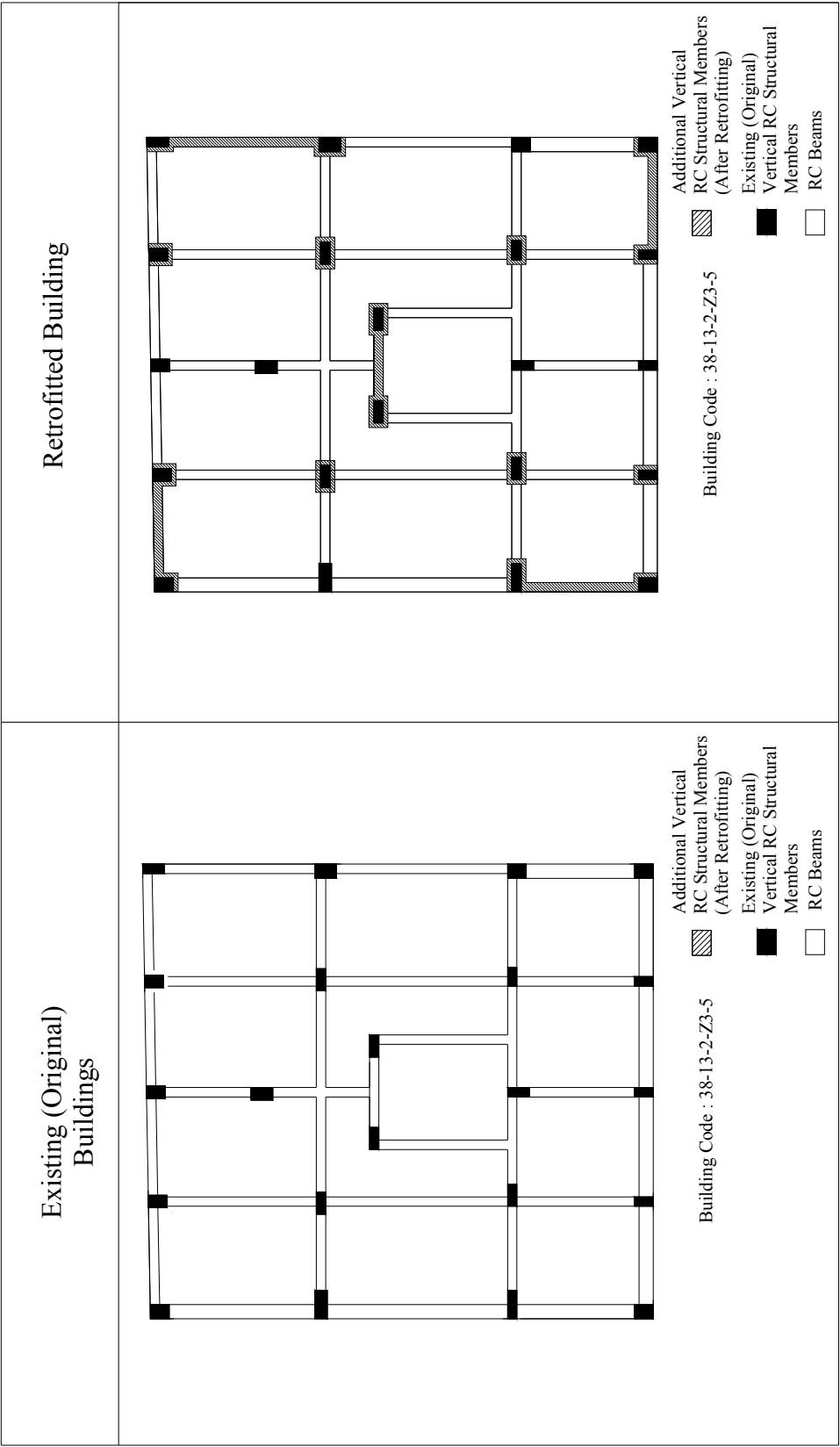


Fig. 4.9c. Sample showing existing (original) building and retrofitting design ground storey RC floor plans (Building Code : 38-13-2-Z3-5)

It is necessary to emphasize here that in the retrofitting design of shear walls, which provides sufficient strength and torsional rigidity to the building, were added and that the most economic design alternative was chosen. In retrofitting for the shear walls and in column jacketing for all buildings, C30 class concrete was used. On the figures below (Figs. 4.10, 4.11, 4.12 and 4.13), typical shear wall additions and column jacketing implemented in buildings are illustrated.

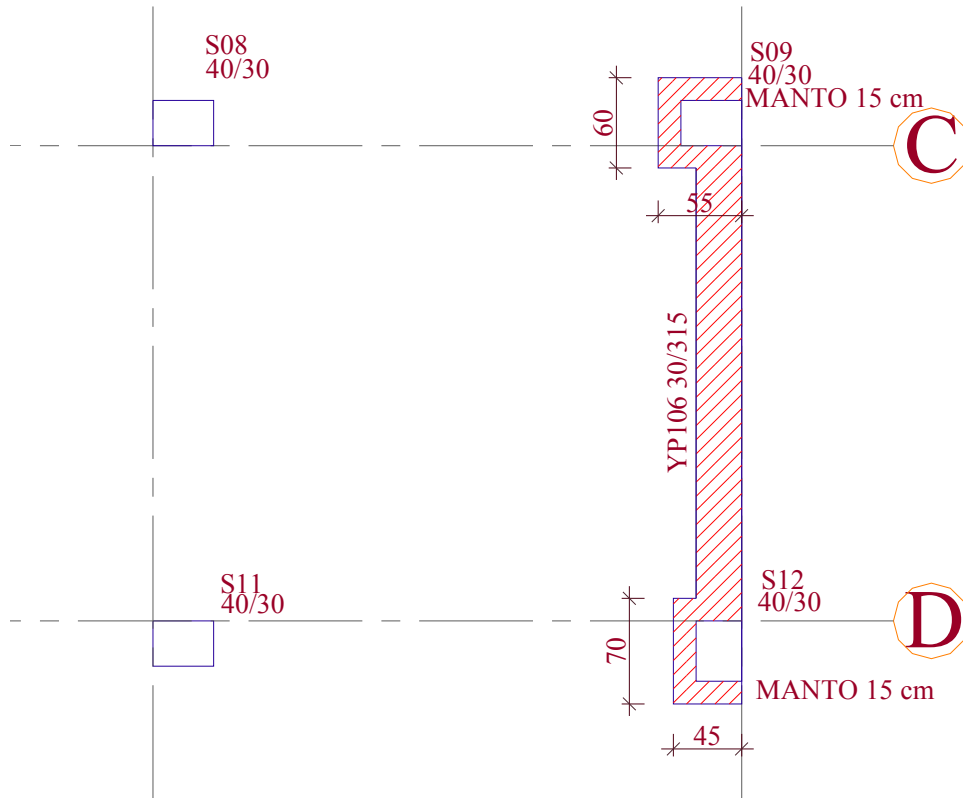


Fig. 4.10. Typical infill shear wall plan detail

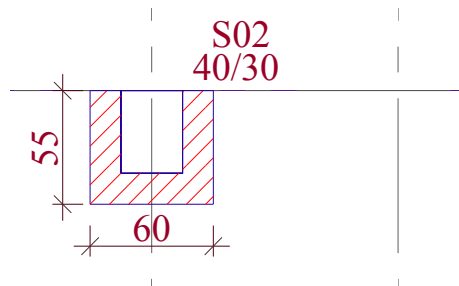


Fig. 4.11. Typical column jacketing plan detail

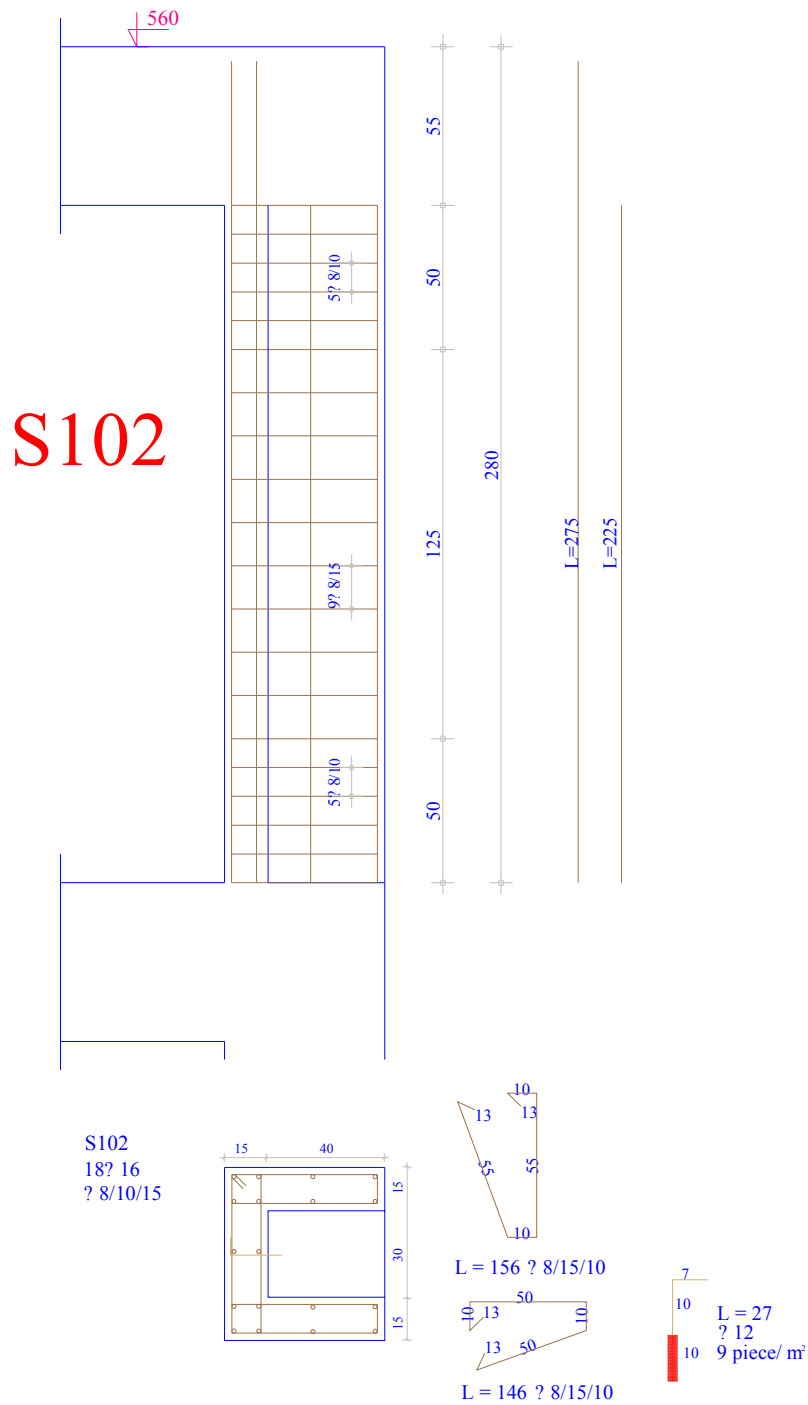


Fig. 4.13. Typical column jacketing detail

The ratios of structural (load-bearing) system members' cross-sectional areas of buildings in existing (original) and retrofitted conditions in x and y directions to the ground storey area are shown, together with the ratios of total area of structural system on a storey to the total area of ground storey in Appendix B. The distributions of these ratios for buildings are illustrated in the graphs below (Figs. 4.14, 4.15 and 4.16).

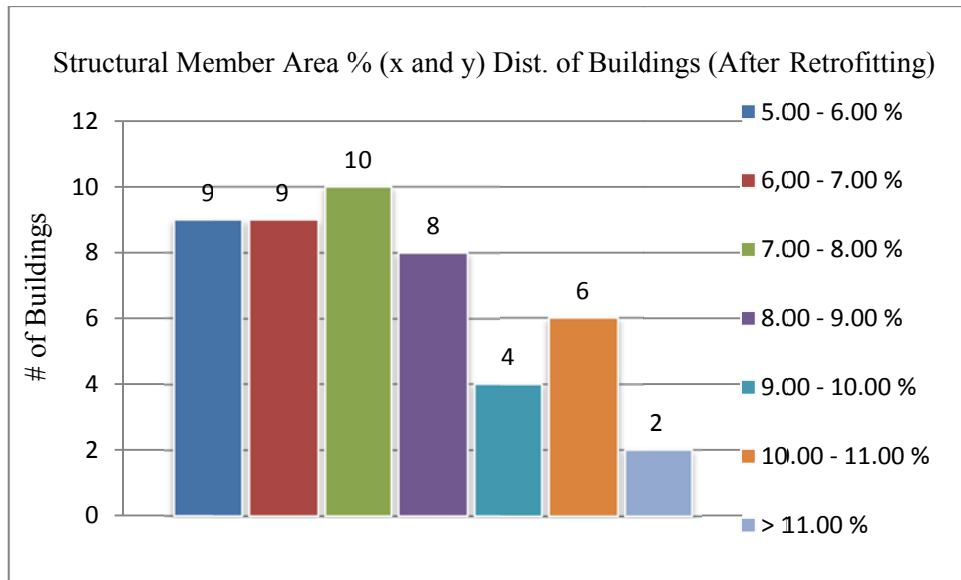


Fig. 4.14. Histogram showing the distribution of ground floor structural system members' cross-sectional area % (in both x and y direction) of buildings (After retrofitting)

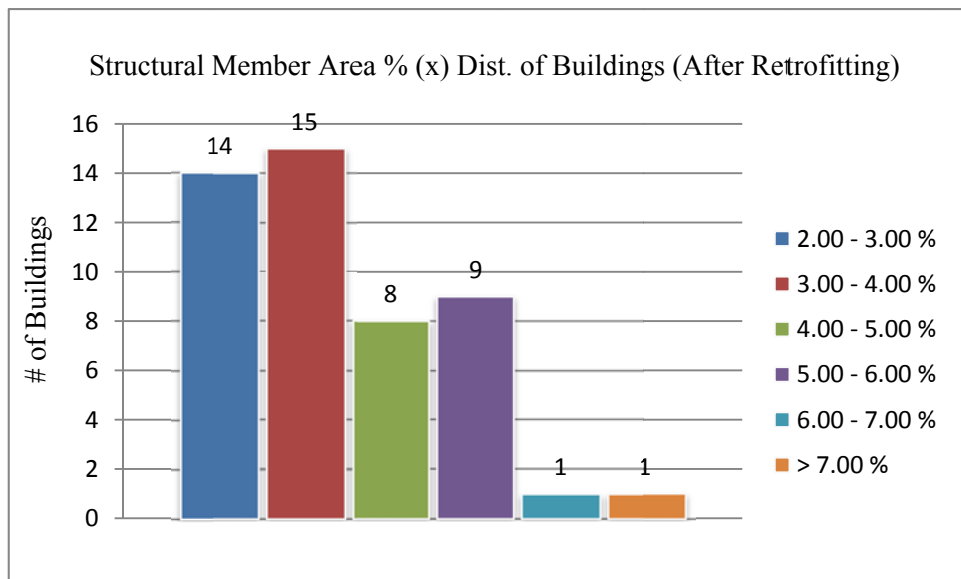


Fig. 4.15. Histogram showing the distribution of ground floor structural system members' cross-sectional area % (in x direction) of buildings (After retrofitting)

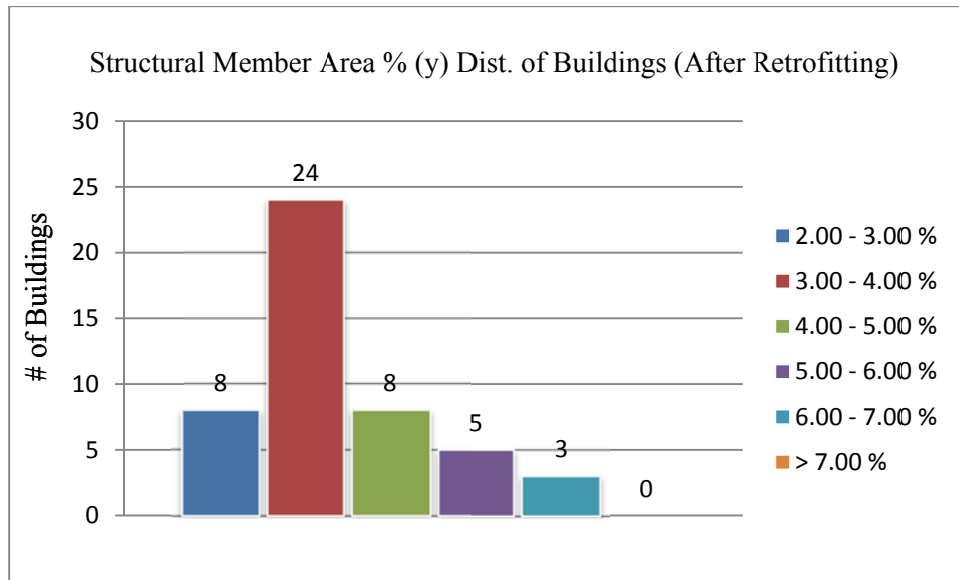


Fig. 4.16. Histogram showing the distribution of ground floor structural system members' cross-sectional area % (in y direction) of buildings (After retrofitting)

CHAPTER 5

GEOLOGY AND TECTONICS OF MARMARA REGION AND ISTANBUL PROVINCE

5.1. Geology of Marmara Region and Istanbul Province

In this section, geological and seismotectonic features of Marmara Region, particularly of Istanbul, where the buildings within the scope of our study are located and the geotechnical characteristics of the soils on which the buildings are founded will be discussed. It is to be noted that this chapter is based mainly on the review of relevant published results based on a literature survey.

Okay (1986) divides Marmara region into three geological parts, namely Istranca massif, Istanbul zone and Sakarya zone. There is an intra-pontid suture between Istanbul zone and Sakarya zone, roughly following the northern strand of the North Anatolian fault line. Trakya basin is the southern part of Istranca massif. Cenozoic sedimentary rocks and Quaternary alluvial deposits overlay this basin (Yüzer, 1997).

Istranca massif is composed by sandstone, quartzite, shale limestone and Late Permian granitoid which had been deformed and metamorphosed during the late Jurassic time. It is connected to Istanbul zone and covered by Eocene sediments on the further east (Aydan, 1999).

Istanbul zone lies in the south western margin of Black Sea and is characterized by a well-developed, unmetamorphosed and slightly deformed continuous Paleozoic sedimentary succession that extends from Ordovician to the Carboniferous overlain with a major unconformity presented by Uppermost Permian to the lowermost Triassic continental red beds (Aydan, 1999).

Sakarya zone is defined as an E-W trending continental fragment (Okay and Tüysüz, 1999). Presenting a significant contrast to Istanbul zone, Sakarya zone lacks of a Paleozoic basement. It is characterized by a variably metamorphosed and severely deformed Triassic basement called Karakaya complex which is overlain with a major unconformity by Liassic conglomerates and sandstones passing up to the Middle Jurassic – Lower Cretaceous limestone layers as well as Upper Cretaceous flysch (Aydan, 1999).

By Izmir-Ankara-Erzincan suture, which represents the main geological boundary between Laurasia and Gondwana during the late Paleozoic and Early Tertiary, Sakarya zone is separated from Anatolide – Tauride units (Okay and Tüysüz, 1999).

Regarding the geology of Istanbul and its vicinity, which is our main area of study, 1/50000 scaled surface geology map prepared by Istanbul Metropolitan Municipality can be referred. As it can be observed in this map, the northern, northwestern and the central part of Istanbul are dominated by Paleozoic shale and greywacke. Also various folds, faults, fractures and joint sets have been identified in this area.

5.2. Tectonics of Istanbul Province

The city of Istanbul is located in the Marmara Region, which has a complex tectonic structure and is one of the most seismically active regions in the world. To get a better understanding of the seismicity and the tectonics of the area, it is necessary to analyse the overall seismicity and tectonics of Marmara Region. According to Barka (1997), in Marmara Region, many tectonic events are related to the North Anatolian Fault System (NAFS).

48 buildings examined in this thesis are under the threat of large earthquakes to be sourced from the Central Marmara segment of the North Anatolian Fault System (NAFS). The NAFS is an intercontinental transform fault type of plate boundary between the Eurasian plate to the north and the Anatolian platelet to the south (Ayhan and Koçyiğit, 2010). It is approximately 1700 km long, a few km to 120 km wide belt of active deformation located next to Lake Van in the east and the main land of Greece in the west (Koçyiğit, 2012). It trends in approximately E-W direction and cuts across the northern section of Anatolia (Figure 5.1a). The NAFS consists of numerous single, a number of fault sets and fault zones. Starting from the Beldibi Town along the Dokurcun Valley, it bifurcates first into two major strands. Northern one runs across the Izmit Gulf and then bends towards northwest up to south-southwest of Istanbul, where rebends west-southwest direction and extends beneath sea water throughout Marmara Sea; to the south of Kumbağı Town it appears on the land and trends in the southwest direction for about 40 km distance and then enters into sea water of northern Aegean trough and lastly runs across sea up to the main land of Greece, where it disappears. This section of the NAFS is termed as the Northern strand of the NAFS (Fig. 5.1b). This segment is seismically very active as indicated by the occurrence of a series of destructive historical and recent earthquakes such as the 1509, 1766 historical earthquakes and the 1912 Şarköy-Mürefte seismic events (Koçyiğit, 2012).

The southern branch of the NAFS follows a path along the Geyve, Pamukova counties and then rebifurcates into two sub branches just to the east of Lake Izmit (Fig. 5.1b). The northern subbranch runs in approximately E-W direction along Gemlik Gulf, southern shore line of Marmara Sea up to Bandırma County, where it bends towards southwest and then extends across the Biga Peninsula and also northern Aegean Sea to the south of both Bozcaada and Limnos islands where it bounds northern margin of Skyros strike-slip basin and lastly disappears. This subbranch is termed central strand of the NAFS (Fig. 5.1b). The Central stand is also seismically very active as indicated by a series of historical and recent destructive earthquakes such as the 1737 Çan-Etili historical and 1968 North Aegean to 2013 Bozcaada recent seismic events (Koçyiğit, 2012).

The southern sub branch follows a path along Yenişehir, Bursa, Gönen settlements and Biga Peninsula and then enters into water of Northern Aegean Sea and bounds the southern margin of the Skyros strike-slip basin in the offshore section of North Aegean Sea (Fig. 5.1b). This sub branch is termed as the southern strand of the NAFS. This strand is also seismically very active. This is proved by both the historical and recent destructive earthquakes such as the 1855 Bursa historical and 1953 Gönen to 1981 Skyros recent seismic events caused by the southern strand of the NAFS (Koçyiğit, 2012).

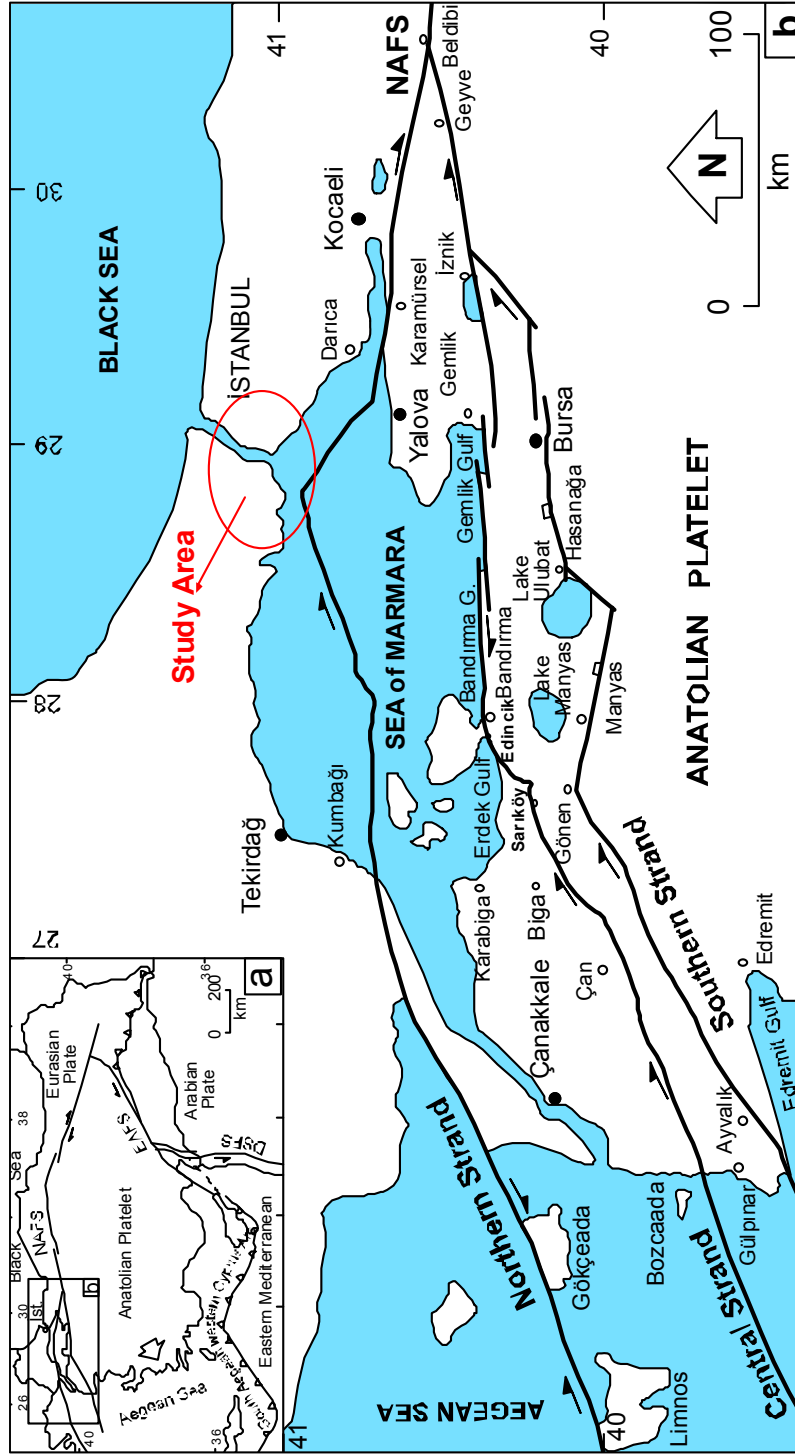


Fig. 5.1. Fault segmentation of NAFS in Marmara Region (Kocyigit, 2012)

5.3. Geotechnical Properties of Soil at the Location of Buildings

According to the Seismic Zoning Map of Turkey (1996), the Marmara region is located in the first, second and third degree seismic zones.

Geotechnical soil classification of Istanbul where the buildings within the scope of our study are located has been conducted by Boğaziçi University via NEHRP (1997) soil classification. NEHRP (1997) classification criteria are given in the table below. Soil Classification Map of Istanbul, which is produced according to the internationally acknowledged NEHRP (1997) criteria in earthquake engineering applications, is presented in Fig. 5.2.

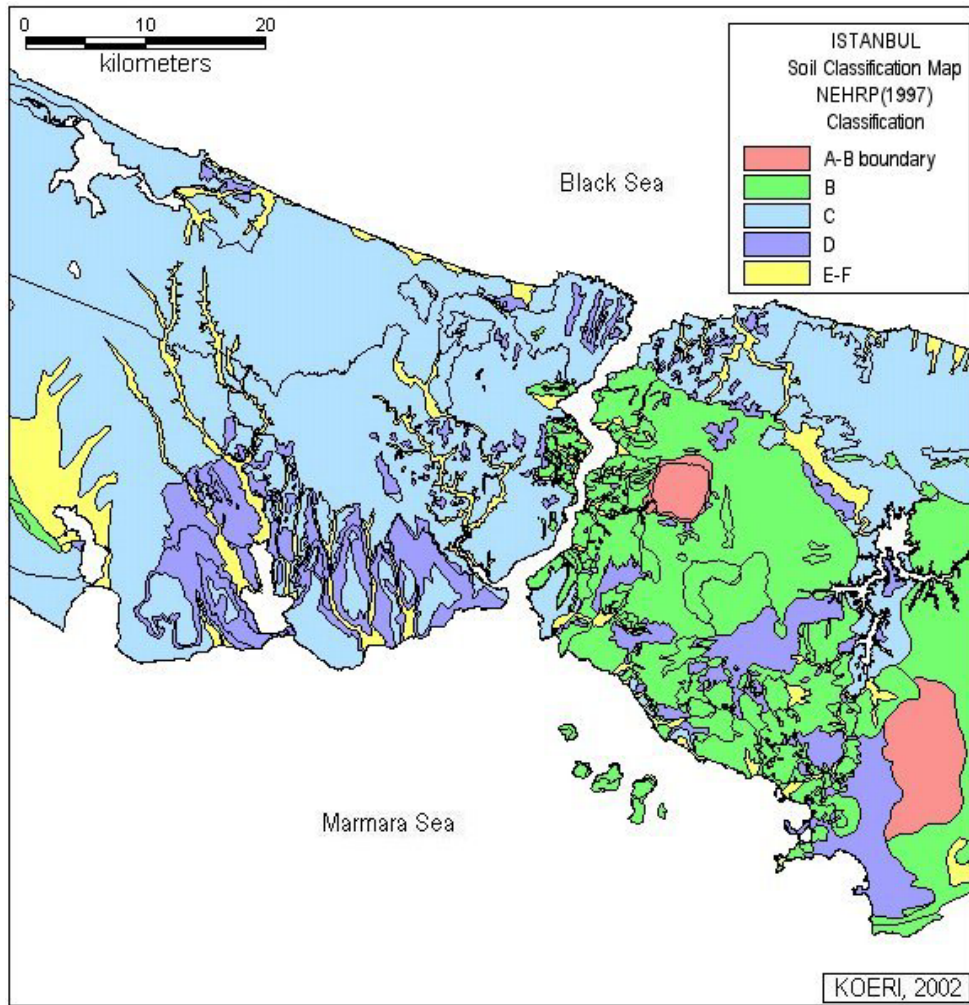


Fig. 5.2. Soil classification map of Istanbul (KOUN, 2003)

Regarding the soil on which buildings within the scope of our study are located, geotechnical surveys described for the examination of original buildings in Turkish Seismic Code (TSC-2007) are realized through explored soil survey studies for all buildings. After soil surveys, soil parameters to be used in detailed analyses of buildings are determined. These are presented in Appendix A.

5.4. Ground Motion Prediction (Attenuation) Relationships and Scenario Earthquake for Istanbul

The ‘attenuation’ of earthquake ground motions is an important matter to take into account in estimating ground -motion parameters for the purposes of seismic safety assessment and design. Ground - motion prediction equations (or attenuation relationships) are analytical expressions that describe ground-motion variation with magnitude, source distance, and site condition which account for the mechanisms of energy loss of seismic waves during their course through a path (Elnashai and Sarno, 2008).

Attenuation relationships allow us to estimate both the ground motion at a site from a specified event and the uncertainty associated with the prediction. This estimation is a key step in probabilistic and deterministic seismic hazard analyses (Cornell, 1968). There are a number of ground-motion models that have been developed by various researchers. Relationships based on peak ground - motion parameters (peak ground acceleration, PGA; peak ground velocity, PGV; peak ground displacement, PGD) and spectral acceleration, velocity and displacement parameters (S_a , S_v and S_d) are generally employed in earthquake engineering (Elnashai and Sarno, 2008).

A sudden fault rupture emanating from the accumulation of strains in the crust is the cause for the radiation of seismic waves and, consequently, of the ground motion. The development and the propagation of the dislocation front on the fault surface and the time for the completion of the slip are crucial for the explanation of ground motion. Seismic moment, various stress parameters, rupture velocity, and slip time functions are taken to be the main parameters required for the description of the source as well as the simulation of ground motion. It has been repeatedly indicated that the strong motion acceleration time history is highly influenced by the complexity of source rupture due to fault heterogeneities. Thus a proper description of the source process, especially in connection with the scenario earthquake, is important for the simulation of ground motion for any site or spatially, in a particular urban area (Elnashai and Sarno, 2008).

Attenuation models provide for the change of ground motion severity with source mechanism, distance and local geology. Currently there are reliable empirical models in terms of peak ground acceleration, velocity and displacement (PGA, PGV and PGD) as well as pseudo spectral velocity (PSV), at specific frequencies and damping ratios, for given earthquake magnitude, distance, fault mechanism and local geology.

Empirical attenuation relationships are generally used for quantifying seismic hazard in either deterministic or probabilistic approaches. These attenuation relationships exist for intensity, PGA, PGV, area intensity, duration related parameters and spectral accelerations. All empirical attenuation relationships are based on or calibrated against strong motion databases (Elnashai and Sarno, 2008).

A deterministic seismic hazard assessment was conducted to determine the spatial distribution of the earthquake ground motion that would emanate from a given earthquake scenario (KOUN, 2003). Geological and seismological information constitute the basis for the prediction of appropriate earthquake scenario, which is usually given in broad terms, including rupture length, location and magnitude. In general terms, earthquakes may be associated with local, nearby and distant sources. The maximum event size is supposed for the worst case scenarios. Earthquake scenario can and has also been defined as the largest earthquake that is likely to occur in a reasonable period of time. Although the use of multiple scenario earthquakes can provide for the range of risk mitigation efforts to be planned, it can also decrease the public credibility of the risk assessment. For intrinsically probabilistic applications, the selection of scenario earthquake is based on the de-aggregation of the hazard in order to indicate which events contribute most to the loss. As such, it will be an event with a

high likelihood of occurrence in the source region with respect to other events that can cause the same loss. Based on this methodology, an earthquake scenario has been defined for Istanbul. According to Koçyiğit (2012), this massive earthquake associated with the unruptured section of the Central Marmara Segment of NAFS that passes through the south of the city in Marmara Sea. On these bases and other technical considerations an $M_w = 7.5$ is selected as the “worst credible case” scenario are shown in Fig. 5.3.

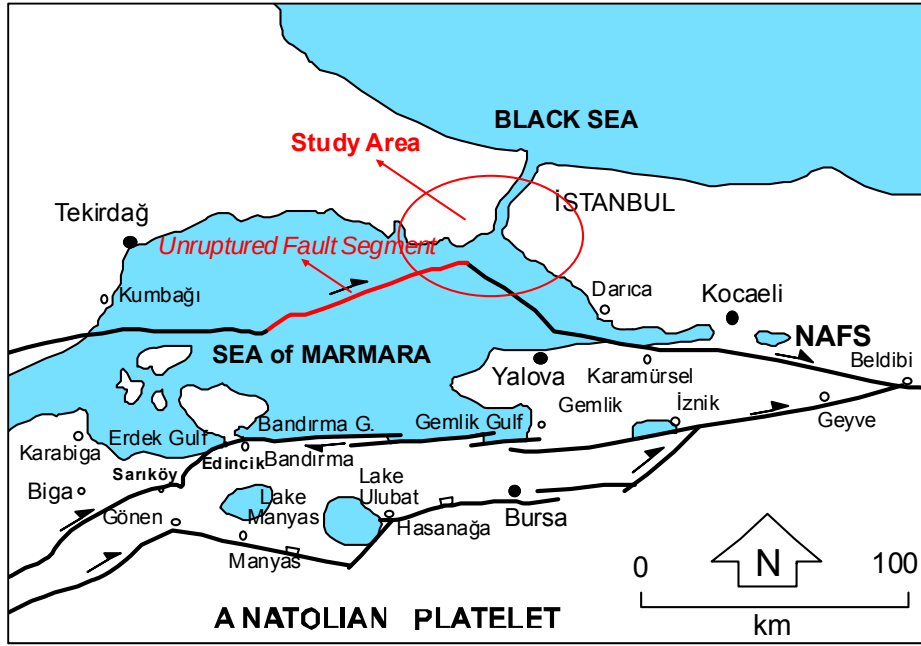


Fig. 5.3. Map showing the location of the fault forming basis for the scenario earthquake (Koçyiğit, 2012).

The scenario earthquake fault properties mentioned above are used in the preliminary assessment method proposed by Özcebe et al. (2003), in the calculations of the cutoff values for each performance classification by using the relationships given in Eqs. 2.41 and 2.42. In this equation, CM values, which introduces spatial variation of the ground motion in the evaluation process shall be defined with the location of the building relative to the fault and the soil properties of the site shall be taken from the JICA Report (2002).

CHAPTER 6

ASSESSMENT OF THE SEISMIC SAFETY OF THE BUILDING STOCK AND ESTIMATION OF THE RETROFITTING COSTS

6.1 Introduction

In this section, the procedure used in the detailed seismic assessment and retrofitting studies of buildings considered in our study will be described based on the Turkish Seismic Code (TSC-2007). Then information will be provided on the application details of the preliminary assessment procedures with respect to both original and retrofitted conditions of buildings. After these discussions, the distribution of building scores pertaining to preliminary assessment procedures applied to in their original (existing) and retrofitted conditions will be examined according to the cross-sectional areas of the load-bearing system members. Basic purpose in examining these distributions is to estimate whether a selected building is safe or unsafe in its current condition with respect to the criteria set forth in the Turkish Seismic Code (TSC-2007) by using preliminary assessment scores calculated for any building and load-bearing system cross-sectional areas. In order to determine this, a method is developed within the scope of this study. The first step in the method is the examination of buildings' vertical load-bearing system members' cross-sectional areas and distributions of preliminary assessment scores pertaining to the original and retrofitted conditions of buildings. Basic aim in such an examination is to determine the safe and unsafe zones, on a graph to be developed according to the distributional characteristics of original and retrofitted conditions of buildings. This would enable to determine whether a building is safe or unsafe according to seismic preliminary assessment scores and vertical load-bearing system member's cross-sectional areas. The second step in the method is to predict to what extent a building, which is determined to be unsafe according to the limit conditions defined in the previous step, requires retrofitting, i.e. increase in the vertical load-bearing system cross-sectional area. Approaches regarding this prediction are explained in Section 6.4. At the third step, the costs of the cross-sectional areas added to the system (vertical load-bearing system members cross-sectional areas required for the retrofitting of buildings) will be calculated. For this purpose, the relationship between the sum of vertical load-bearing system cross-sectional areas added due to retrofitting and retrofitting costs will be investigated in Section 6.6.

6.2 Detailed Seismic Assessment of Building Stock in Their Original and Retrofitted Conditions According to the Turkish Seismic Code (2007)

Mode superposition method identified among seismic assessment methods in the third chapter of this study is used for detailed seismic assessment of buildings. These assessment studies incorporate a "Life Safety" performance criterion corresponding to earthquake impacts with a 10 % probability of exceedance in 50 years. The evaluation results obtained for each building in their original condition and the corresponding performance levels of buildings in their original condition are provided in Appendix C. These levels indicate that performance levels of the buildings are at pre-collapse or at collapse levels. The evaluation results show that all of these buildings do not satisfy the minimum performance targets stipulated by TSC- 2007 and thus need to be retrofitted. Accordingly, retrofitting designs are prepared for each building for this purpose. Details of such designs were presented in Chapter 4.

Similar to evaluating the buildings in their original conditions, evaluations were conducted for the buildings in their retrofitted condition with respect to the "Life Safety" performance

criterion. After these analyses, it was seen that safety levels of all buildings have reached to the “Life Safety” performance level. Performance analysis results for the retrofitted condition of buildings are given in Appendix C.

6.3. Preliminary Seismic Assessments of Buildings in Their Existing (Original) and Retrofitted Conditions

In this section, preliminary assessment scores computed for buildings both in their original and retrofitted conditions and the distribution of these scores with respect to the load-bearing system cross-sectional areas will be examined. This is the percentage of total cross-sectional areas of shear walls and columns in the ground storey in proportion to the area of ground storey – which is considered to be the most critical storey in preliminary assessment methods. From this point on in the text, the sum of total cross-sectional areas of shear walls and columns in the ground storey will be referred to as *Cross-sectional Area Index* (CAI) and the ratio of total cross-sectional areas of shear walls and columns in the ground storey to the area of ground storey, expressed in percentage will be referred to as the “*Percentage of Cross-Sectional Area Index Ratio*” (CAIR %) (Eqs. 6.1 and 6.2).

$$CAI = A_{sw} + A_c \quad (6.1)$$

$$CAIR \% = CAI / A_{gf} \quad (6.2)$$

where,

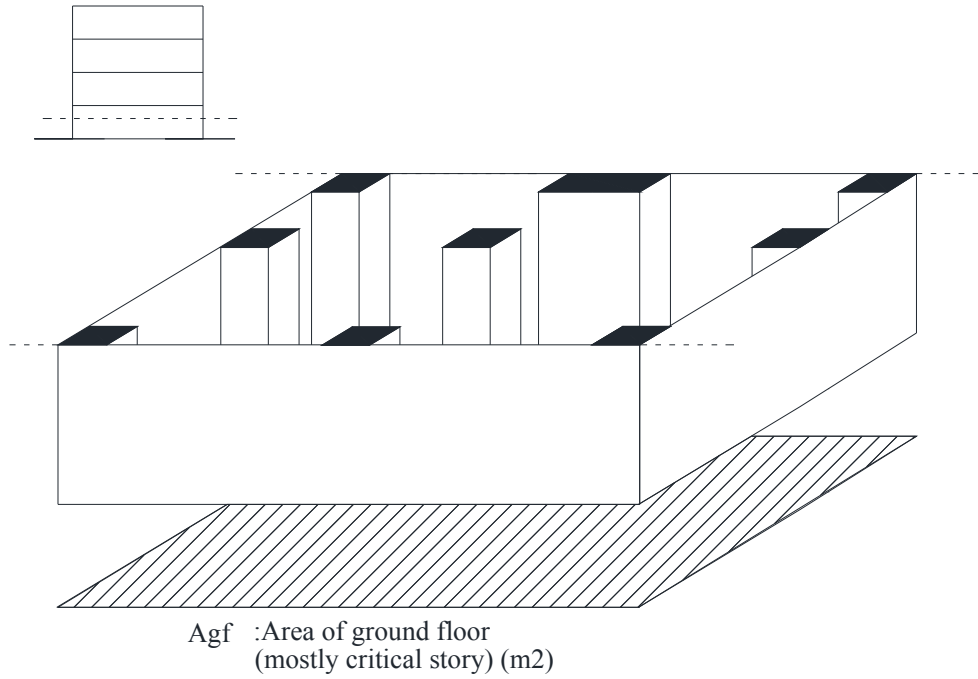
A_{sw} : Total cross-sectional area of shear walls in ground storey (m²)

A_c : Total cross-sectional area of columns in ground storey (m²)

A_{gf} : Area of the ground storey (m²)

CAI : Cross-sectional Area Index (total cross sectional area of shear walls and columns)
(m²)

$CAIR \%$: Percentage of cross-sectional area index ratio



"k" Values for Column, Structural Walls	
$(A_{col})_x = k_x \times A_{col}$	$(A_{sw})_x = k_x \times A_{sw}$
$(A_{col})_y = k_y \times A_{col}$	$(A_{sw})_y = k_y \times A_{sw}$
for square and circular column  $k_x = 1/2$	for structural walls in the direction of x  $k_x = 1$
for rectangular columns with $b_x > b_y$ $k_x = 2/3$	for structural walls in the direction of y  $k_x = 0$
for rectangular columns with $b_x < b_y$ $k_x = 1/3$	
$k_y = 1 - k_x$	$k_y = 1 - k_x$

Cross-sectional Area Index
in x and y directions
(CAI_x % and CAI_y %)

$$CAI_x = \sum A_{(sw)x} + \sum A_{(c)x}$$

$$CAI_y = \sum A_{(sw)y} + \sum A_{(c)y}$$

Cross-sectional Area Index in both
x and y directions
(CAI)

$$CAI = \sum (A_{(sw)x} + A_{(sw)y}) + \sum (A_{(c)x} + A_{(c)y})$$

Percentage of Cross-sectional
Area Index Ratio in x and y
directions (CAIR_x % and CAIR_y %)

$$CAIR_x \% = \frac{\sum A_{(sw)x} + \sum A_{(c)x}}{Agf} \times 100$$

$$CAIR_y \% = \frac{\sum A_{(sw)y} + \sum A_{(c)y}}{Agf} \times 100$$

Percentage of Cross-sectional
Area Index Ratio in both x and y
directions (CAIR %)

$$CAIR\% = CAIR_x \% + CAIR_y \%$$

Fig. 6.1. Schematic illustration of CAI (m²) and CAIR %

Preliminary assessment methods are applied separately for both to the original and retrofitted conditions – after previous detailed analyses – of each building. Preliminary assessment method scores for the original and retrofitted conditions of buildings are shown in Appendix D.

In the calculations of columns and shear walls moments of inertia used in preliminary assessment method proposed by Özcebe *et al.* (2003) and preliminary assessment method proposed by Gülay *et al.* (2008), moments of inertia pertaining to infill shear-wall added to the building through retrofitting design are calculated together with other vertical structural system members (columns) with which they are connected with anchors, as a whole. The schematic presentation of this situation is presented in Fig. 6.2. Moments of inertia pertaining to the single columns after retrofitting are calculated by taking into account their enlarged dimensions after the process of jacking.

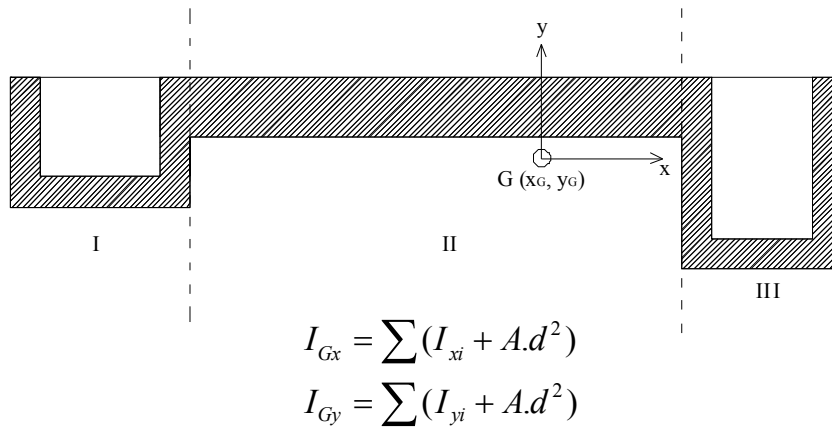


Fig. 6.2. Moment of inertia calculations of infill shear walls

Non-bearing masonry wall cross-sectional areas considered in Özcebe *et al.* (2003), Yakut (2004) and P25 Score Methods (Gülay *et al.*, 2008) are not considered in calculations. This assumption is adopted so as to remain on the safe side regarding the scores obtained from the methods, also accepted due to the fact that non-bearing partition walls at internal axes of buildings may be changed in the course of building's usage.

Characteristic concrete compressive strength (f_{ck}) values used for P25 Score Method (Gülay *et al.*, 2008) were assigned as C20 fixed value in the case of retrofitted condition analyses of buildings. When the same method was applied to the original conditions of buildings, average concrete compression obtained through experimental data from buildings in accordance with the provisions set forth in Chapter 7 of Turkish Seismic Code (TSC-2007) and which was used for previous detailed analyses was employed.

In the application of the method proposed by Yakut (2004), due to the nature of the method, regarding the concrete characteristic tensile strength (f_{ctk}) values, C30 concrete class is foreseen for infill shear-walls added through retrofitting designs to buildings and jacketed columns.

The distribution of scores belonging to the existing (original) conditions of buildings (in other words, pre-retrofitting conditions) with respect to the CAIR % is shown in Figs. 6.3a-g. In their original condition, buildings are unsafe (requiring retrofitting according to TSC-2007); these are shown by orange dots in these figures. In the same figures, preliminary assessment scores

and CAIR % of the retrofitted condition of the buildings (i.e. after retrofitting designs) are identified with green dots.

When the graphs given in Figs. 6.3a-g are examined, it is observed that the CAIR % of buildings within the scope of our study in their existing (original) condition varies between 1.48 % and 5.02 %. On the other hand the CAIR % of buildings in their retrofitted condition varies between 5.24 % and 12.63 %. The details of these values with respect to buildings are given in Appendix B.

According to the Özcebe *et al.* (2003) preliminary seismic assessment method, it is observed in Fig 6.3a that DI-LS scores of buildings in their existing (original) condition vary between 1.07 and -3.12. These values vary between -2.17 and -12.09 for retrofitted conditions of the buildings. As seen in Fig. 6.3b, according to Özcebe *et al.* (2003) preliminary seismic assessment method, DI-IO score changes between 2.84 and -3.42 for the original conditions of the buildings and -2.13 and -14.19 in their retrofitted condition.

For the P25 scoring method (Gülay *et al.*, 2008), P0 scores of buildings in their existing (original) condition vary between 47.34 and 288.24, as observed in Fig. 6.3c. These values vary between 121.39 and 386.26 in retrofitted conditions of the buildings. It is seen in Fig. 6.3d, for the P25 scoring Method P1 score changes between 14.99 and 108.08 in the case of existing (original) conditions of the buildings and between 47.76 and 239.87 in their retrofitted condition. Pw score of P25 scoring method changes between 41.93 and 88.96 in existing (original) conditions of buildings and 50.63 and 113.07 in their retrofitted condition (Fig. 6.3e).

In the case of the method proposed by Yakut (2004), CI(x) and CI(y) scores of buildings in their existing (original) condition vary between 0.28 and 2.66 (Fig. 6.3f). These values vary between 1.47 and 14.75 in retrofitted conditions of the buildings.

Regarding the application of Hassan and Sözen (1997) method, it is seen that PI(x) and PI(y) scores of buildings in their existing (original) condition vary between 0.98 and 4.26 (Fig. 6.3g). These values vary between 3.66 and 11.52 in retrofitted conditions of buildings. Comparing the method proposed by Hassan and Sözen (1997) with the other preliminary assessment methods, it can be realized that this method has shortcomings in determining safe and unsafe conditions of the buildings in terms of limit values as it is directly related to system cross-sectional areas and does not include structural characteristics such as structural irregularity, soil properties which are directly related to the simple assessment approach and earthquake resistance.

When the distribution of points corresponding to safe and unsafe conditions of buildings displayed in Figs. 6.3a-g are examined, it is observed that the dots located in the unsafe zone according to the Seismic Code move to the safe zone through the increases in CAIR % which causes an increases in preliminary assessment scores (PAS). As an example, this situation is shown in Fig. 6.4 for Özcebe *et al.* (2003) preliminary seismic assessment method, CI-LS score.

An important point to be highlighted here is that methods preferred for retrofitting increase the CAIR % in buildings. Therefore, the retrofitted conditions of buildings exhibit a higher CAIR % than that corresponding to the original condition of buildings. This fundamental difference allows us to distinguish original and retrofitted conditions of buildings according to the CAIR %. Besides, differences between the original and the retrofitted conditions of buildings also constitute the main component of retrofitting cost calculations which will be discussed in the next sections.

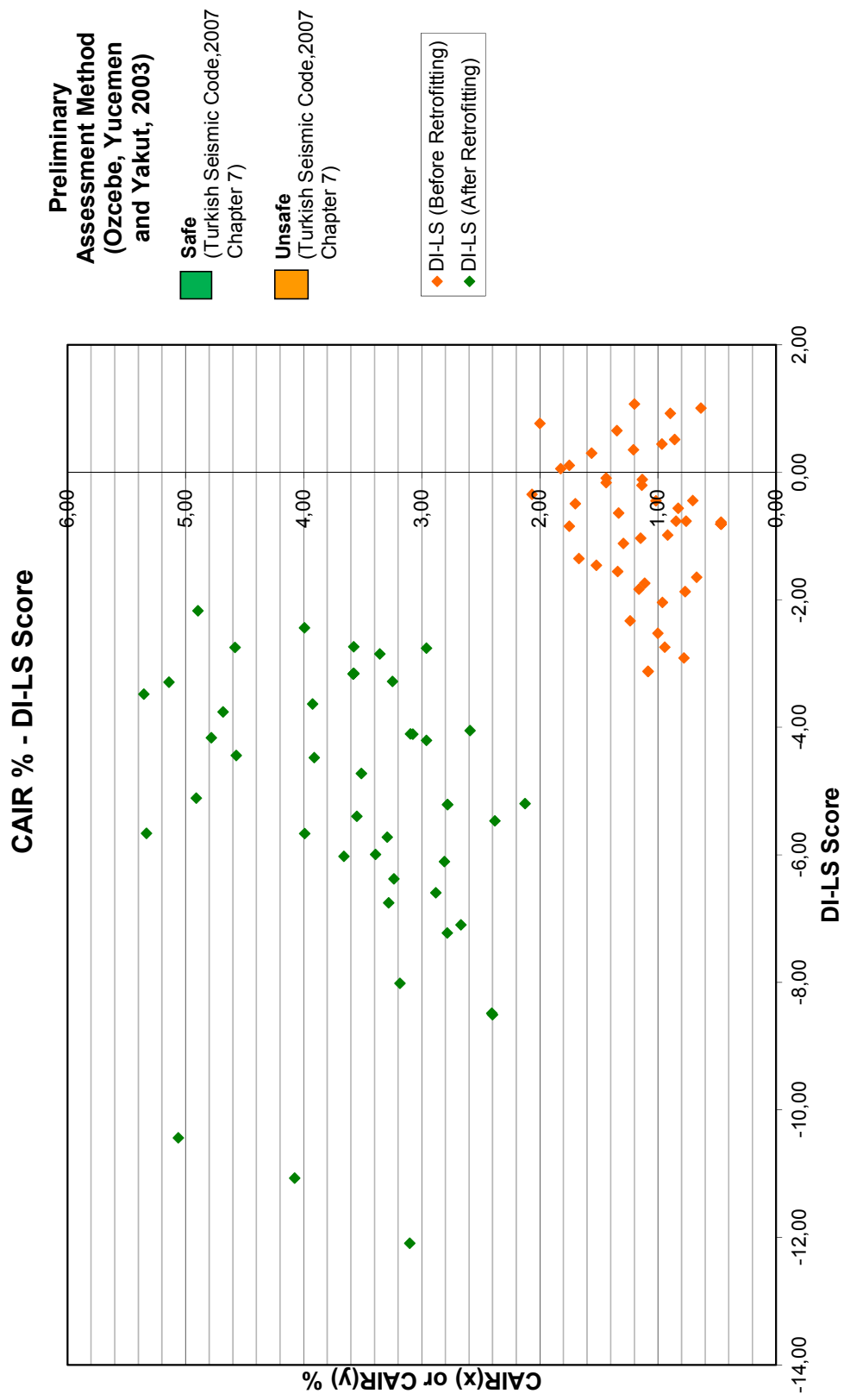


Fig. 6.3a. Distribution of DI-LS scores with respect to CAIR % for buildings in their original and retrofitted conditions



Fig. 6.3b. Distribution of DI-IO scores with respect to CAIR % for buildings in their original and retrofitted conditions

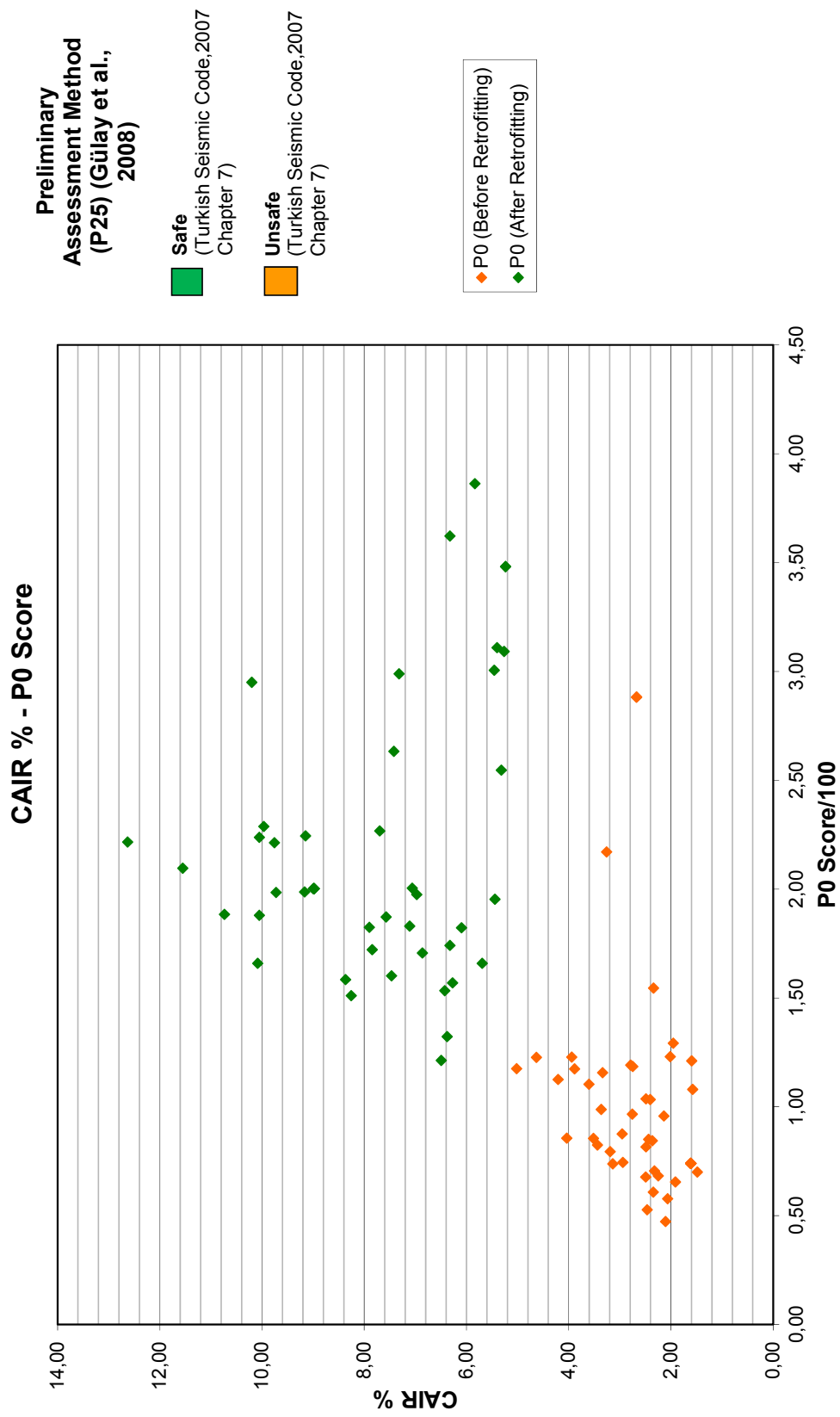


Fig. 6.3c. Distribution of P0 scores with respect to CAIR % for buildings in their original and retrofitted conditions

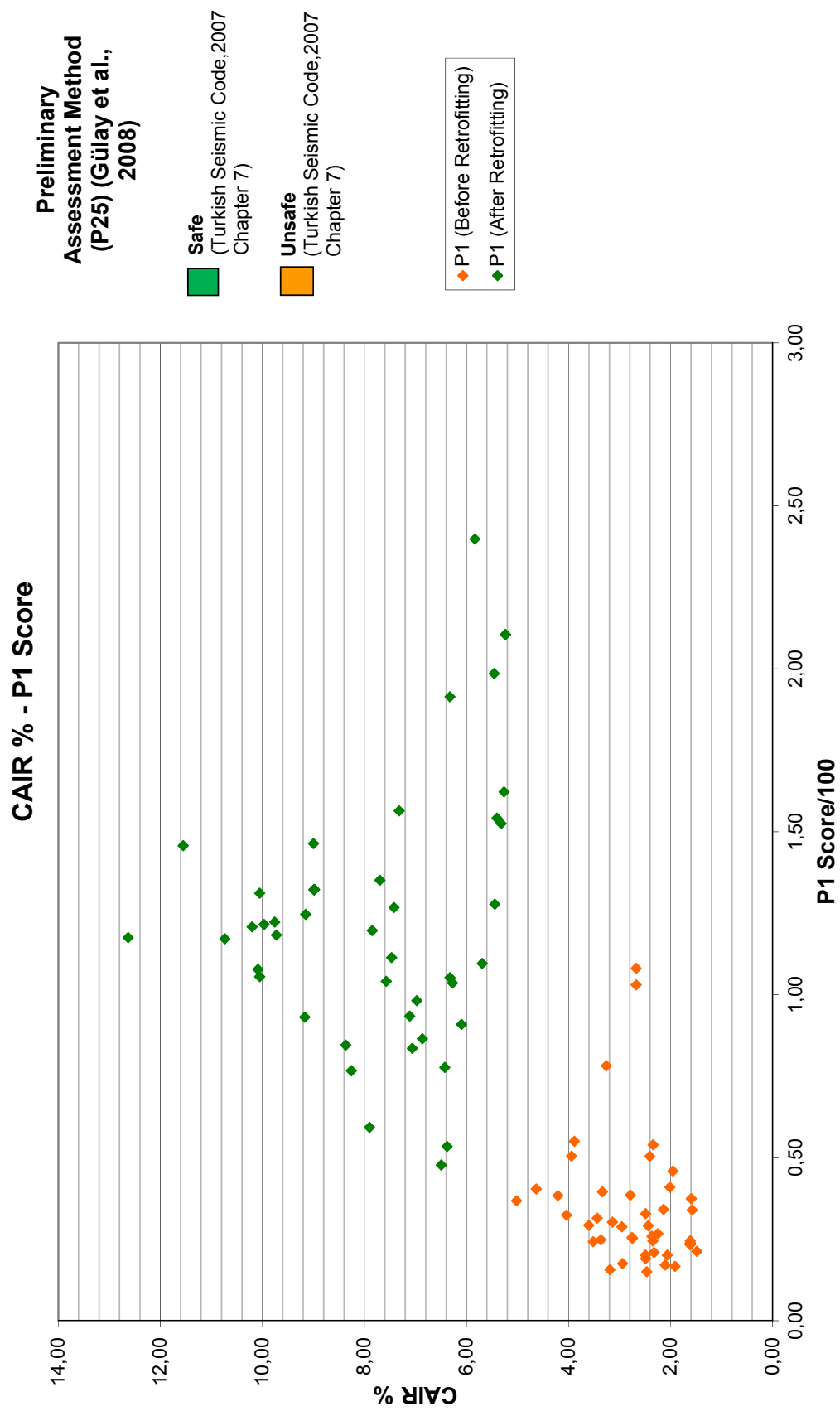


Fig. 6.3d. Distribution of P1 scores with respect to CAIR % for buildings in their original and retrofitted conditions

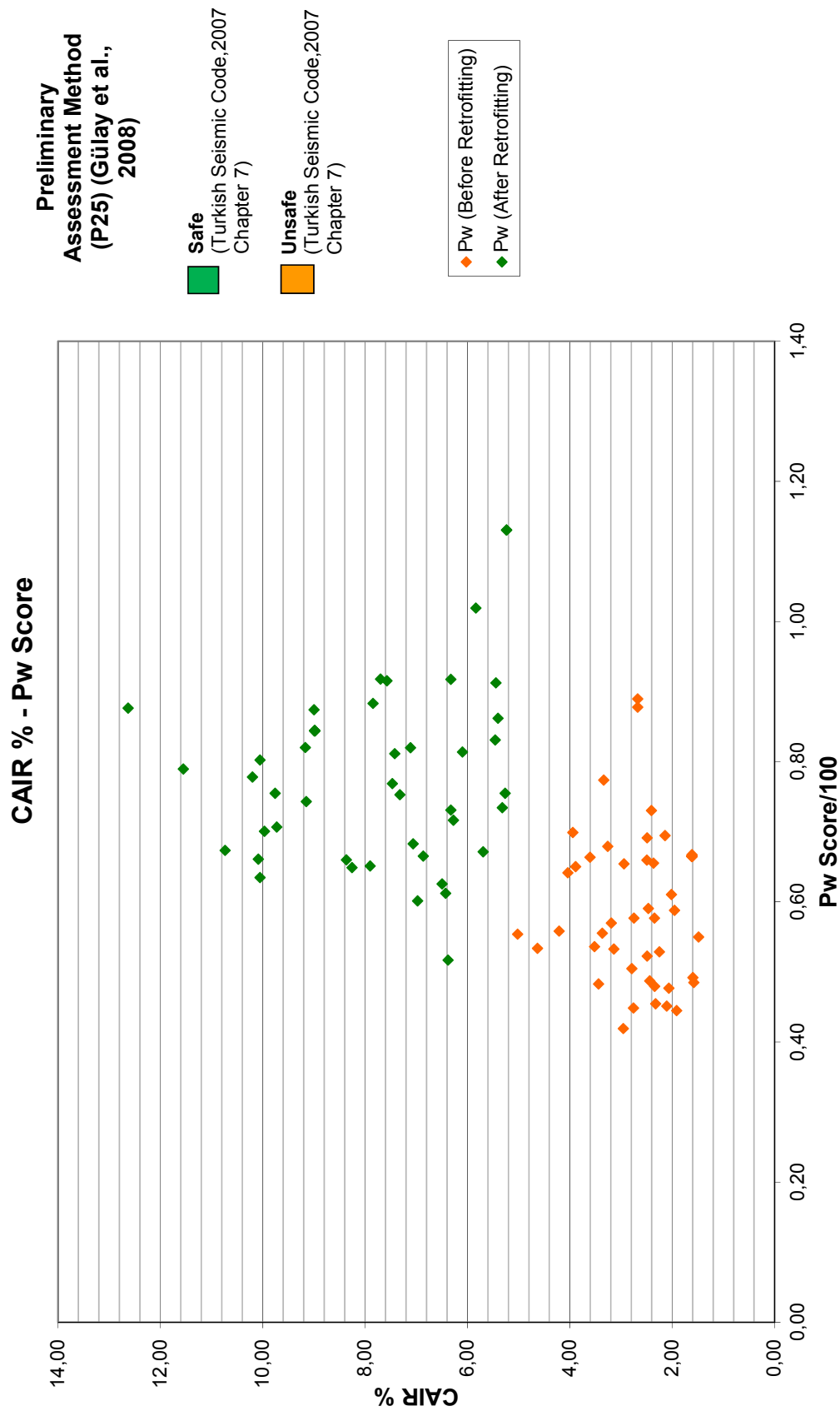


Fig. 6.3e. Distribution of Pw scores with respect to CAIR % for buildings in their original and retrofitted conditions

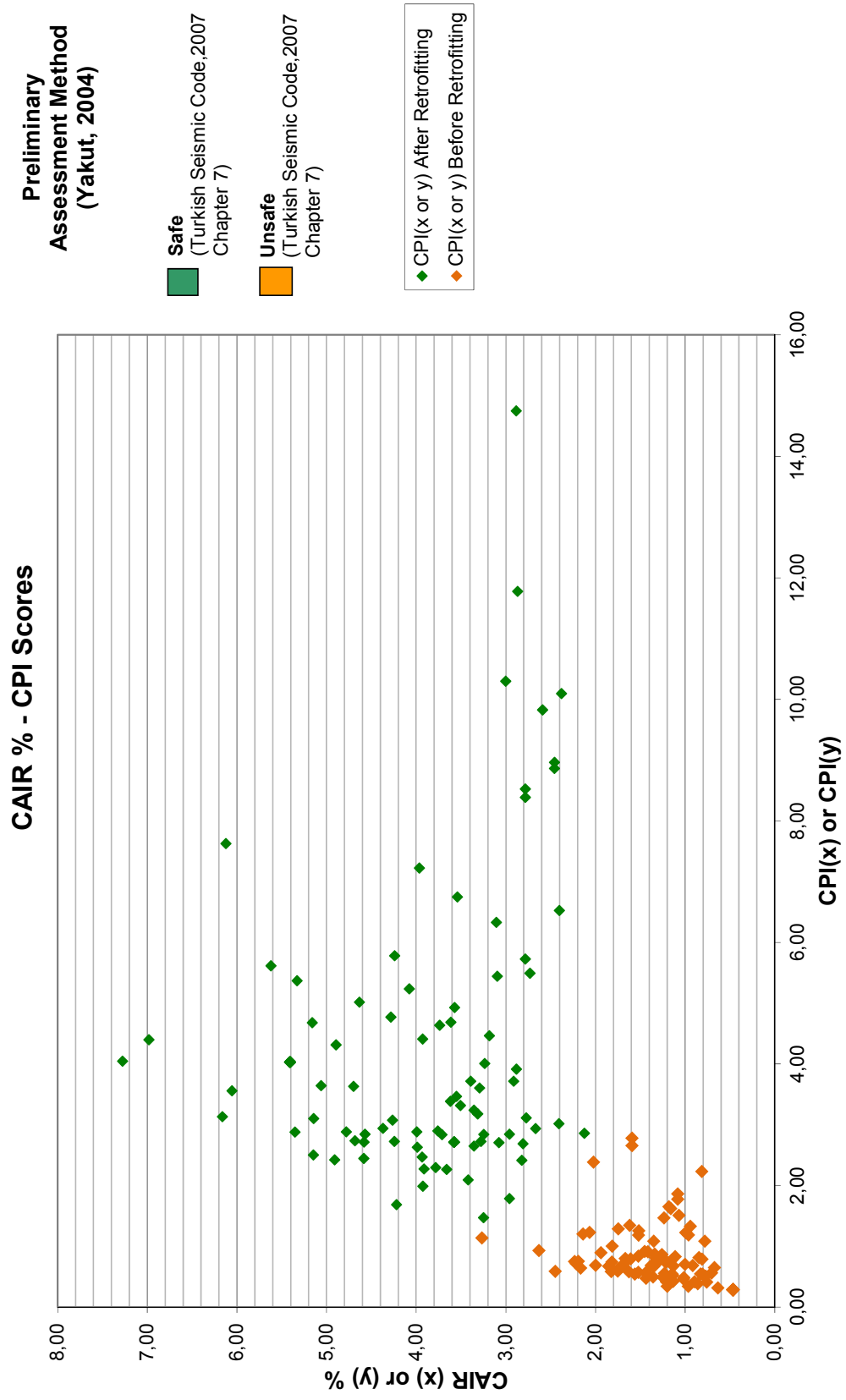


Fig. 6.3f. Distribution of CPI(x) and CPI(y) scores with respect to CAIR % for buildings in their original and retrofitted conditions

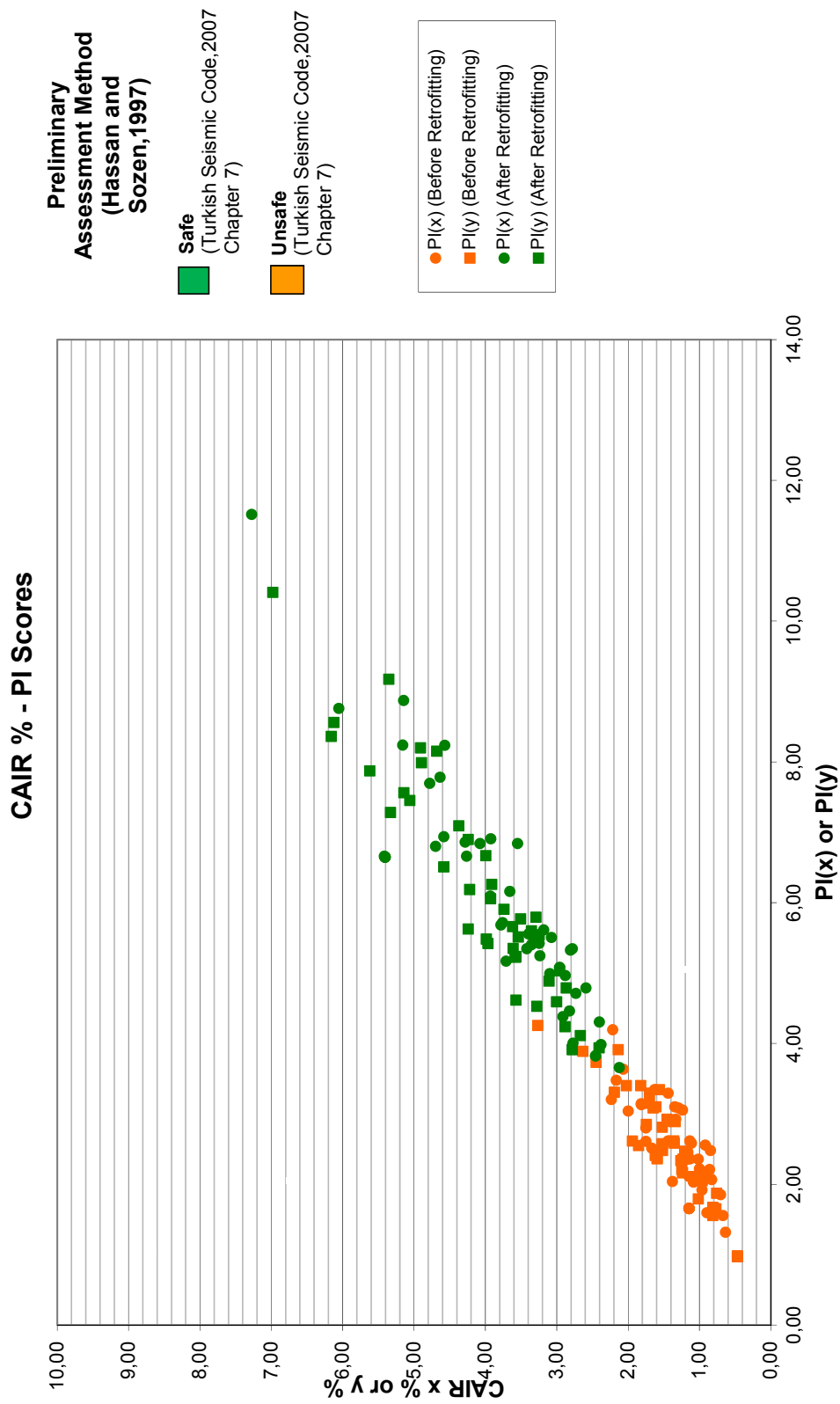


Fig. 6.3g. Distribution of PI(x) and PI(y) scores with respect to CAIR % for buildings in their original and retrofitted conditions

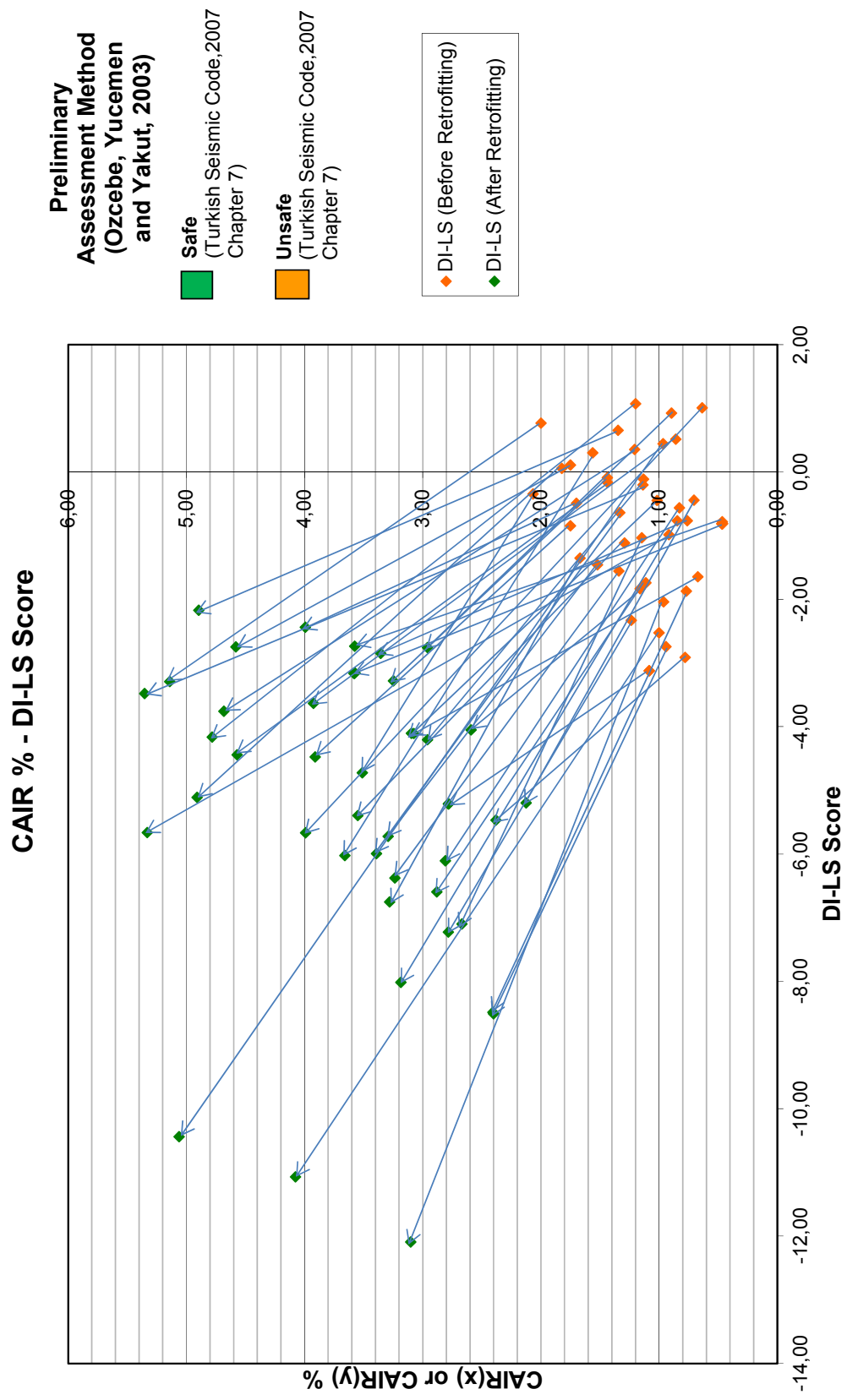


Fig. 6.4. Distribution of CAIR% and PAS increase paths for Özcebe *et al.* (2003) method , DI-LS score

6.4 A Methodology for Estimating Building Seismic Safety

In the previous chapter, the distributions of vertical load-bearing system members of buildings in their existing and retrofitted conditions were inspected with respect to their CAIR % and preliminary assessment scores (PAS). When these distributions that are displayed in Figs. 6.3a-g are inspected, it is observed that the existing and retrofitted condition distributions form two different clusters.

Delineation of lines on these graphs is required to partition the region in order to determine whether a given building is in safe or unsafe state. A statistical technique known as discriminant analysis is used for this purpose in this study. This technique provides a more systematic and rational approach for differentiating unsafe buildings from the safe ones. The basic aim here is to evaluate the building safety of low to medium rise reinforced concrete frame buildings based on their CAIR% and PAS values.

The discriminant analysis procedure creates a statistical basis for deciding into which category (unsafe or safe) a certain set of observations falls (Yüçemen *et al.* 2004). The identification of the first group of estimation variables that provide the best discrimination among the groups is done in discriminant analyses. They are known as the discriminator variables. Then a discriminant function, which is a linear combination of discriminator variables, is derived. The values resulting from the discriminant function are known as discriminant scores. The discriminant function is estimated in such a way that the ratio of between-groups sums of squares to within group sum squares for the discriminant scores is a maximum (Sharma, 1996). The final objective of discriminant analysis is to classify future observations into one of the specified groups, based on the values of their discriminant scores.

In our study reinforced concrete building safety classification will be considered based on CAIR % and PAS values. This classification has two groupings with the first group consisting of “unsafe” buildings with an indicator variable 0 and the second group consisting of “safe” buildings, with an indicator variable 1. In both cases the statistical analyses are carried out by using the SPSS Software (SPSS, 2001).

An output of the various parameters and options that have been selected for computing the discriminant function and classifying the observations in the sample is given by the SPSS in the discriminant analysis procedure. The maximum computable number of discriminant functions is the minimum of $g-1$ or p , wherein g is the number of groups and p is the number of variables. As the number of groups is equal to 2, for each preliminary assessment method, only one discriminant function is possible.

If the two estimation parameters (CAIR % and PAS) are included into the discriminant analysis for each preliminary assessment method, then the following unstandardized estimate of the discriminant function is obtained as an output of the SPSS software;

Table 6.1. Unstandardized estimate of discriminant functions (DI)

Preliminary Assessment Method	Discriminant Score (DI)
Method proposed by Özcebe <i>et al.</i> (2003) DI-LS score	$DI = -0.380 PAS + 1.341 CAIR \% - 4.256$
Method proposed by Özcebe <i>et al.</i> (2003) DI-IO score	$DI = -0.289 PAS + 1.339 CAIR \% - 4.007$
Method proposed by Gülay <i>et al.</i> (2008) (P25 Method) P0 score	$DI = 1.046 PAS + 0.615 CAIR \% - 4.893$
Method proposed by Gülay <i>et al.</i> (2008) (P25 Method) P1 score	$DI = 2.211 PAS + 0.565 CAIR \% - 4.707$
Method proposed by Gülay <i>et al.</i> (2008) (P25 Method) Pw score	$DI = 4.210 PAS + 0.639 CAIR \% - 6.254$
Method proposed by Yakut (2004) CPI(x) and CPI(y) scores	$DI = 0.283 PAS + 1.035 CAIR \% - 3.681$
Method proposed by Hassan and Sözen (1997) PI(x) and PI(y) scores	$DI = 0.751 PAS + 0.403 CAIR \% - 4.194$

Here, DI is the discriminant score, which is a composite index that results from the linear combination of the original estimation variables (CAIR % and PAS). The functions given in Table 6.1 are referred to as the unstandardized discriminant function, because the unstandardized (raw) data are used for computing discriminant function. In this context discriminant score is an indicator of expected damage (i.e. safe or unsafe state) and therefore it is denoted by DI and termed as damage indicator.

The coefficients of the discriminant function are not unique; they are unique only in relative sense. With that in mind, the standardized coefficients and so the standardized discriminant function are found by way of multiplication of each unstandardized coefficient by the pooled standard deviation of the variable that is associated with that coefficient: The standardized discriminant function obtained as an output from the SPSS software is as follows:

Table 6.2. Standardized estimate of discriminant functions.

Preliminary Assessment Method	Standardized Discriminant Functions (DI_s)
Method proposed by Özcebe <i>et al.</i> , (2003), DI-LS score	$DI_s = -0.676 PAS + 0.893 CAIR \%$
Method proposed by Özcebe <i>et al.</i> , (2003), DI-IO score	$DI_s = -0.640 PAS + 0.892 CAIR \%$
Method proposed by Gülay <i>et al.</i> , (2008), (P25 Method) P0 score	$DI_s = 0.586 PAS + 0.893 CAIR \%$
Method proposed by Gülay <i>et al.</i> , (2008) (P25 Method) P1 score	$DI_s = 0.692 PAS + 0.821 CAIR \%$
Method proposed by Gülay <i>et al.</i> , (2008) (P25 Method) Pw score	$DI_s = 0.493 PAS + 0.928 CAIR \%$
Method proposed by Yakut, (2004), CPI(x) and CPI(y) scores	$DI_s = 0.651 PAS + 0.879 CAIR \%$
Method proposed by Hassan and Sözen (1997), PI(x) and PI(y) scores	$DI_s = 0.894 PAS + 0.686 CAIR \%$

Here, DI_s denotes the standardized discriminant score. Standardized coefficients are normally used for assessing the relative importance of discriminator variables forming the discriminant function. The greater the standardized coefficient, the greater is the relative importance of the corresponding variable. Thus, in the methods proposed by Özcebe *et al.* (2003), Gülay *et al.* (2008) and Yakut (2004) CAIR % appears to be the most discriminating variable in forming the discriminant function.

Summarizing the classification results, corresponding to different preliminary seismic assessment methods are given in Tables 6.3a-g.

Table 6.3a. Classification results based on Özcebe *et al.* (2003), DI-LS score.

Özcebe <i>et al.</i> (2003) <i>DI-LS score</i>		Predicted Group Membership*		TOTAL
		0	1	
Original Group Membership Count	0	48	0	48
	1	0	48	48
%	0	100.0	0.0	100
	1	0.0	100.0	100
* 100.0 % of the original grouped cases are correctly classified				

Table 6.3b. Classification results based on Özcebe *et al.* (2003), DI-IO score.

Özcebe <i>et al.</i> (2003) <i>DI-IO score</i>		Predicted Group Membership*		TOTAL
		0	1	
Original Group Membership Count	0	48	0	48
	1	0	48	48
%	0	100.0	0.0	100
	1	0.0	100.0	100
* 100.0 % of the original grouped cases are correctly classified.				

Table 6.3c. Classification results based on Gülay *et al.* (2008), P0 score.

Gülay <i>et al.</i> (2008) <i>P0 score</i>		Predicted Group Membership*		TOTAL
		0	1	
Original Group Membership Count	0	48	0	48
	1	0	48	48
%	0	100.0	0.0	100
	1	0.0	100.0	100
* 100.0 % of the original grouped cases are correctly classified.				

Table 6.3d. Classification results based on Gülay *et al.* (2008), P1 score.

Gülay <i>et al.</i> (2008) <i>P1 score</i>		Predicted Group Membership*		TOTAL
		0	1	
Original Group Membership Count	0	48	0	48
	1	0	48	48
%	0	100.0	0.0	100
	1	0.0	100.0	100
* 100.0 % of the original grouped cases are correctly classified.				

Table 6.3e. Classification results based on Gülay *et al.* (2008), Pw score.

Gülay <i>et al.</i> (2008) <i>Pw score</i>		Predicted Group Membership*		TOTAL
		0	1	
Original Group Membership Count	0	48	0	48
	1	0	48	48
%	0	100.0	0.0	100
	1	0.0	100.0	100
* 100.0 % of the original grouped cases are correctly classified.				

Table 6.3f. Classification results based on Yakut (2004), CPI(x) and CPI(y) scores combined.

Yakut (2004) <i>CPI(x) - CPI(y) scores</i>		Predicted Group Membership*		TOTAL
		0	1	
Original Group Membership Count	0	95	1	96
	1	2	94	96
%	0	99.0	1.0	100.0
	1	2.1	97.9	100.0
* 98.4 % of the original grouped cases are correctly classified.				

Table 6.3g. Classification results based on Hassan and Sözen (1997), PI(x) and PI(y) scores combined.

<i>Hassan and Sözen (1997) PI(x) and PI(y) Scores</i>		Predicted Group Membership*		TOTAL
Original Group Membership Count		0	1	
	0	96	0	96
	1	2	94	96
%	0	100.0	0	100.0
	1	2.1	97.9	100.0
* 99.0 % of the original grouped cases are correctly classified.				

The cutoff value (CV) is defined as the discriminant score's value that divides the space into two. In general, the cutoff value is selected in order to minimize the number of misclassifications. A cutoff value that minimizes the number of incorrect classifications for the sample data that is used frequently is the average of the mean discriminant scores for the two groups (those being safe and unsafe) as expressed by Eq. 6.3.

$$CV = \frac{(\bar{Z}_{SAFE} + \bar{Z}_{UNSAFE})}{2} \quad (6.3)$$

where,

$\bar{Z}_{SAFE}$ and $\bar{Z}_{UNSAFE}$: Mean values of the discriminant scores for the safe and unsafe groups.

From the output of the SPSS software, the mean discriminant scores for safe and unsafe states are computed and the resulting CV values are shown in Table 6.4 for the different seismic preliminary assessment methods. Thus, for any building with known CAIR % and PAS values, the discriminant score will be computed from the equations given in Table 6.1 and if the computed score is greater than the cutoff value, this building is assigned to the "safe" state, whereas if the discriminant score is less than cutoff value, this building is rated as "unsafe". Using the unstandardized discriminant functions together with the corresponding cutoff values, cutoff value limit line (CVLL) equations are obtained for each assessment method and plotted in Figs. 6.5a-f. Note that in these figures, y and x represent CAIR% and PAS, respectively.

Table 6.4. Calculated cutoff values (CV) for the different preliminary assessment methods.

Preliminary Assessment Method	Cutoff Value (DI)
Method proposed by Özcebe <i>et al.</i> ,(2003), DI-LS score	-0.0015
Method proposed by Özcebe <i>et al.</i> ,(2003), DI-IO score	-0.7246
Method proposed by Gülay <i>et al.</i> ,(2008) (P25 Method), P0 score	0.0002
Method proposed by Gülay <i>et al.</i> ,(2008) (P25 Method), P1 score	-0.0015
Method proposed by Gülay <i>et al.</i> ,(2008) (P25 Method), Pw score	0.0038
Method proposed by Yakut, (2004), CPI(x) and CPI(y) scores	-0.0279
Method proposed by Hassan and Sözen (1997), PI(x) and PI(y) scores	0.0373

An important point here is, that all the structures that are included in our study are buildings that don't meet the minimum performance levels of TSC-2007, have various structural deficiencies and do not meet the desired structural quality. Accordingly, it is known that a structure that is designed according to TSC-2007 can be safe in the graphics with a lesser amount of CAIR%. This situation can make the safe and unsafe structure discrimination more difficult, in other words, it is a reality that a structure that was designed and built with respect to the earthquake code and hence does not include structural deficiencies and is satisfactory in structural quality may have a higher PAS value with lesser CAIR% value. To solve this problem, it will be useful to create a second limit line in addition to the partition line that was created by the discriminant analysis and to define a third zone besides the safe and unsafe zones in the graphs.

For this purpose, inspection of the Fig. 6.4 will be helpful. Here, it is observed that the unsafe buildings shown by orange points reach a safe state (which is indicated by green points) after the CAIR% and PAS values increase through retrofitting. The positive tendency that is seen after retrofitting is described by paths between the unsafe and safe points as shown in Fig. 6.4. Each path line in the graph has a different slope. This slope can be described as the ratio of the increase in CAIR % to the increase in PAS values after retrofitting as described by Eq. 6.4.

$$m_i = \frac{CAIR\%_{ARi} - CAIR\%_{BRi}}{PAS_{ARi} - PAS_{BRi}} \quad (6.4)$$

where,

- m_i : is the path line slope of i^{th} building
- $CAIR\%_{ARi}$: is the cross-sectional area index ratio of i^{th} building in retrofitted condition
- $CAIR\%_{BRi}$: is the cross-sectional area index ratio of i^{th} building in original (existing) condition
- PAS_{ARi} : is the preliminary assessment score of i^{th} building in retrofitting condition
- PAS_{BRi} : is the preliminary assessment score of i^{th} building in original (existing) condition

The paths plotted in Fig. 6.4 have different slopes. Accordingly, the maximum and minimum values of the slopes can be identified (min m_i and max m_i). Any point that takes places among the orange points can be moved to the safe zone with a slope between min and max slope values. It is advantageous to use the minimum slope value (min m_i) to create the second boundary condition in addition to the cutoff value limit line (CVLL) that was derived earlier. The reason for this usage is hidden in the definition of the minimum increase path slope. The minimum increase path slope describes the minimum value of the ratio of the CAIR % increase to the PAS increase. This situation is compatible with the definition of new structures that are safe with lesser CAIR % values accompanied by higher PAS values.

Based on the identified minimum slope, a method is devised to create a secondary safe and unsafe zone boundary condition using the distributions in Figs. 6.3a-g. The steps of this procedure are shown in Fig. 6.5.

The first step is to determine the slopes of the path lines between orange (unsafe) and green (safe) point distributions shown in Fig. 6.4 for every preliminary assessment method (Fig. 6.5a). After this, the minimum and the maximum values are found among these slope values determined in this process (Fig 6.5b).

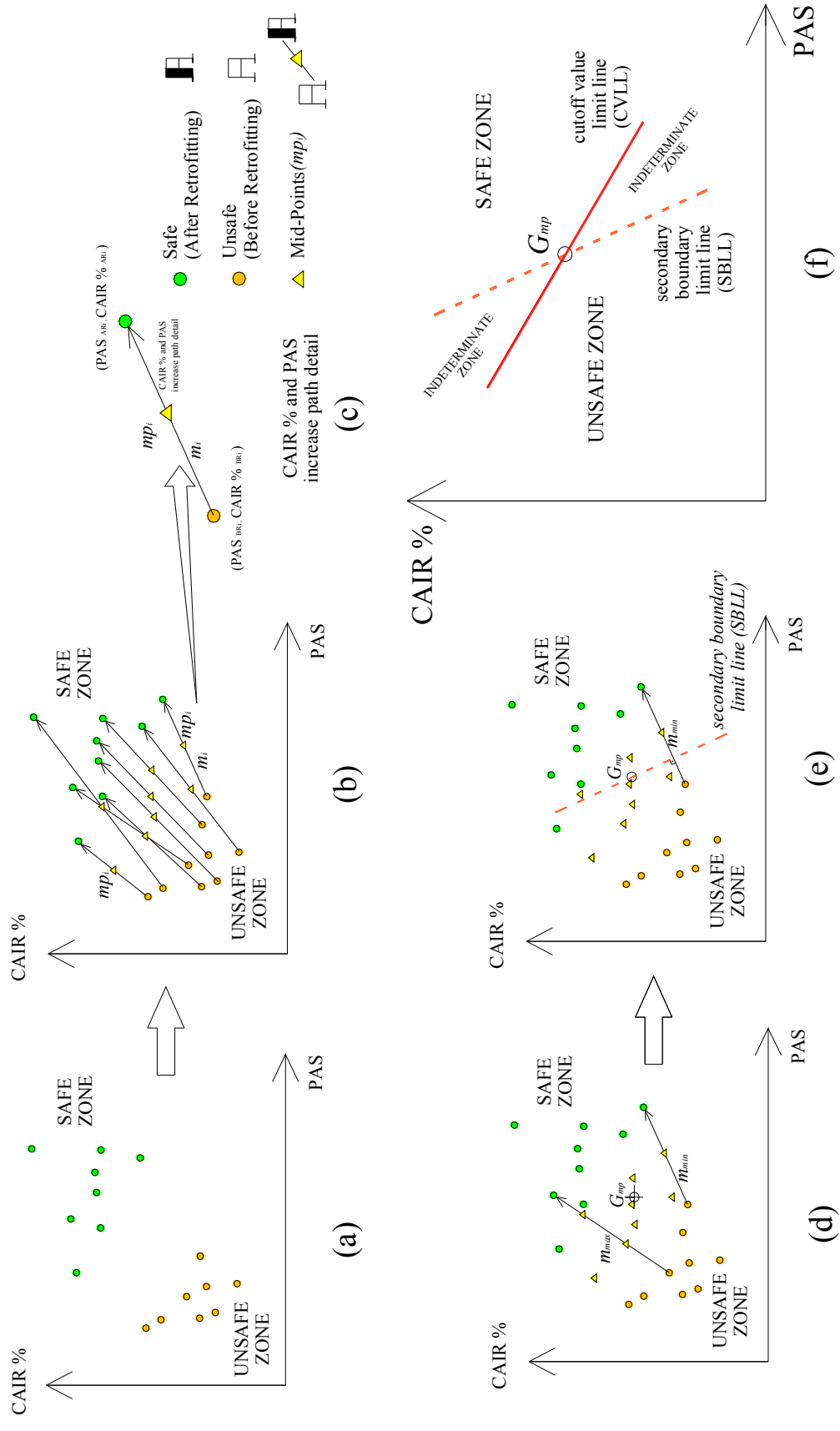


Fig. 6.5. Steps for plotting the secondary boundary limit line (SBLL)

In the second step, the midpoints (mp_i) of the path lines that define the CAIR % and PAS increases are found. These points that are shown in yellow in Fig. 6.5c correspond to the average values. The coordinates of mid-points are given in Eq. 6.5.

$$mp_i \left(\frac{CAIR\%_{ARi} + CAIR\%_{BRi}}{2}, \frac{PAS_{ARi} + PAS_{BRi}}{2} \right) \quad (6.5)$$

After the definition of midpoints, the center of gravity of the midpoints (G_{mp}) is found. The coordinates of this point are given by Eq. 6.6. The center of gravity of the midpoints also corresponds to the midpoint of the entire safe and unsafe (green and orange points) distributions.

$$G_{mp} \left(\sum_{i=1}^n mp_{ix} / n, \sum_{i=1}^n mp_{iy} / n \right) \quad (6.6)$$

In the third step, a secondary line that passes through the center of gravity of the midpoints and is perpendicular to the m_{min} values found in Step 1 is plotted. This is called “*secondary boundary limits line*” (SBLL). Using the resulting secondary boundary limit line together with the discriminant based partition line (cutoff value limit line-CVLL) the PAS-CAIR % domain is split into three zones as shown in Fig. 6.5f.

The first zone, called the “unsafe zone”, is composed of the points that define the unsafe conditions of structures. The “safe zone” is contains points that define the safe conditions of the same structures. The third zone which lies between the CVLL and SBLL is called the “indeterminate zone”. The safe or unsafe state of structures that are in this zone can’t be distinctly identified according to CAIR % and PAS values. There is a need for further analysis to correctly rate these buildings as safe or unsafe.

The cutoff value limit lines (CVLL) and the secondary boundary limit lines (SBLL) that were defined in this section are shown in the Figs. 6.6a-g together with their corresponding equations.

The classifying criteria developed in this study are checked with respect to some existing buildings that were found to be unsafe according to the linear seismic assessments conducted with respect to Chapter 7 of TSC-2007. The results of these evaluations are presented in Figs. 6.7a-g. On the same figures the results of evaluation of buildings that are safe and were designed according to TSC-2007 are given. The results show that the created boundary conditions are quite appropriate, especially in the determination of unsafe buildings in their existing conditions that were projected and built before 1998.

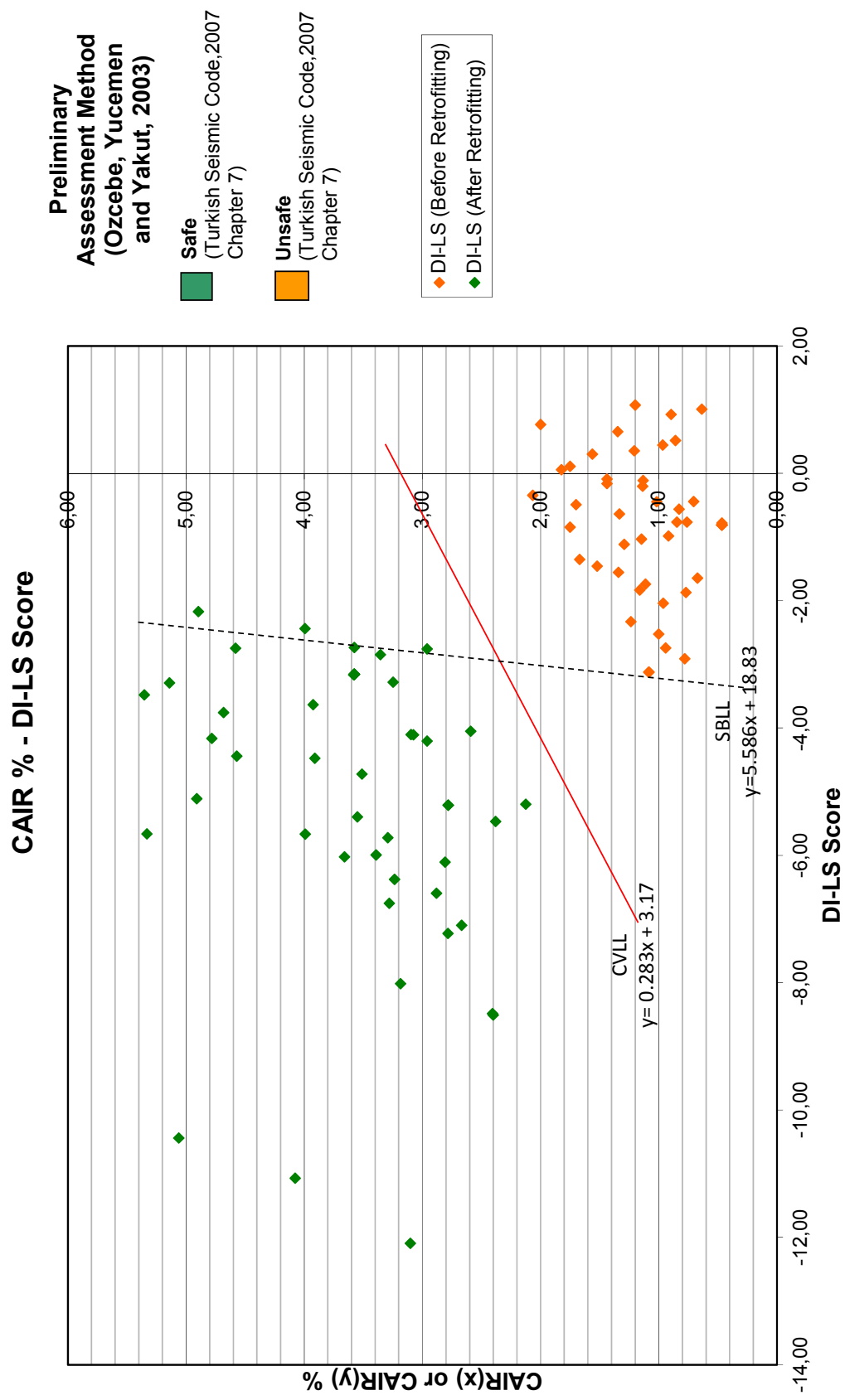


Fig. 6.6a. CVLL and SBLL equations for Özcebe *et al.*(2003), DI-LS score

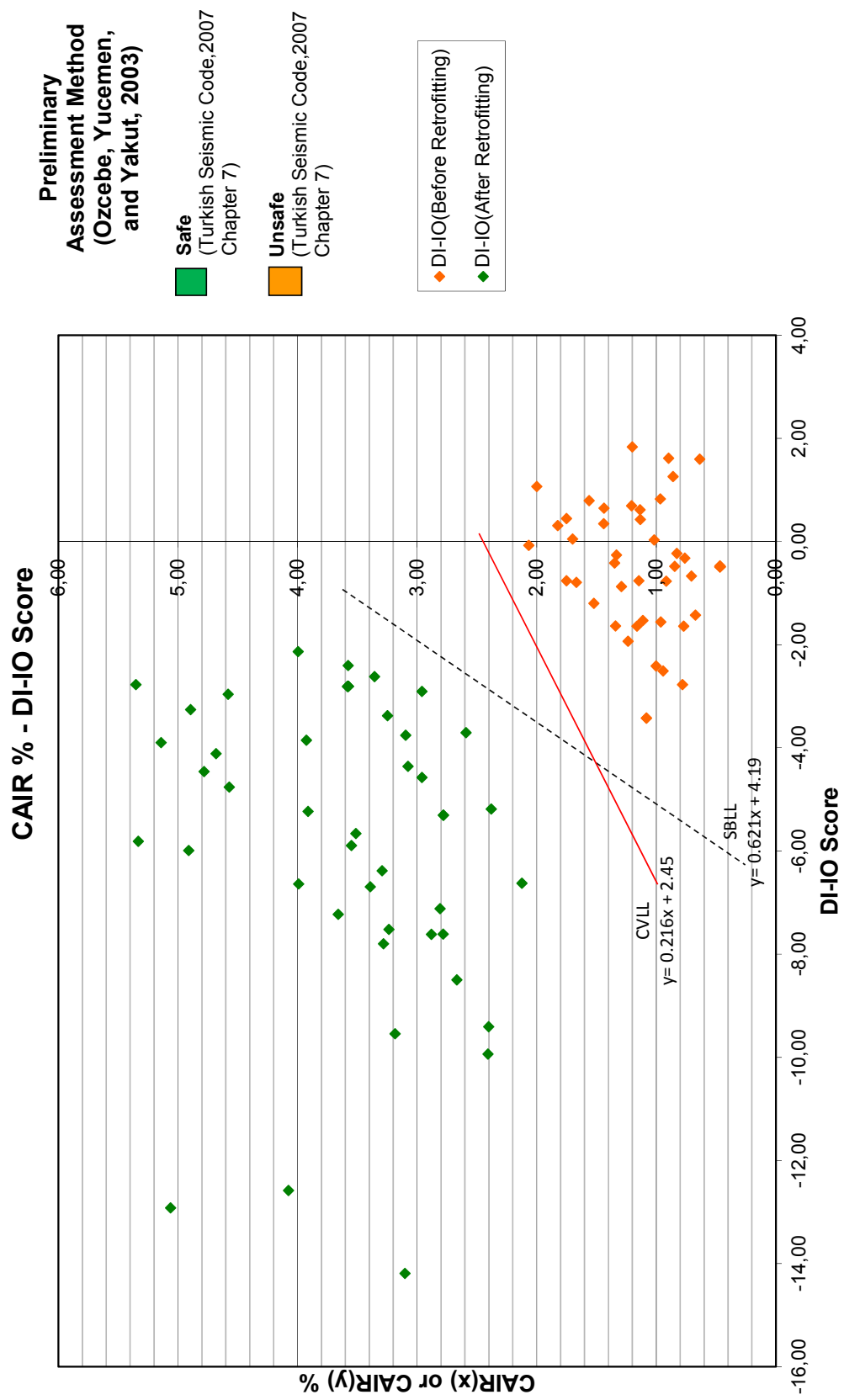


Fig. 6.6b. CVLL and SBLL equations for Özcebe *et al.* (2003), DI-IO score

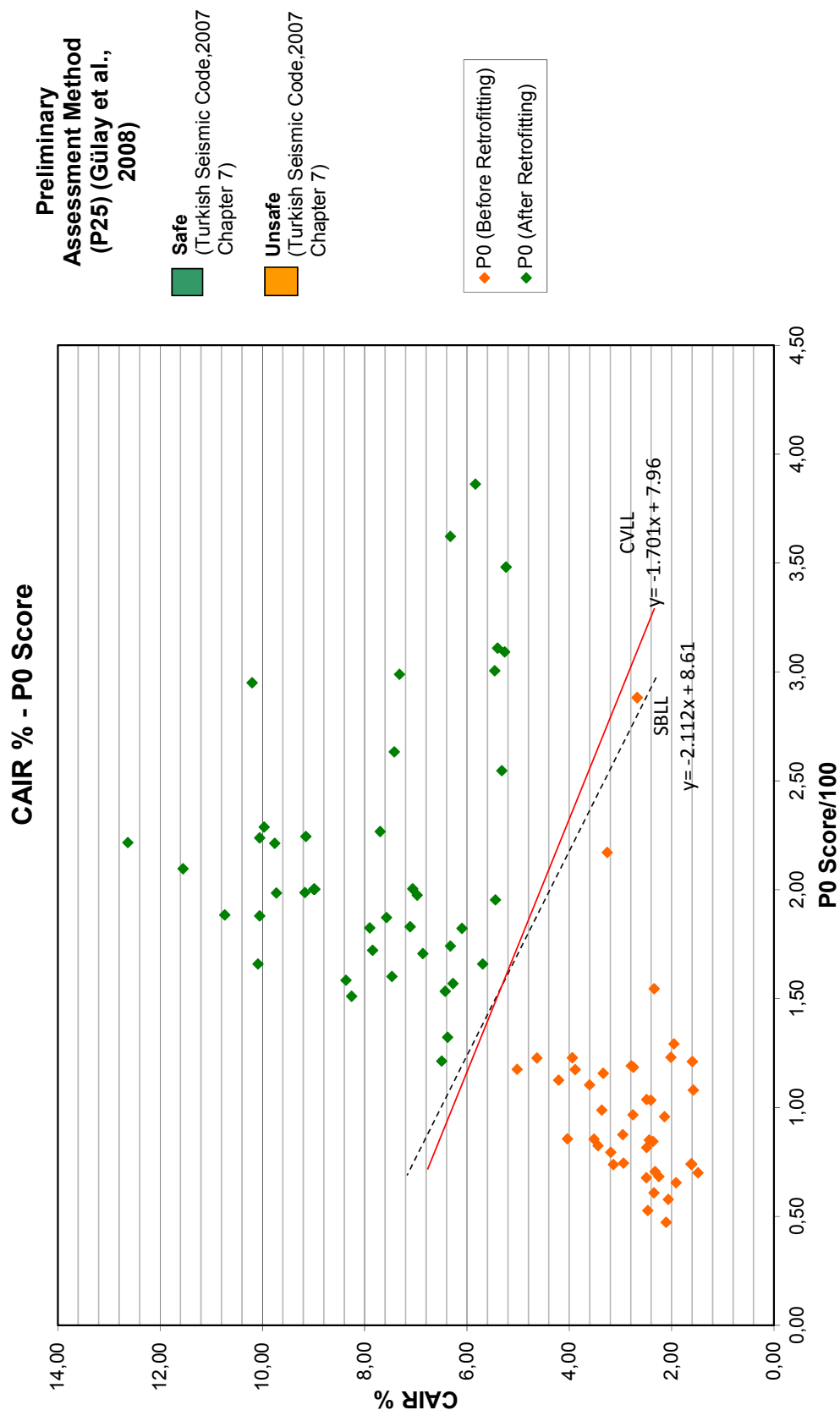


Fig. 6.6c. CVLL and SBLL equations for P25 Scoring Method, P0 score

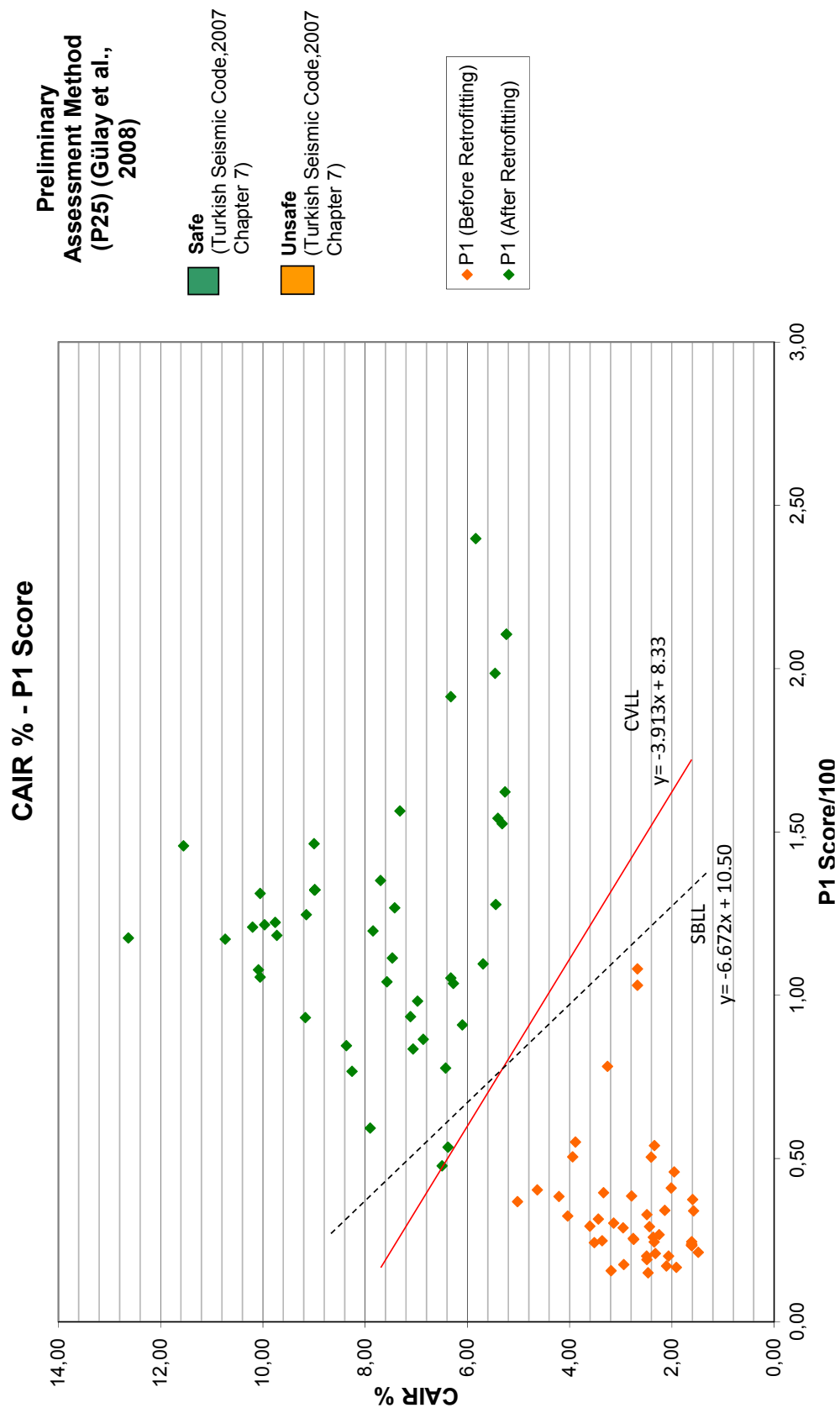


Fig. 6.6d. CVLL and SBLL equations for P25 Scoring Method, P1 score

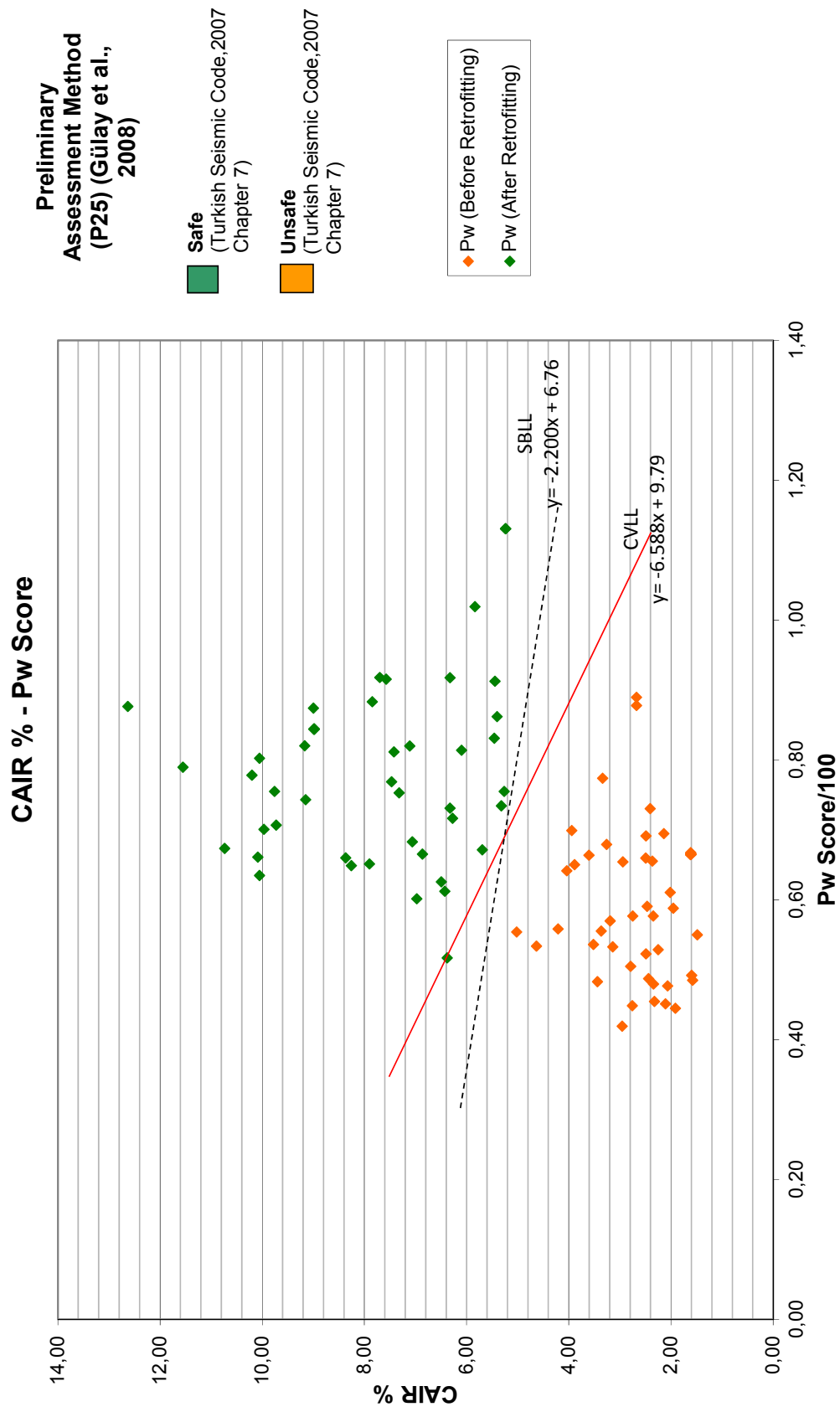


Fig. 6.6e. CVLL and SBLL equations for P25 Scoring Method, Pw score

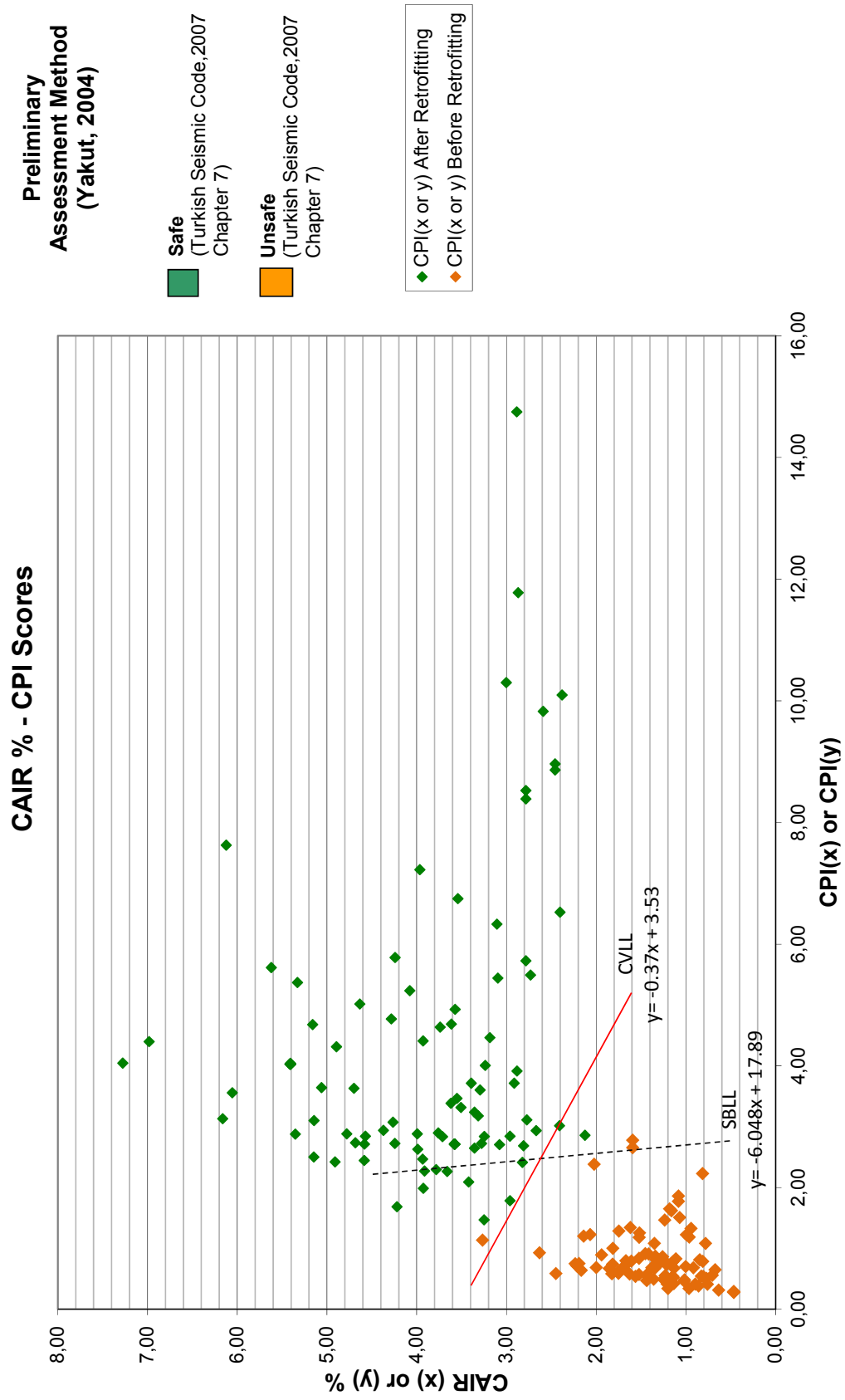


Fig. 6.6f. CVLL and SBLL equations for Yakut (2004) preliminary assessment method, CPI scores

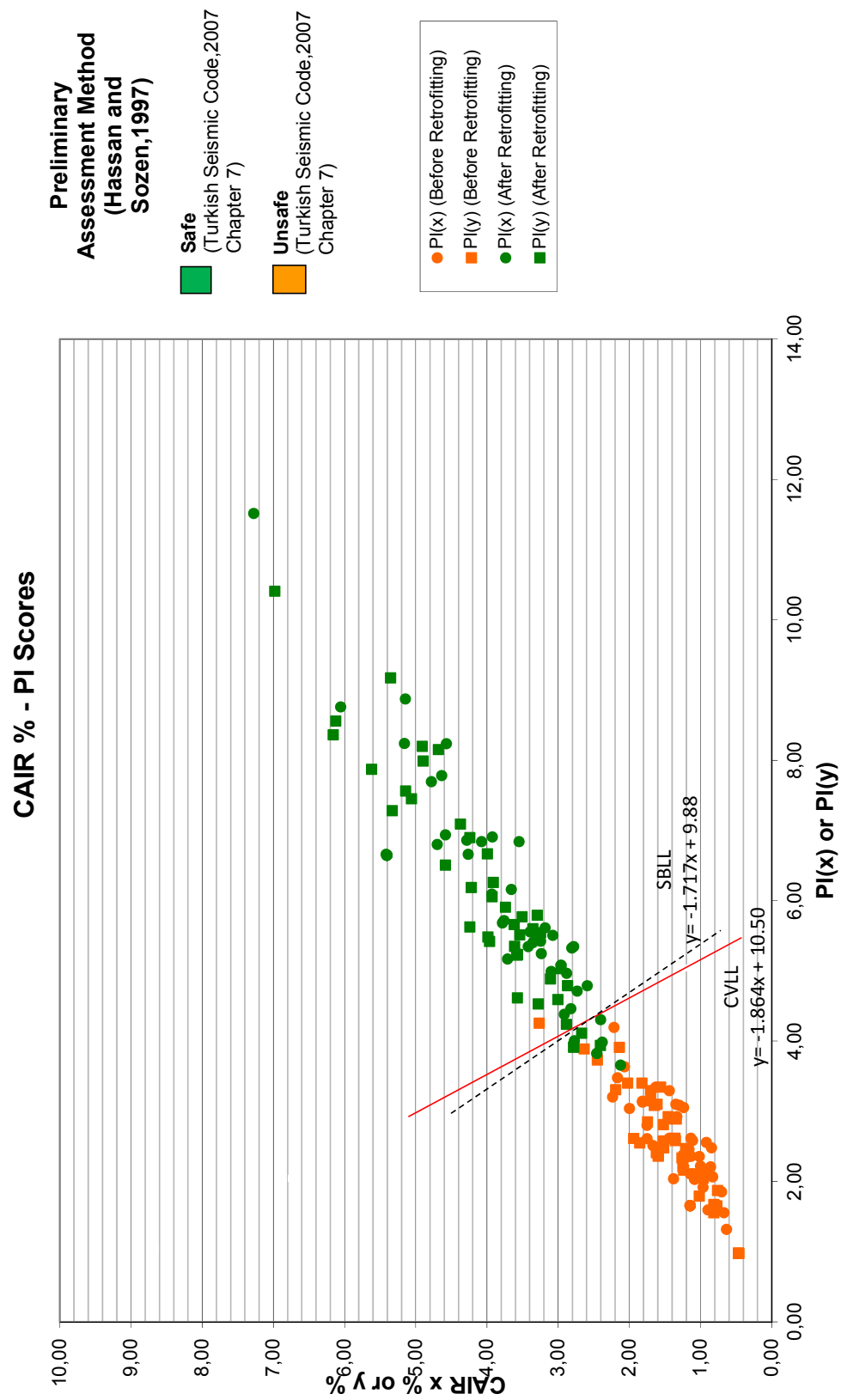


Fig. 6.6g. CVLL and SBL equations for Hassan and Sozen (1997) preliminary assessment method, PI scores

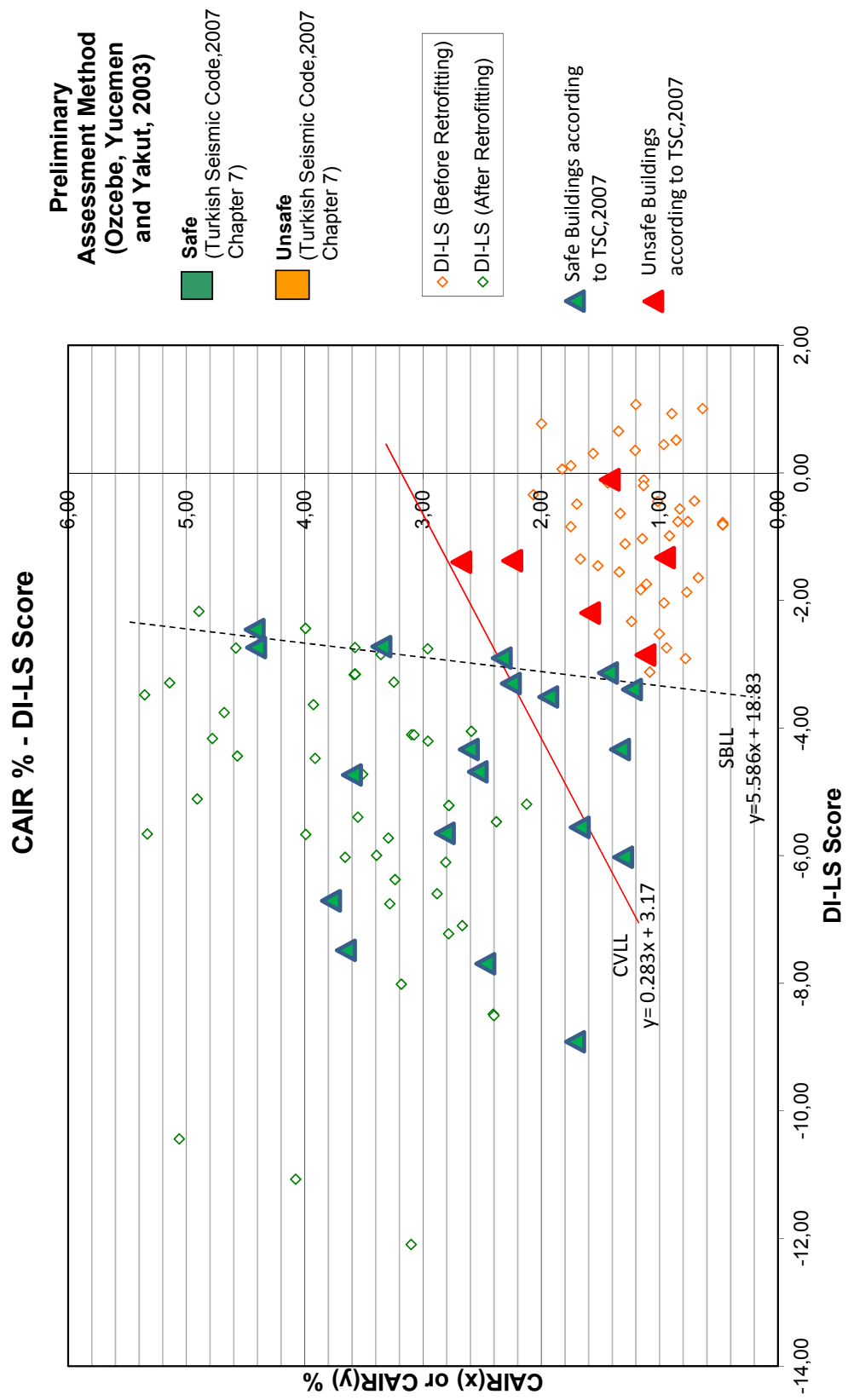


Fig. 6.7a. Evaluation (safety checking) of selected buildings according to Özcebe *et al.* (2003), DI-LS score

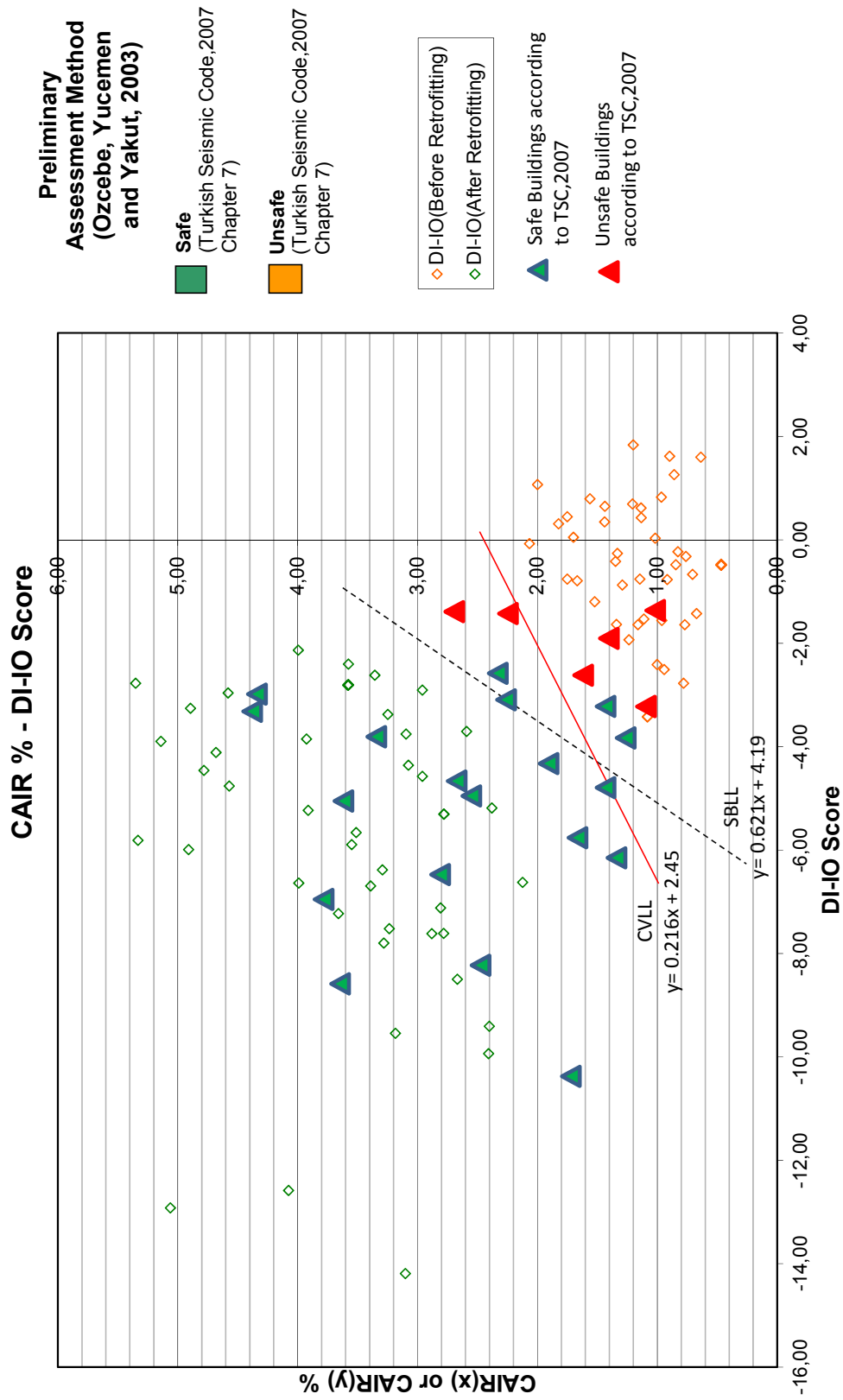


Fig. 6.7b. Evaluation (safety checking) of selected buildings according to Özcebe *et al.* (2003), DI-IO score

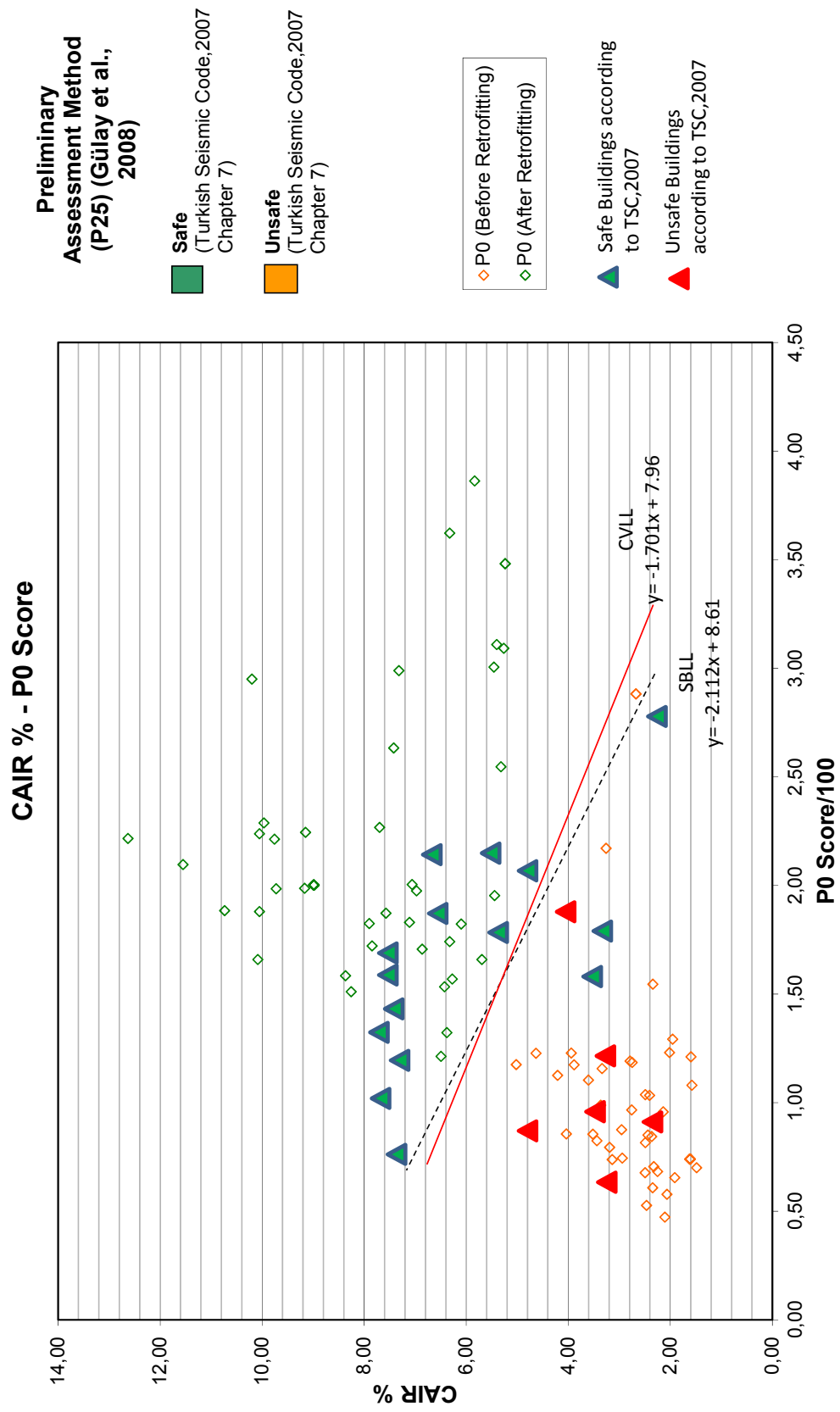


Fig. 6.7c. Evaluation (safety checking) of selected buildings according to Gülay *et al.* (2008) , P0 score

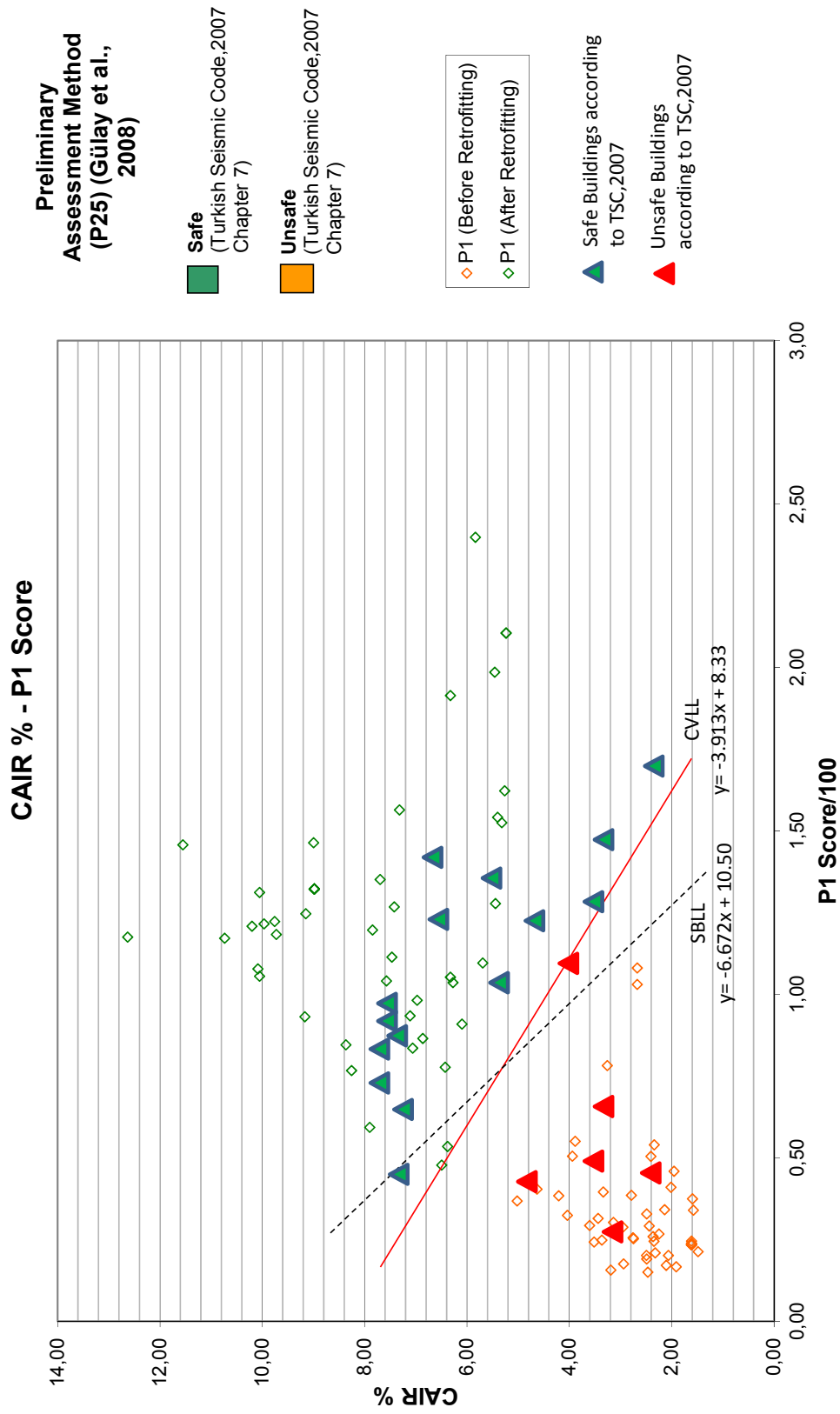


Fig. 6.7d. Evaluation (safety checking) of selected buildings according to Gülay *et al.* (2008), P1 score

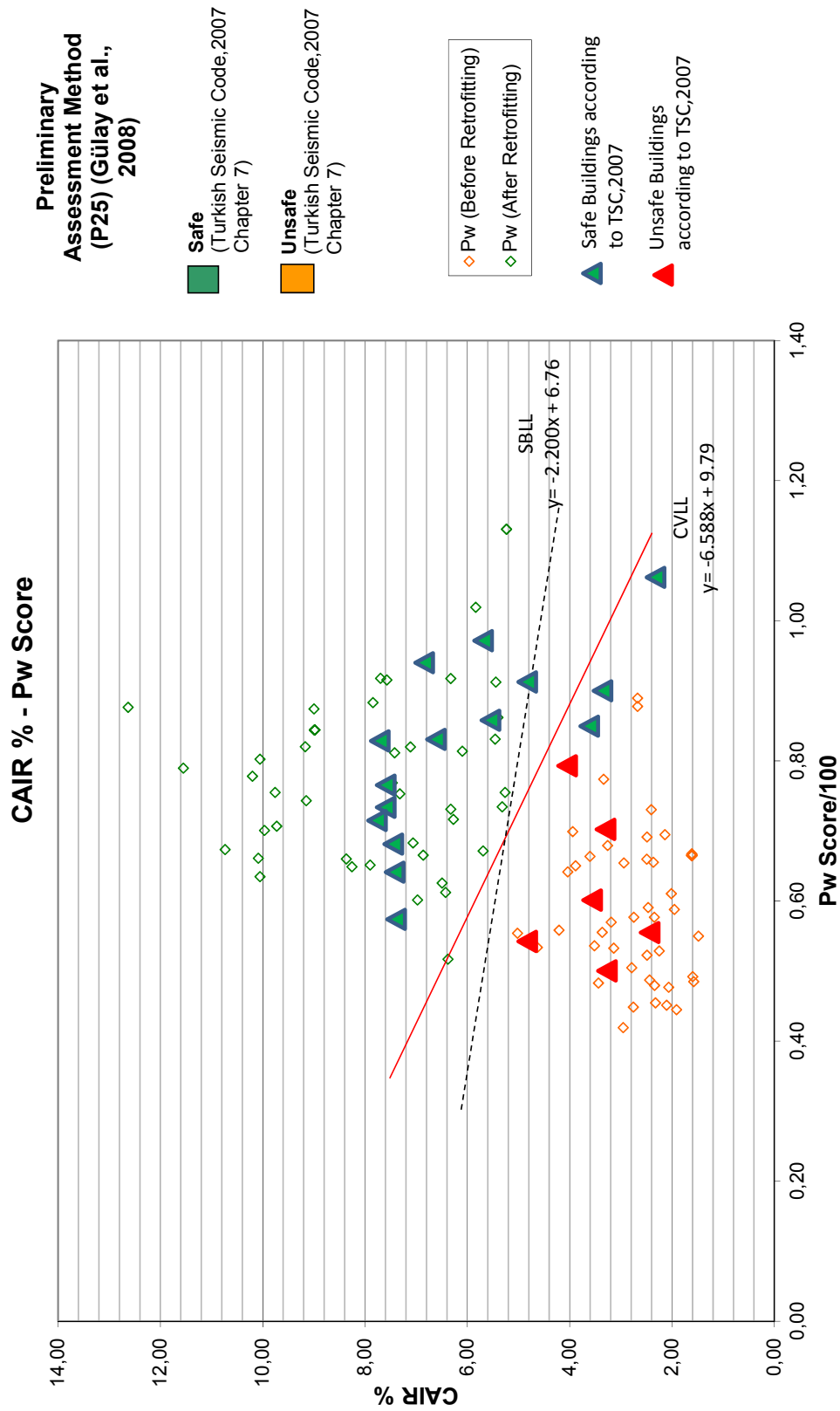


Fig. 6.7e. Evaluation (safety checking) of selected buildings according to Gülay *et al.* (2008), Pw score

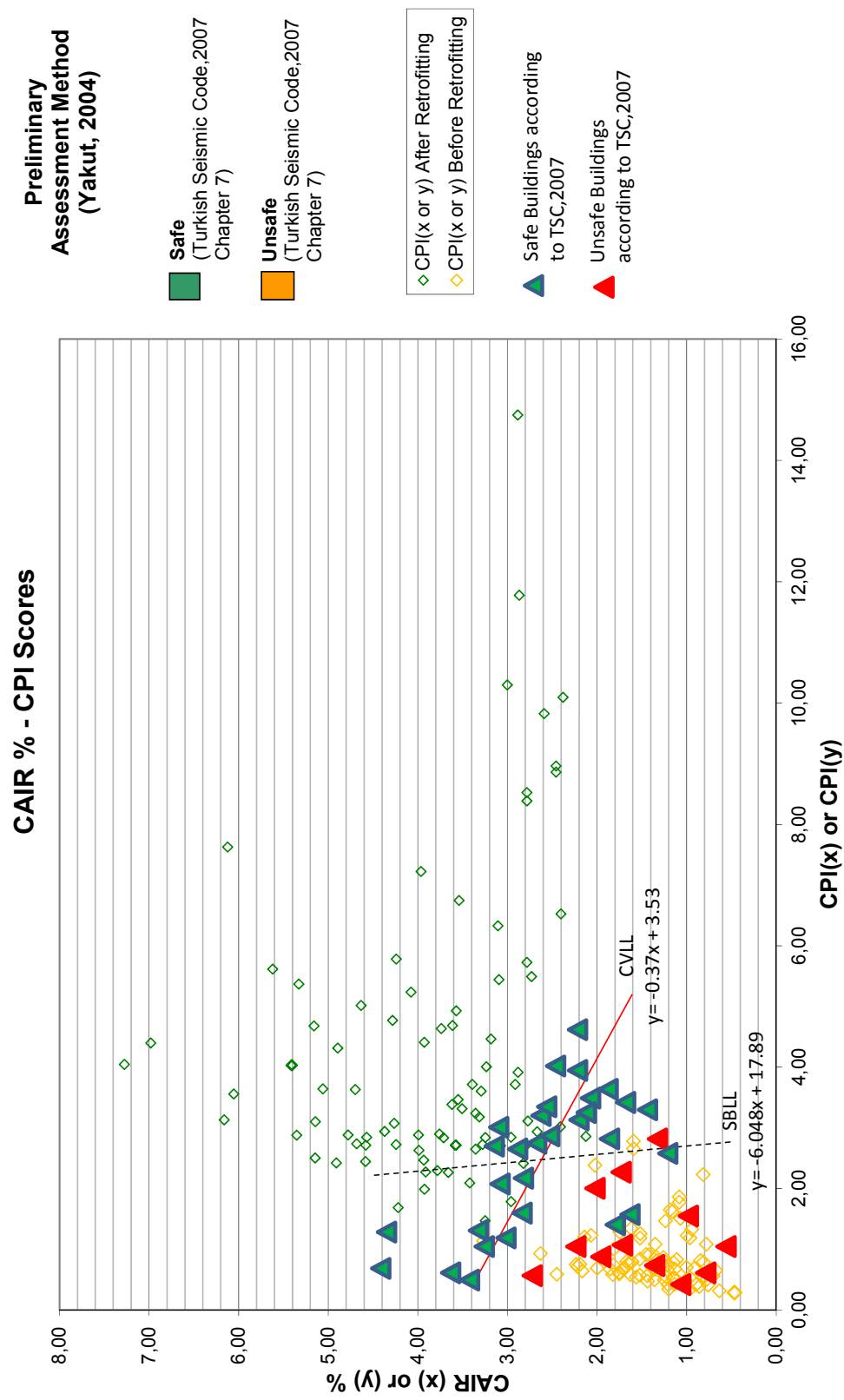


Fig. 6.7f. Evaluation (safety checking) of selected buildings according to Yakut (2004), CPI(x) and CPI(y) scores

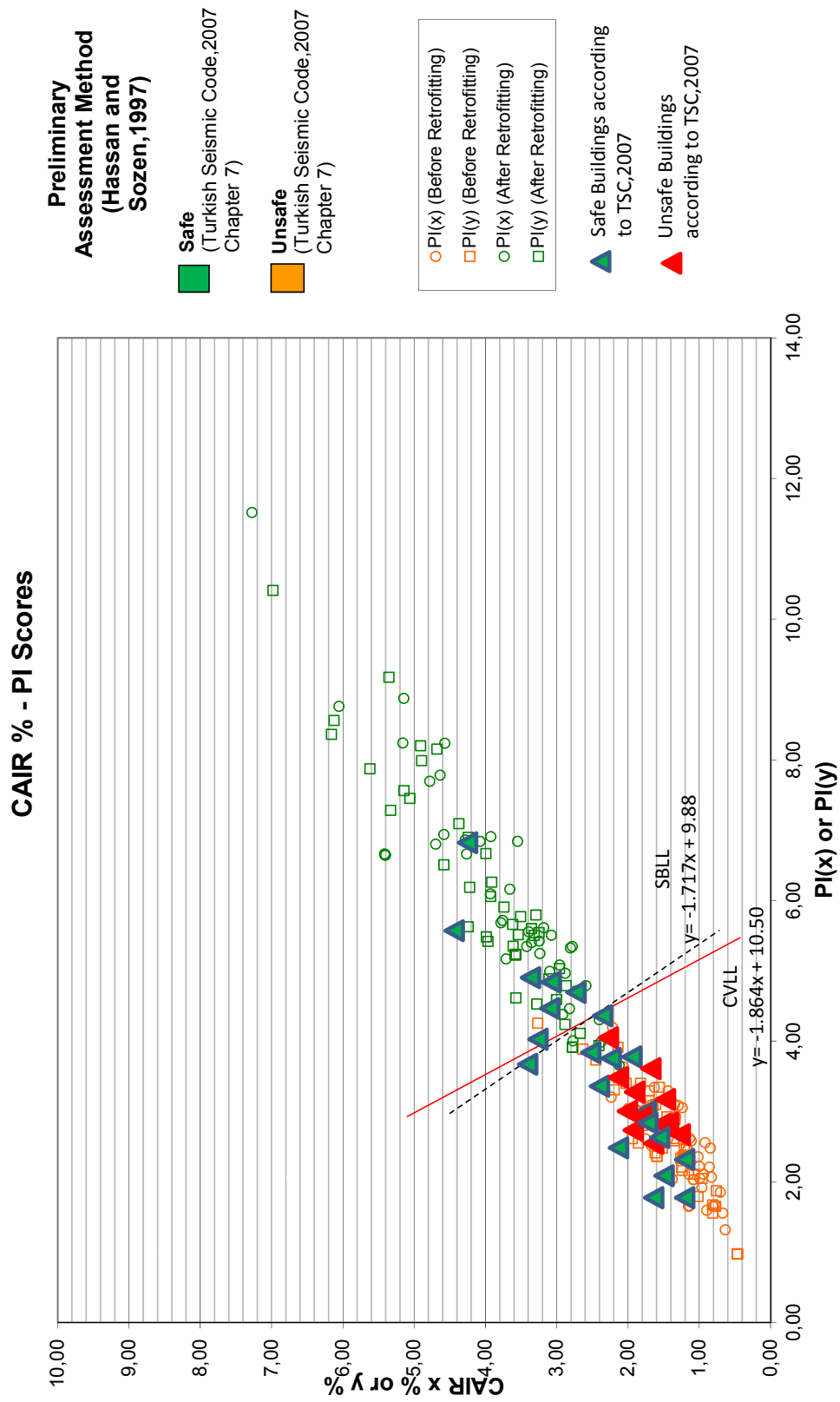


Fig. 6.7g. Evaluation (safety checking) of selected buildings according to Hassan and Sözen (1997), PI(x) and PI(y) scores

6.5 Cost of Seismic Retrofitting

As described in Section 4, primarily infill shear-walls, then jacketing in necessary columns and FRP wrapping applications in a few beams are used for retrofitting. In addition to these, the costs of performing other civil-architectural, mechanical and electrical works for each building are calculated. Construction work items and current unit prices of these items are given in Table 6.5. Also total costs of retrofitting for each building are summarized in Appendix E.

Construction quantities used in the computation of costs are calculated from retrofitting projects. The unit prices are taken from the unit price lists of the Ministry of Environment and Urban Planning of Turkey. Total retrofitting cost is assessed under three main groups in our study.

The first group includes the cost of constructing infill shear-walls and column jacketing concrete construction, added to the load-bearing system for the purpose of retrofitting. The relationship between the increase in CAIR (m^2) and building reinforced concrete retrofitting costs is shown in Fig. 6.8. In the vertical axis (y axis) of this graph, the product of the increase in CAI (m^2) and the number of storeys (including basement(s)) of a building takes place. With the help of Fig. 6.8, derived based on data obtained from buildings evaluated within the scope of this study, the calculation of the reinforced concrete retrofitting cost due to increase in corrected CAI (m^2) can be achieved.

The second group is the cost of retrofitting of the foundations of buildings that are rated as insufficient. 29 buildings require foundation retrofitting. The foundation retrofitting method applied consists of adding reinforced concrete sections or layers to the foundation wholly or partially. The relationship between the cost of such reinforced concrete additions and the increase in foundation areas is shown in Fig. 6.9.

Table 6.5. Retrofitting construction work items and current unit prices (Akçalı, 2012).

Code of Price	Definition	Unit	Unit Price (2012) (TL)
14.003	Digging soft soil by hand	m ³	17,26
14.018	Compressing filling material through ramming by hand	m ³	5,89
15.140/3	Filling with lightweight aggregate	m ³	4,13
27.581/MK	Creating a levelling coat with 200 dose cement mortar	m ²	7,15
18.071/3	Building a wall with dimensions 19x19x13.5 cm with horizontal coring brick	m ²	16,63
18.185/1	Pulling down reinforced and plain concrete building with machinery	m ³	45,79
27.583	Building a screed concrete in 2,5 cm thickness with 400 kg dose cement	m ²	10,34
18.183	Pulling down cement -mortar massive construction without using explosives	m ³	39,85
18.192	Any kind of work for removing internal plastering	m ²	3,20
18.195	Any kind of work for removing wood door frame, door leaf and window wall	m ²	4,99
18.198/28	Removing PVC windows	m ²	4,40
18.198/12	Removing ceramics from the walls	m ²	5,96
23.241/A	Plastic joinery manufacturing and the placement works	kg	6,55
04.773/B18	Adjustable hinge (double) (plastic coated)	no	5,50
04.774/2	Plastic window fittings espagnolette (3-clutch up to 180 cm)	no	25,70
C.04	Transom window espagnolette manufacturing	no	26,00
28.134/A	Fastening profile or lath 4+4 mm heat control coated double glazing into metallic constructions	m ²	74,16
21.011-TAK	Formwork for flat surfaced concrete and reinforced concrete	m ²	27,99
27.532	Applying flat plaster with mortar which is mixture of cement-lime	m ²	11,05
22.001	Producing massive frames and jambs for interior doors out of white pine timber and placing them	m ²	72,23
22.043	Producing interior and exterior glass swing door leaf out of hardwood	m ²	82,29
25.004	Painting furniture surfaces of new wood door and window glass partition with two-coat oil paint.	m ²	15,41
A-8	Accessories of door handle plates and mounting.	no	8,94
04.773/A10	Hinge accessories	no	1,56
A-1	Accessories of built-in interior door lock	no	8,94
B-1	Accessories of espagnolette set.	no	8,19
25.001 / 1	Preparing wooden face ready for painting	m ²	2,81
23.014-TAK	Thin reinforcing bar for reinforced concrete	tn	3.077,50
23.015-TAK	Thick reinforcing bar for reinforced concrete	tn	2.841,25
25.048/4A	Applying 1,250 kg putty to new plaster surfaces and painting them with two-coat water based semi-gloss plastic paint	m ²	15,41
27.560/7	Applying silicon based house paint (water based)	m ²	12,83
MSB158	Exposing concrete cover by breaking it.	m ²	31,88
19.094/MK	Providing adherence of old and new concrete.	m ²	4,34
18.189	Removing ceramics from the floor (flooring).	m ²	5,33
26.701/C1	Building exterior windowsill with 3 cm white marble.	m ²	90,28
21.065	Construction of scaffolding.	m ²	4,26
26.052/MK	Wall coating with solid-coloured concrete tile.	m ²	32,58
21.300/2	Wood mosaic parquet laying over existing screed layer	m ²	24,33
26.008/041A	Coating of ceramic laying	m ²	28,28
23.009/03	Placing anchorage equipment.	no	32,08
21.054-TAK	Construction of formwork scaffolds.	m ³	11,74
18.198/27	Removing suspended ceiling.	m ²	6,15
23.243/9	Building a suspended ceiling in 60x60 size, 0,50 in thickness having a minimum 20 micron electrostatic powder paint (polyester based) and lay-on system with	m ²	48,63
6.059/1A-TA	ready-mixed concrete in BS 30 class	m ³	130,81
	FRP application in beams	m	145,00
22.081	Construction of wooden type under-bench kitchen cabinet		245,51
22.082	Construction of wooden type bench-top kitchen cabinet		192,41
MSB.660/A1	Covering bench top with 3 cm colour plates		120,28

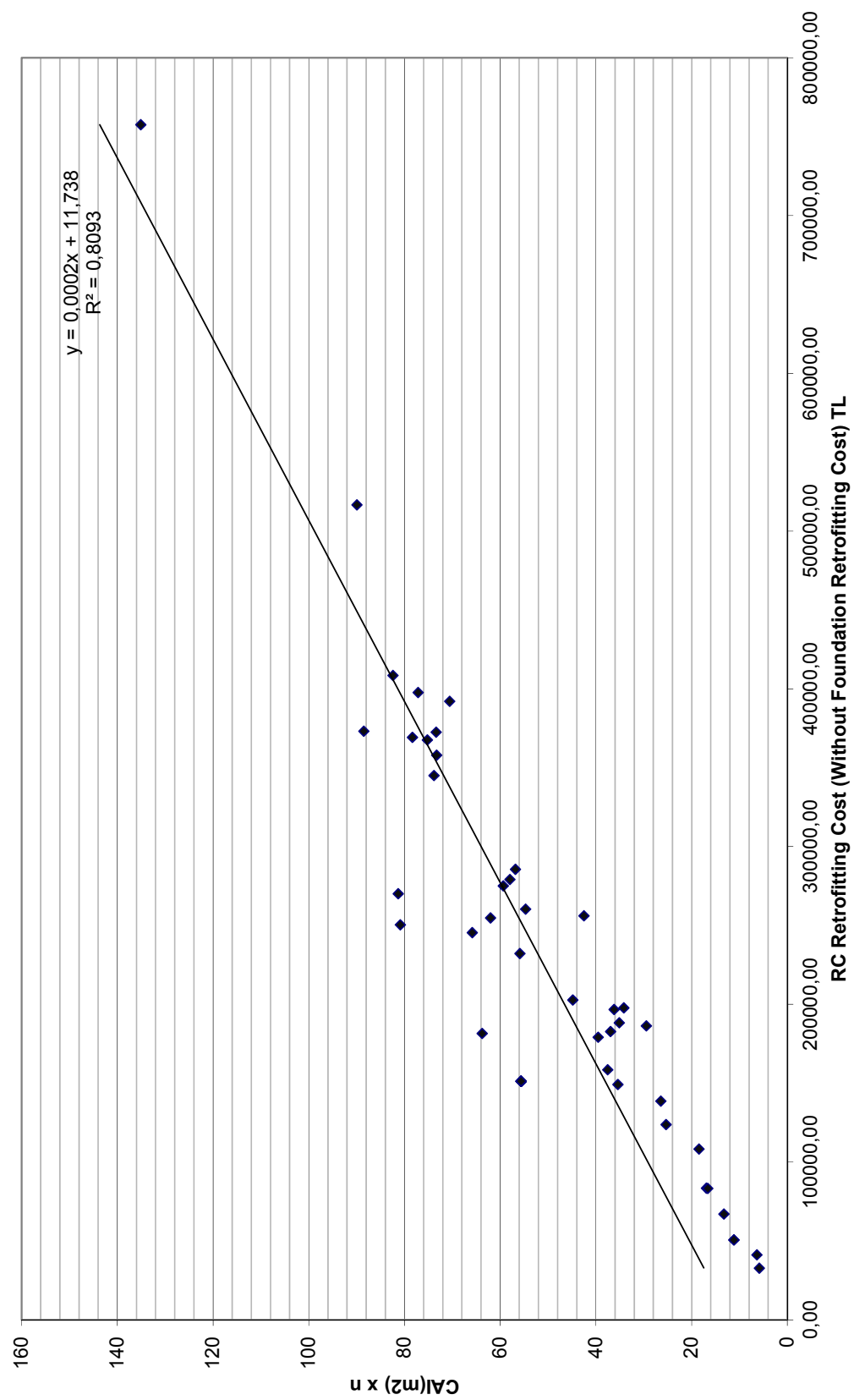


Fig. 6.8. Relationship between RC retrofitting cost and additional CAI due to retrofitting of the whole building

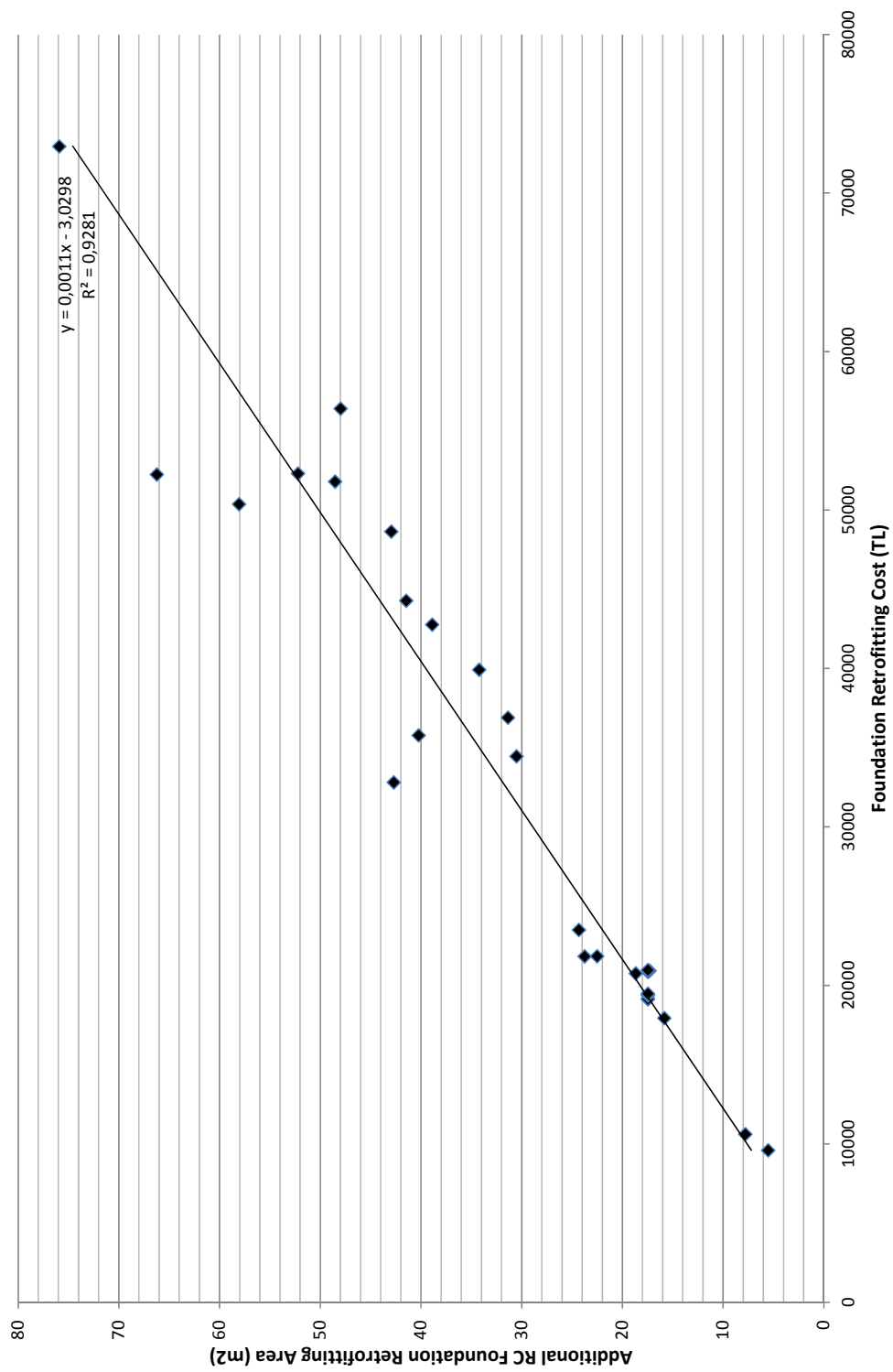


Fig. 6.9. Relationship between RC foundation retrofitting cost and additional RC foundation retrofitting area

The third group to be considered in the calculation of the total retrofitting cost includes the cost of civil (except reinforced concrete construction works) architectural, mechanical and electrical construction works, that need to be fixed/renewed at those parts that are disrupted during the retrofitting operations, as well as transportation costs. Transportation costs within this cost group are added to the calculations as 10% of total costs, as a general approach.

The relationship between the aggregations of all sub-groups, in other words, total retrofitting costs and reinforced concrete retrofitting costs (including foundation retrofitting costs) are given in Fig. 6.10. This highly correlated relation enables us to estimate total retrofitting cost.

An important point that needs to be emphasized here is that all costs are calculated by using the unit prices given in Table 6.5. Except these construction work items, costs regarding the buildings which include specific architectural details that may receive partial damage or completely destroyed during a possible retrofitting work or the buildings which include special equipment and apparatuses must be assessed taking all such matters into account. In these cases, increasing the total cost in required proportions would be useful.

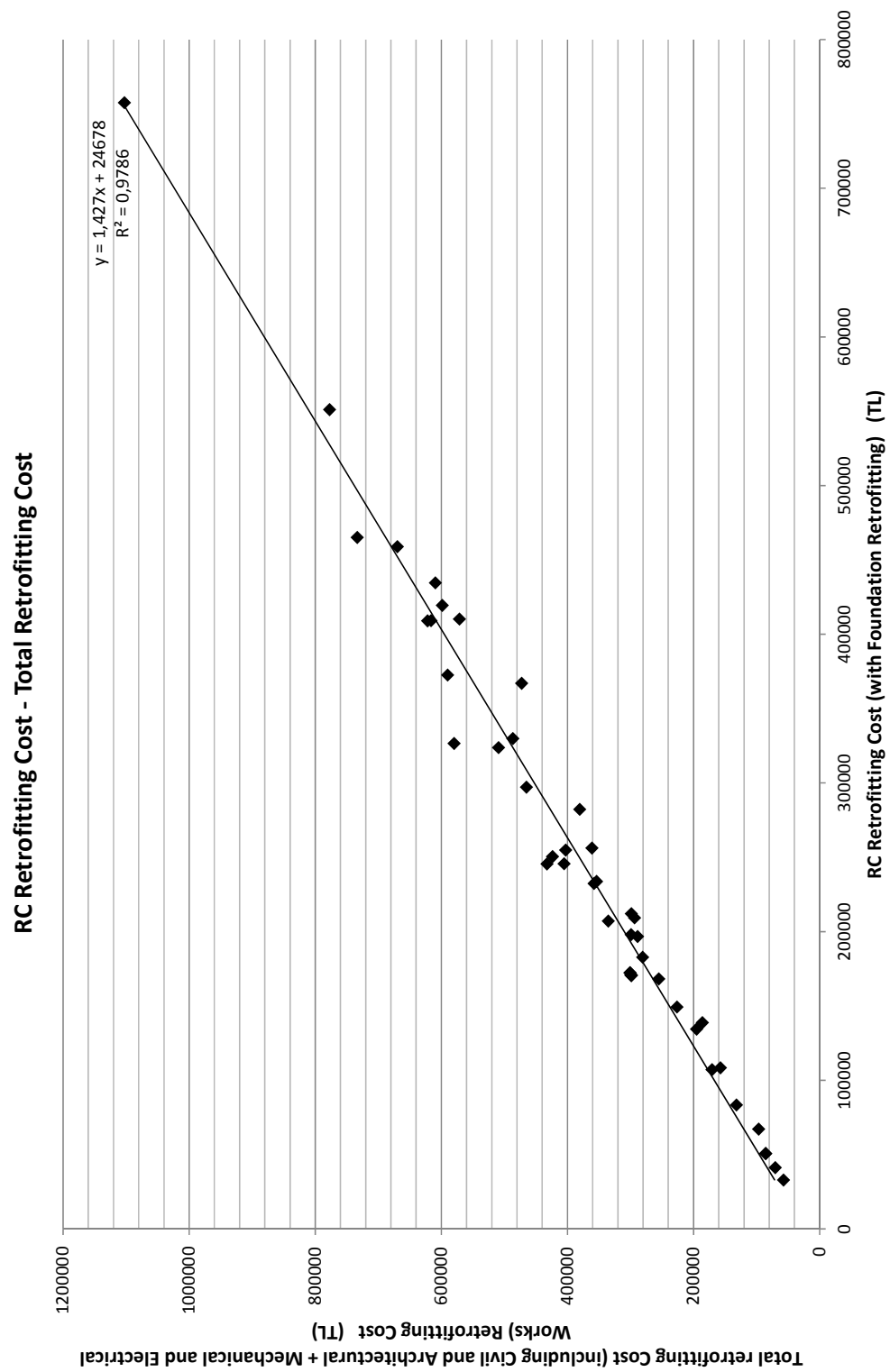
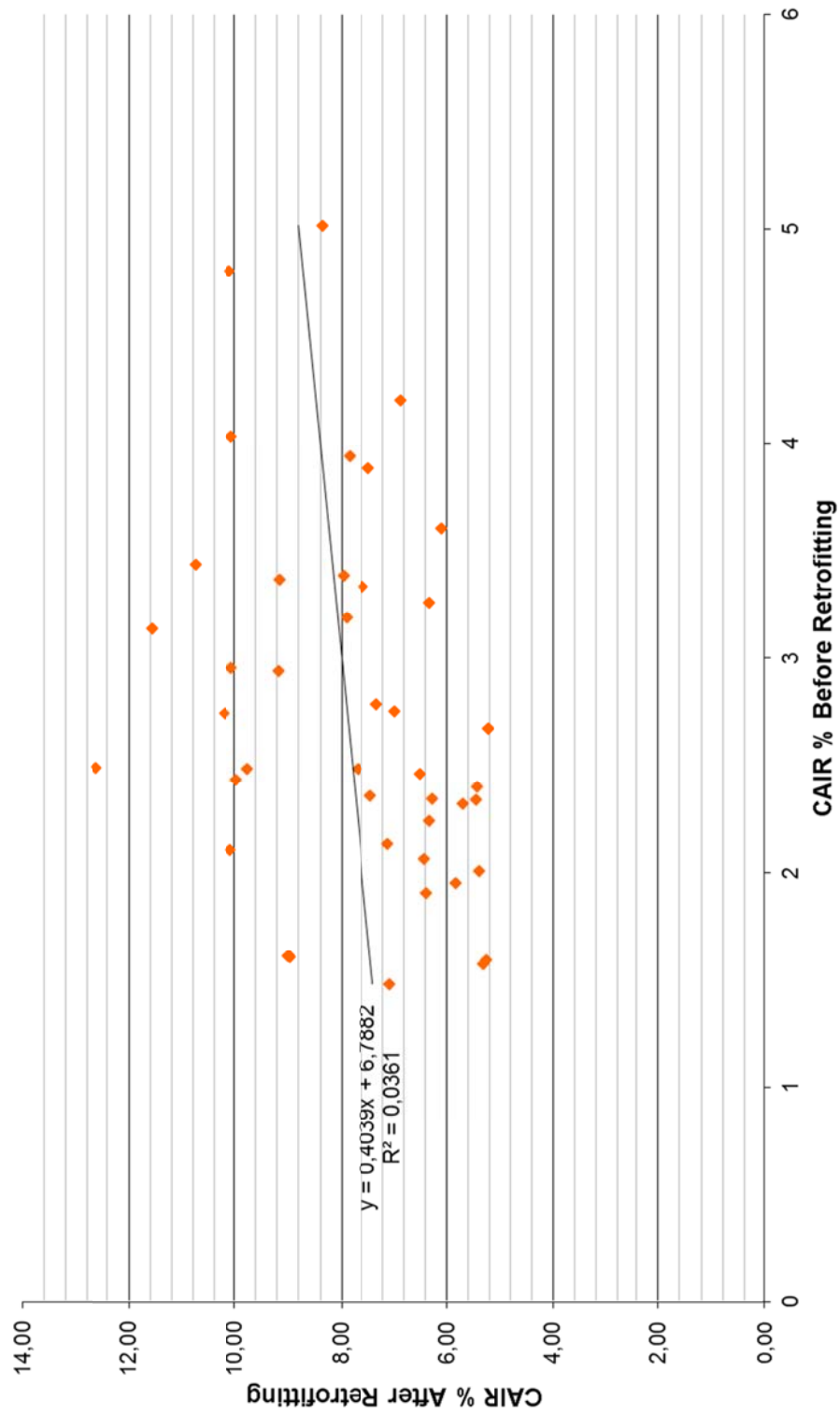


Fig. 6.10. Relationship between RC retrofitting cost and total retrofitting cost

6.6. A Methodology for Estimating Retrofitting Cost of Buildings

Previous to this section, predictability of retrofitting requirements of buildings based on preliminary assessment methods, as well as preliminary classification of buildings as safe or unsafe according to the limit lines plotted with respect to discriminant analyses and minimum path lines slope values ($\min m_i$) for each preliminary assessment method. A significant correlation is observed between vertical load-bearing member's cross-sectional areas (CAI, m^2) resulting after the process of retrofitting and the costs of retrofitting. Predictability of the change in CAIR%, in other words, its estimation by using the partition limit lines between unsafe and safe zones will enable the prediction of required retrofitting costs for the retrofitting. The relationships between the CAIR % of the buildings before and after retrofitting are given in Fig. 6.11. This relationship shows that there is a low correlation between increases of CAIR% resulting from retrofitting. This negative situation hinders the calculation of actual retrofitting cost; however minimum, recommended and conservative estimate of retrofitting costs required move a building to a safe state be estimated based on the partition limit lines developed in Section 6.4. In this section, approaches for estimating minimum, recommended and conservative retrofitting costs will be discussed.



6.6.1. Minimum Estimate of Retrofitting Cost

There is a need to find a procedure to calculate the increase of CAIR % due to retrofitting based on the distribution of points that define the safe and unsafe situations of buildings given in Figs. 6.3a-g. In Section 6.4, the partition lines that are used to identify whether a building is in the safe or unsafe zone based on its PAS and CAIR% values were delineated. In the same section, path lines that define the PAS and CAIR% increases through which “orange” points (unsafe buildings) move to the corresponding “green” points (safe buildings) were displayed.

Based on the partition lines presented in Section 6.4, a building located at the unsafe zone must reach at least a point over the identified cutoff value limit line (CVLL) in order to be rated as a safe building. Accordingly, minimum retrofitting cost estimation approach consists of calculation of the CAIR % required for rendering an unsafe building as safe and estimation of the costs due to the increase in the cross-sectional areas. Steps pertaining to this practical approach are presented below.

Step 1:

The first step is to determine whether a selected building is in the safe or unsafe zone. This situation can be assessed with the help of Figs. 6.6a-g. In these graphs, the status of the selected building is determined by using its original CAIR % and preliminary assessment score (PAS). This is indicated in Fig. 6.12a.

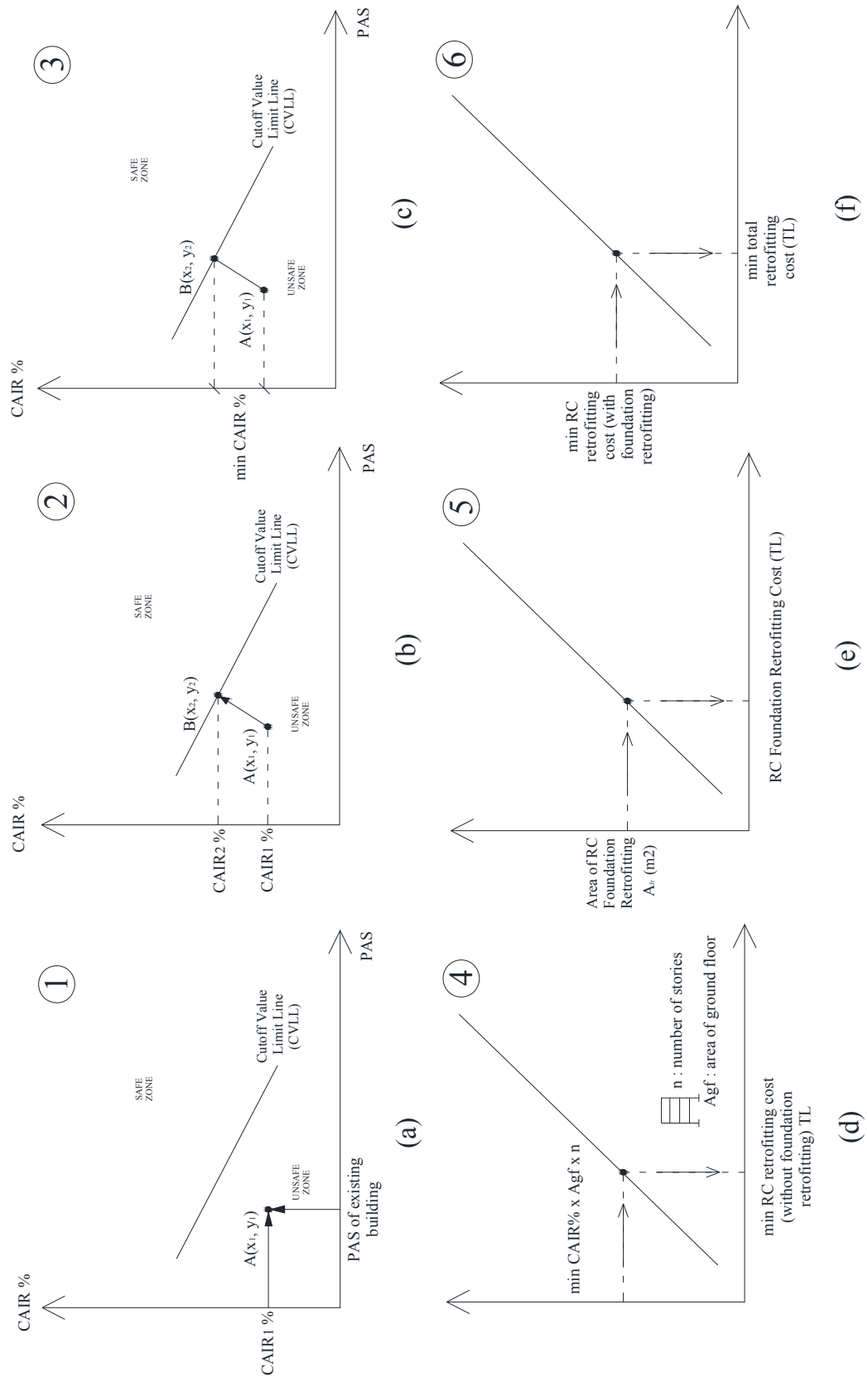


Fig. 6.12. Steps for the estimation of minimum retrofitting cost

Step 2:

The second step of the method is the determination of the shortest path to move a building in the unsafe zone to the safe zone. For this purpose cutoff value limit lines (CVLL) are used. Since CVLL in each preliminary assessment method is assumed to be linear, the shortest path will be the orthogonal line drawn from point A to the CVLL. This line intersects the CVLL at point B. Vertical component of the shortest path would provide the CAIR % that is required for qualifying the building as safe. This is illustrated in Fig. 6.12b.

Step 3:

The difference between the CAIR % obtained from the previous step ($CAIR_2$ % in Fig. 6.12) and the CAIR % of original condition of building ($CAIR_1$ % in Fig. 6.12) will provide the minimum increase in CAIR % required for retrofitting. This difference is expressed through Eq. 6.7.

$$\min CAIR\% = CAIR_2\% - CAIR_1\% \quad (6.7)$$

Operations conducted in Step 3 are illustrated in Fig. 6.12c.

Step 4:

Minimum increase in CAIR % obtained in the 3rd step is multiplied by the building ground floor area. Thus, the minimum increase in the cross-sectional areas of vertical load-bearing system members is obtained in terms of m². This value corresponds to the minimum increase in the cross sectional area index (min CAI), as to be computed from Eq. 6.8.

$$\min CAI = \min CAIR\% \times A_{gf} \quad (6.8)$$

The amount of minimum increase in cross-sectional areas of vertical load-bearing system members (min CAI) calculated in this step are multiplied with the number of storeys (n) to get the total value for the whole building. Based on Fig. 6.8 and the resulting total cross-sectional area of retrofitting, the retrofitting cost is estimated. It's to be noted that this is the estimate of the minimum reinforced concrete retrofitting cost. This step is displayed in Fig. 6.12d.

Step 5:

In case a reinforced concrete retrofitting is required for the foundation of the building (usually encountered in singular or insufficient strip foundations), by using the available layout plans of the foundations and on site examinations, original reinforced concrete foundation areas are computed and then subtracted from the total base area of building (generally basement floor area) (Eq. 6.9). This difference yields to the area over which reinforced concrete retrofitting will be applied (i.e. the area which will be filled with additional reinforced concrete constructions).

$$A_{fr} = A_{bf} - A_f \quad (6.9)$$

- A_{bf} : Total base area of the foundation (usually basement floor area of the building) (m²)
 A_f : Existing reinforced concrete building foundation area (m²)
 A_{fr} : Increase in total building foundation area after retrofitting (reinforced concrete additions) (m²)

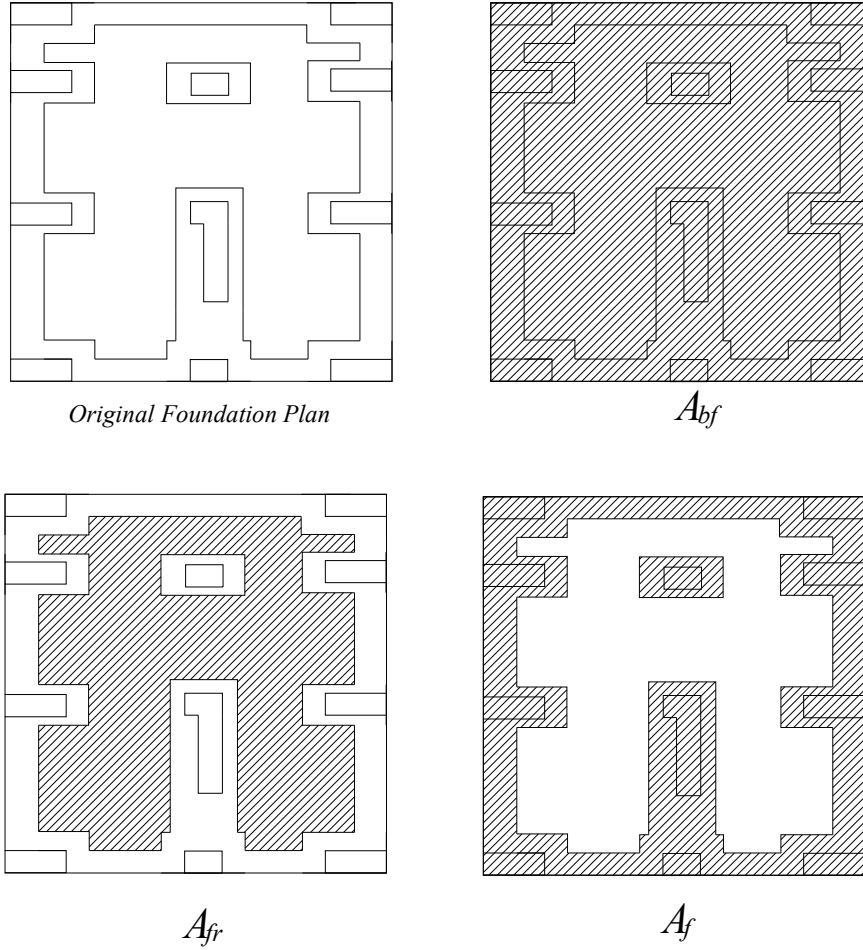


Fig. 6.13. Schematic representation of A_f , A_{fr} and A_{bf} in Eq.6.9

Based on using A_{fr} in Fig. 6.13, reinforced concrete retrofitting cost for the foundation is calculated. After this operation total reinforced concrete retrofitting cost is calculated by summing the RC retrofitting cost (already found in the 4th step) and foundation RC retrofitting costs. The operations in this step are shown in Fig. 6.12e.

Step 6:

Estimate of minimum total retrofitting cost is calculated by using 4th and 5th steps. In this step, total minimum estimated retrofitting cost is transformed into the minimum total retrofitting cost which includes other secondary costs along with reinforced concrete construction costs, by using Fig. 6.10. Operations in this step are shown in Fig. 6.12f.

With this method, as stated before, rather than the actual total retrofitting cost, the minimum total retrofitting cost required for a building to achieve the limit value at which it will be considered as safe is calculated. Comparison of the minimum retrofitting cost with the reconstruction cost of the building may provide important information to the owners in deciding on the feasibility of the retrofitting operation. When the minimum retrofitting cost, which is calculated according to this method, is higher than the cost of demolishing and reconstruction of that building, the owners may decide to take it down and then rebuilt without further analyses. Such a situation will save time, labor and money, when it is used for the evaluation of building stocks involving larger number of buildings and in urban transformation operations.

6.6.2 Recommended and Conservative Estimates of Retrofitting Cost

The minimum estimate of retrofitting cost (MERC) is based on the discriminant analysis forming a partition considering only statistical requirements and data. But as observed in Figs. 6.3a-f, the green points corresponding to actual retrofitted conditions of buildings are further away from this discriminant based partition line. In order to compensate for this deficiency an alternative retrofitting cost is established. For this purpose each building is moved to the safe zone shifting at a distance from original position to the Cutoff Value Limit Line (CVLL). This is referred to as Recommended Estimate of Retrofitting Cost (RERC). It is to be note that this retrofitting cost is twice of the minimum estimate of retrofitting cost (MERC). This approach is illustrated in Fig. 6.14. On the other hand a “conservative” estimate will be obtained by shifting twice. This corresponds to three times of MERC. This is referred to as “Conservative Estimate of Retrofitting Cost” (CERC). This approach is illustrated in Fig. 6.15.

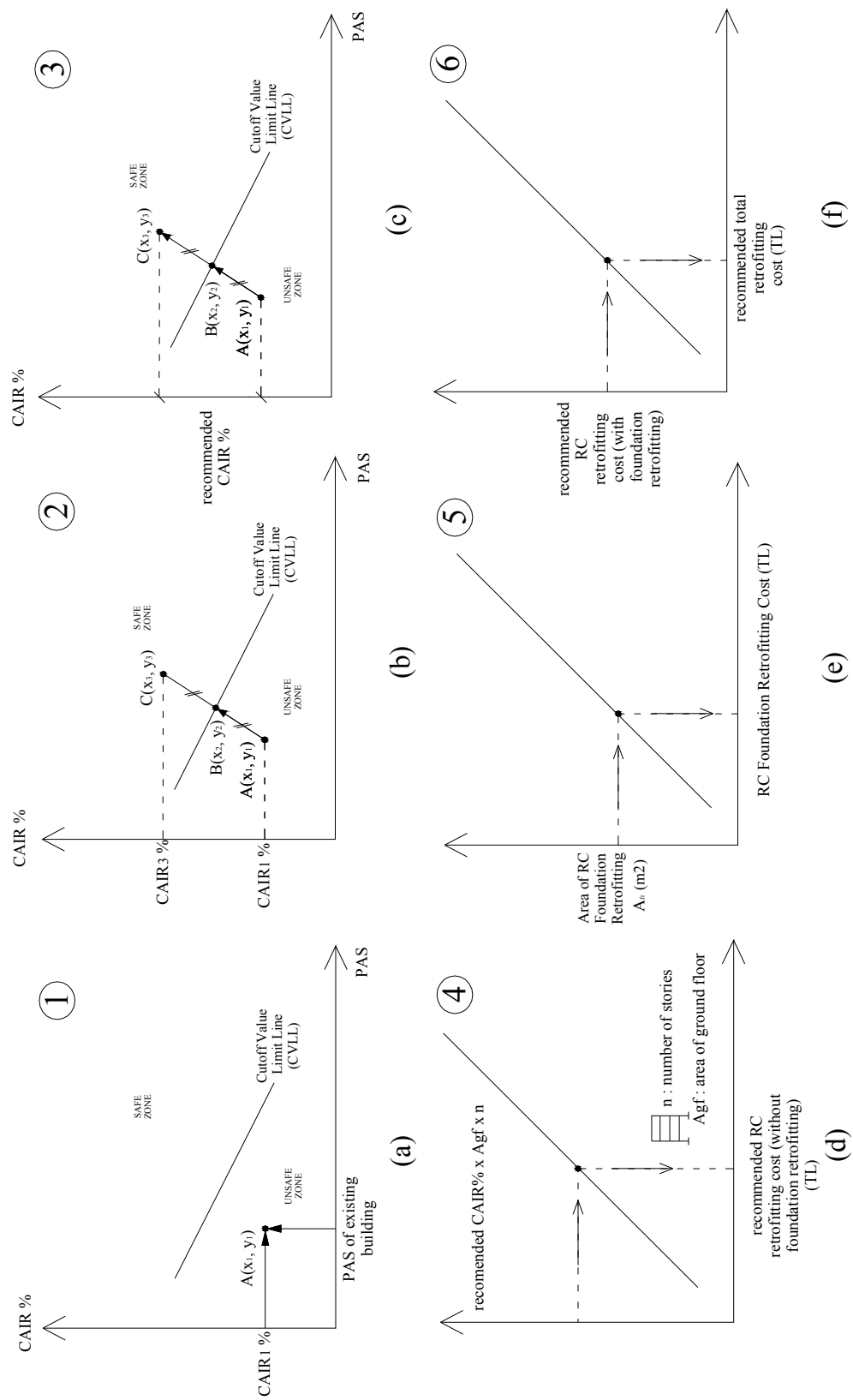


Fig. 6.14. Steps for assessing the recommended estimate of retrofitting cost

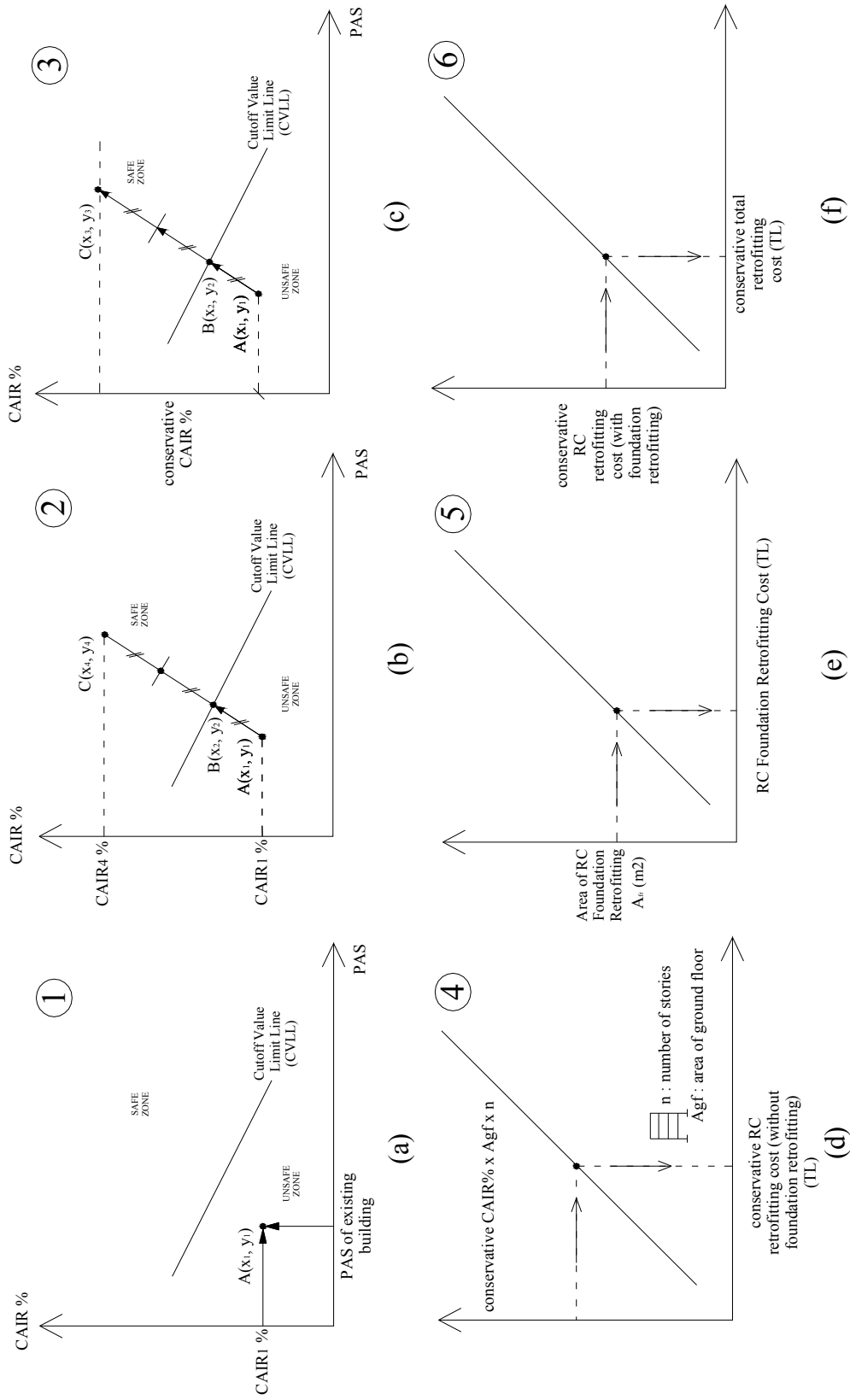


Fig. 6.15. Steps for assessing the conservative estimate of retrofitting cost

In that case, increase of CAIR % to be used in RERC and CERC are illustrated by Eqs. 6.10 and 6.11.

$$\text{recom } CAIR \% = CAIR_3 \% - CAIR_1 \% \quad (6.10)$$

$$\text{cons } CAIR \% = CAIR_4 \% - CAIR_1 \% \quad (6.11)$$

where,

recom $CAIR\%$: Recommended increase in the percentage of cross-sectional ratio (CAIR %)

cons $CAIR\%$: Conservative increase in the percentage of cross-sectional area index ratio (CAIR %)

As can be seen in the figures, considering that any given reinforced concrete building is represented in the graph with its original condition, in RERC approach, in order to estimate the point at which the building is to be represented in the safe zone after the retrofitting design, the point that symmetrically corresponds with reference to the CVLL is taken. This operation consists of multiplying the values obtained through minimum estimate of retrofitting cost approach by two. On the other hand, in CERC approach, operation consists of multiplying the value obtained through MERC approach by three.

The advantage of these approaches is that it enables the realization of more realistic cost estimations without being contented with minimum retrofitting cost.

With reference to the operations conducted, which were described in the paragraph above, formulas that can be used for the estimation of minimum, recommended and conservative retrofitting costs are defined in Table 6.6.

Table 6.6. Formulas for CAIR₂ % , min CAIR % , recom CAIR % and cons CAIR % calculation in the assessment of minimum, recommended and conservative estimates of retrofitting cost approaches.

Preliminary Assessment Method	CAIR ₂ % - min CAIR % - recom CAIR % - cons CAIR %
Method proposed by Özcebe <i>et al.</i> , (2003) DI-LS Score	$CAIR_2(x, y)\% = 0.262 PAS + 0.0742 CAIR_1\% + 2.93$
	min $CAIR(x, y)\% = 0.262 PAS - 0.926 CAIR_1\% + 2.93$
	recom $CAIR(x, y)\% = 0.524 PAS - 1.852 CAIR_1\% + 5.86$
	cons $CAIR(x, y)\% = 0.786 PAS - 2.778 CAIR_1\% + 8.79$
Method proposed by Özcebe <i>et al.</i> , (2003) DI-IO Score	$CAIR_2(x, y)\% = 0.206 PAS + 0.0446 CAIR_1\% + 2.34$
	min $CAIR(x, y)\% = 0.206 PAS - 0.955 CAIR_1\% + 2.34$
	recom $CAIR(x, y)\% = 0.412 PAS - 1.910 CAIR_1\% + 4.68$
	cons $CAIR(x, y)\% = 0.618 PAS - 2.865 CAIR_1\% + 7.02$
Method proposed by Gülay <i>et al.</i> , (2008) (P25 Method) P0 Score	$CAIR_2(x + y)\% = -0.437 PAS + 0.743 CAIR_1\% + 2.04$
	min $CAIR(x + y)\% = -0.437 PAS - 0.257 CAIR_1\% + 2.04$
	recom $CAIR(x + y)\% = -0.874 PAS - 0.514 CAIR_1\% + 4.08$
	cons $CAIR(x + y)\% = -1.311 PAS - 0.771 CAIR_1\% + 6.12$
Method proposed by Gülay <i>et al.</i> , (2008) (P25 Method) P1 Score	$CAIR_2(x + y)\% = -0.240 PAS + 0.939 CAIR_1\% + 0.51$
	min $CAIR(x + y)\% = -0.240 PAS - 0.061 CAIR_1\% + 0.51$
	recom $CAIR(x + y)\% = -0.480 PAS - 1.028 CAIR_1\% + 1.02$
	cons $CAIR(x + y)\% = -0.720 PAS - 0.183 CAIR_1\% + 1.53$

Table 6.6. (Continued)

Method proposed by Gülay <i>et al.</i> , (2008) (P25 Method) Pw Score	$CAIR_2(x+y)\% = -0.148PAS + 0.978CAIR_1\% + 0.22$
	$\min CAIR(x+y)\% = -0.148PAS - 0.022CAIR_1\% + 0.44$
	$\text{recom } CAIR(x+y)\% = -0.296PAS - 0.044CAIR_1\% + 0.88$
	$\text{cons } CAIR(x+y)\% = -0.444PAS - 0.066CAIR_1\% + 1.32$
Method proposed by Yakut, (2004) CPI(x) and CPI(y) Scores	$CAIR_2(x,y)\% = -0.325PAS + 0.120CAIR_1\% + 3.10$
	$\min CAIR(x,y)\% = -0.325PAS - 0.880CAIR_1\% + 3.10$
	$\text{recom } CAIR(x,y)\% = -0.650PAS - 1.760CAIR_1\% + 6.20$
	$\text{cons } CAIR(x,y)\% = -0.975PAS - 2.640CAIR_1\% + 9.30$
Method proposed by Hassan and Sözen (1997) PI(x) and PI(y) scores	$CAIR_2(x,y)\% = -0.417PAS + 0.777CAIR_1\% + 2.35$
	$\min CAIR(x,y)\% = -0.417PAS - 0.223CAIR_1\% + 2.35$
	$\text{recom } CAIR(x,y)\% = -0.834PAS - 0.446CAIR_1\% + 4.70$
	$\text{cons } CAIR(x,y)\% = -1.251PAS - 0.669CAIR_1\% + 7.05$

So far, the methods for estimating the minimum, recommended and conservative retrofitting costs, required for rendering an unsafe building as safe have been discussed. The percentages of increases in CAIR % after the application of these methods are presented in Appendix F. The retrofitting costs calculated by using these percentages as well as retrofitting costs calculated based on the retrofitting projects prepared after detailed analyses are also presented in the same appendix.

6.7. Evaluation of Preliminary Seismic Assessment's Applicability for Retrofitting Cost Estimation

Based on the methodology explained in Section 6.6, increases in CAIR % for each one of the preliminary assessment methods are shown in Figs. 6.16a-g. Details of calculations for CAIR % increases pertaining to each method are provided in Appendix F. In these figures, the increases in CAIR % of buildings are displayed in an increasing sequence from low to high. Increases in CAIR % with respect to original condition of buildings after actual retrofitting are also displayed in these figures (blue points).

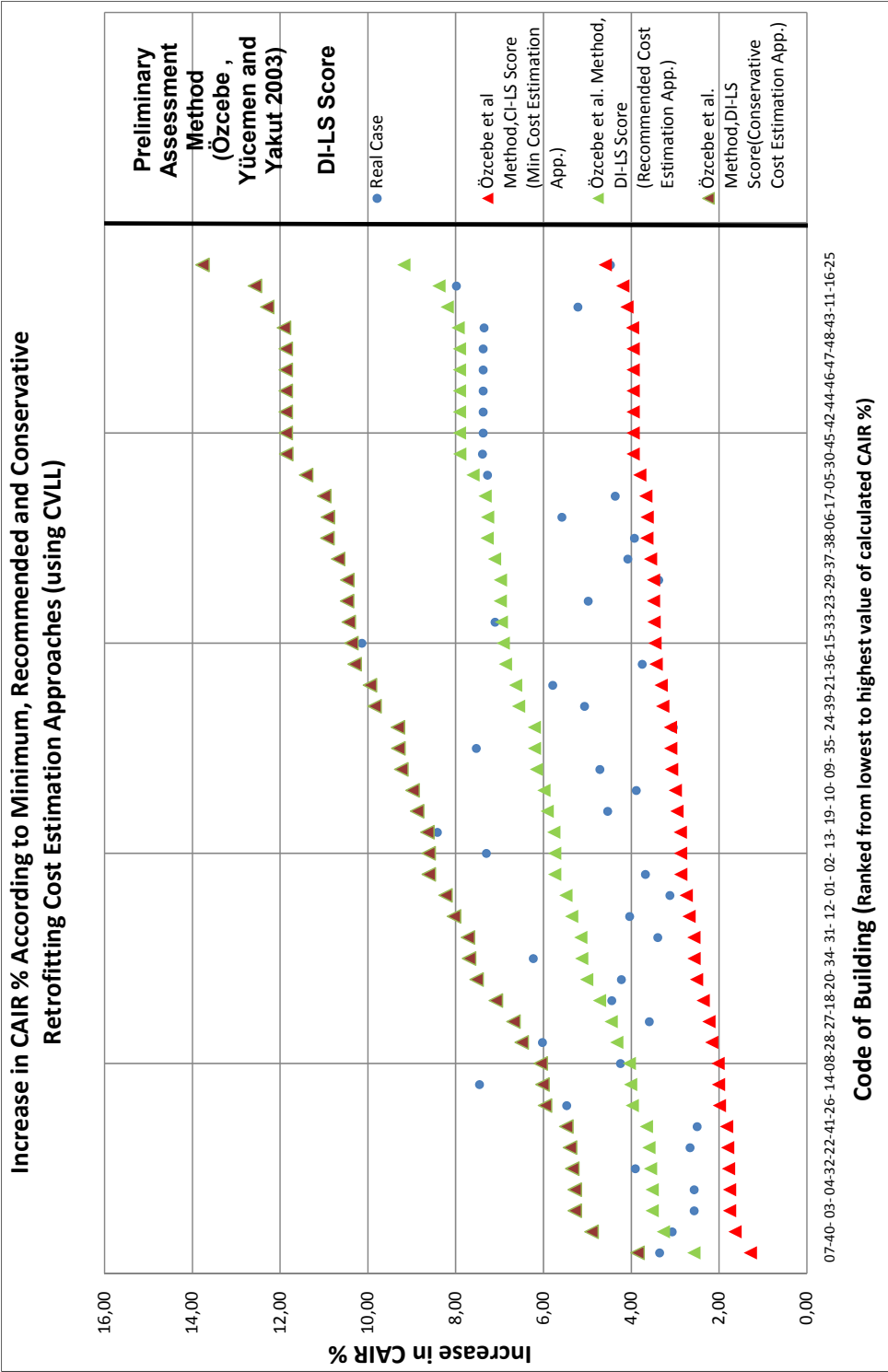


Fig. 6.16a. Real CAIR % increases compared with calculated CAIR % increases according to minimum, recommended and conservative retrofitting cost estimation methods (DI-LS score)

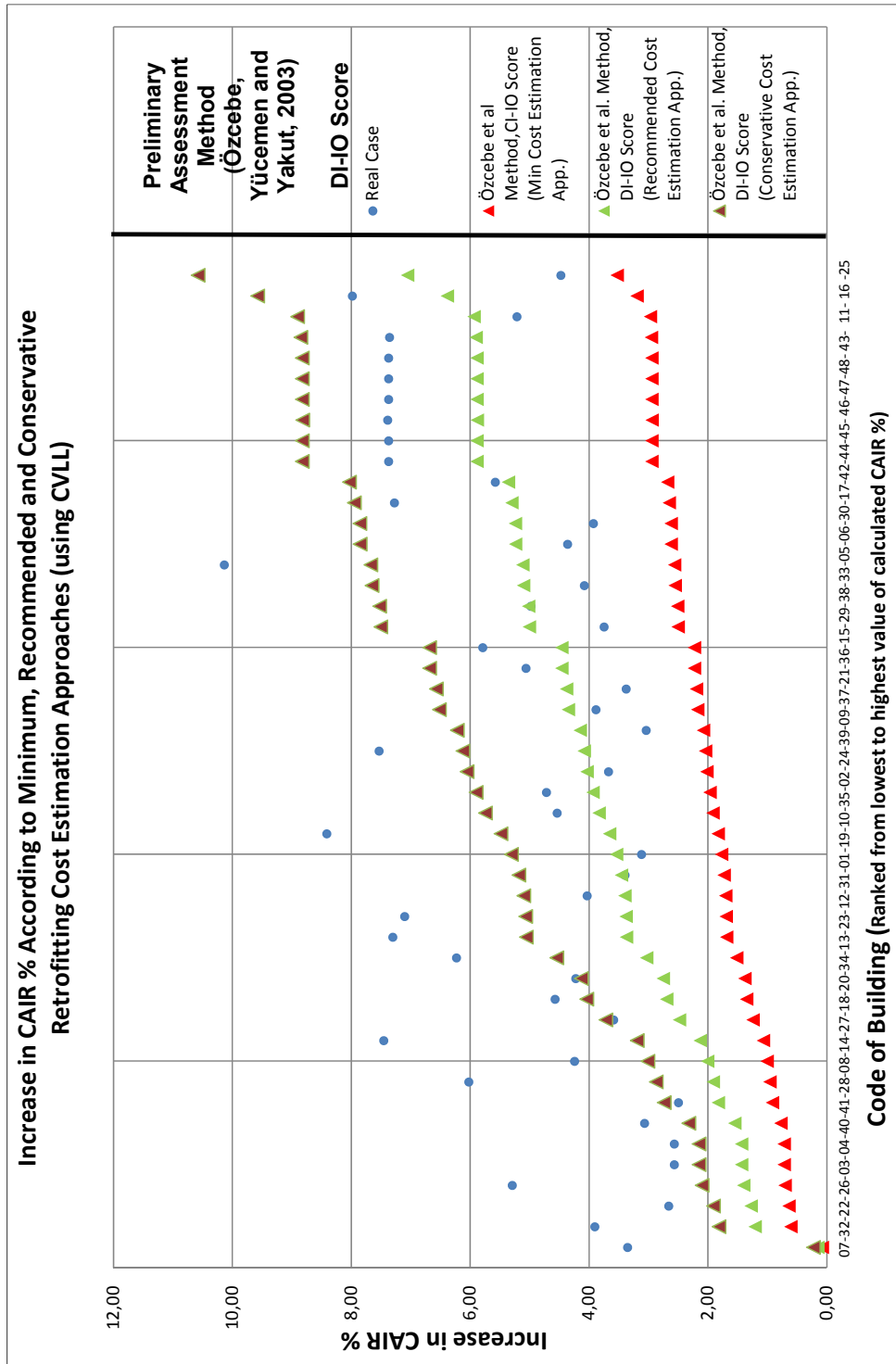


Fig. 6.16b. Real CAIR % increases compared with calculated CAIR % increases according to minimum, recommended and conservative retrofitting cost estimation methods (DI-IO score)

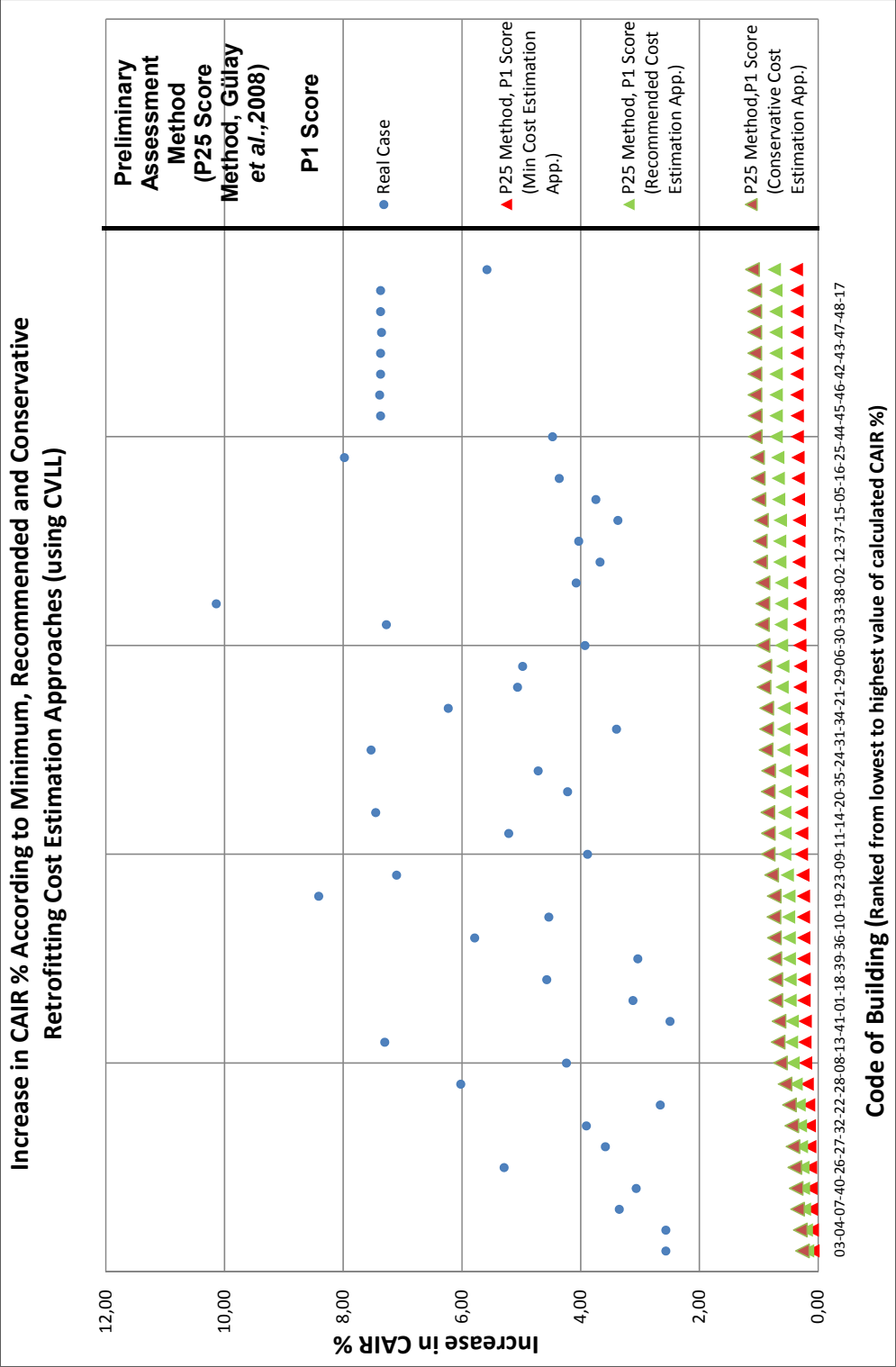


Fig. 6.16d. Real CAIR % increases compared with calculated CAIR % increases according to minimum, recommended and conservative retrofitting cost estimation methods (P1 score)

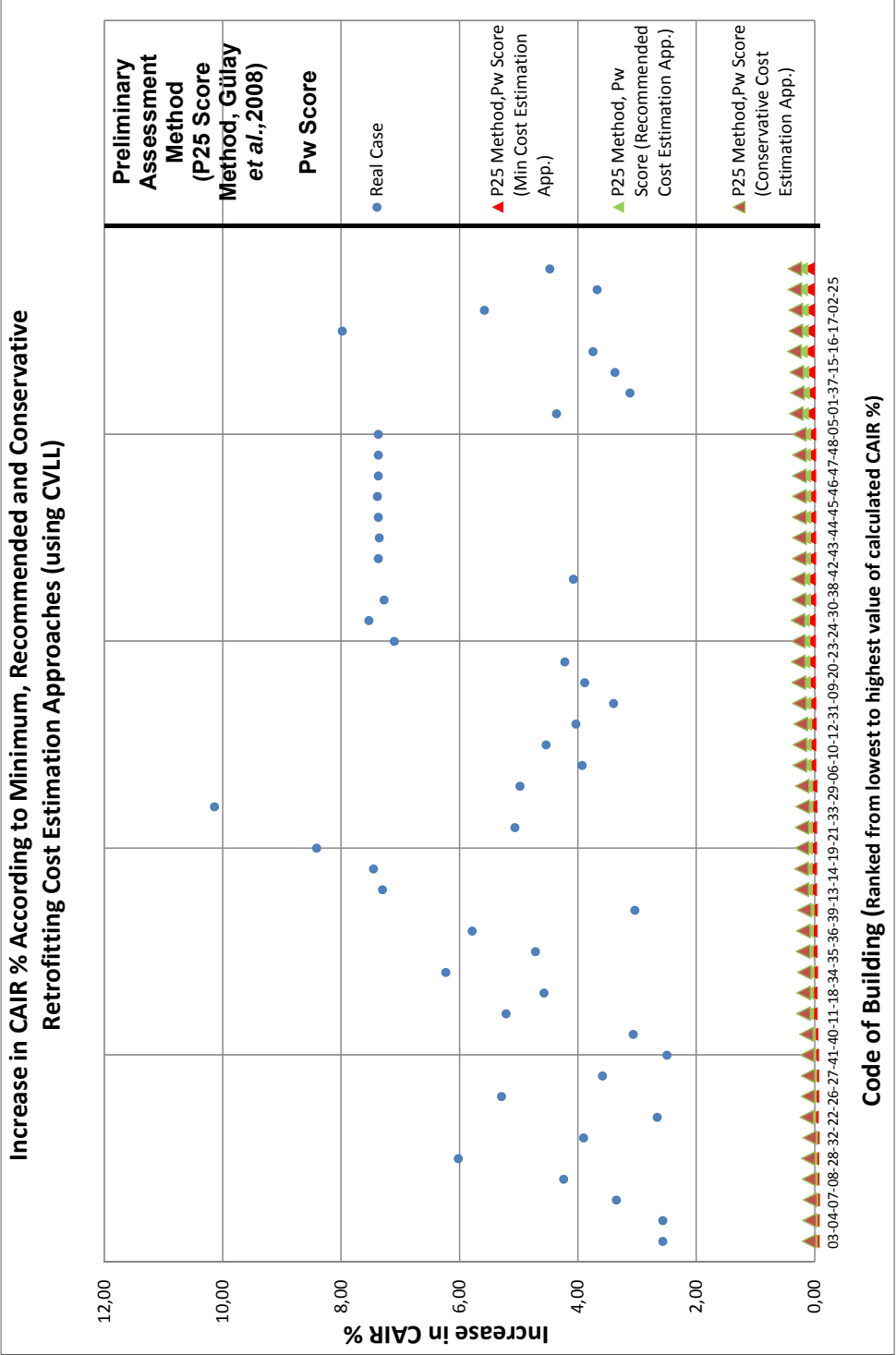


Fig. 6.16e. Real CAIR % increases compared with calculated CAIR % increases according to minimum, recommended and conservative retrofitting cost estimation methods (Pw score)

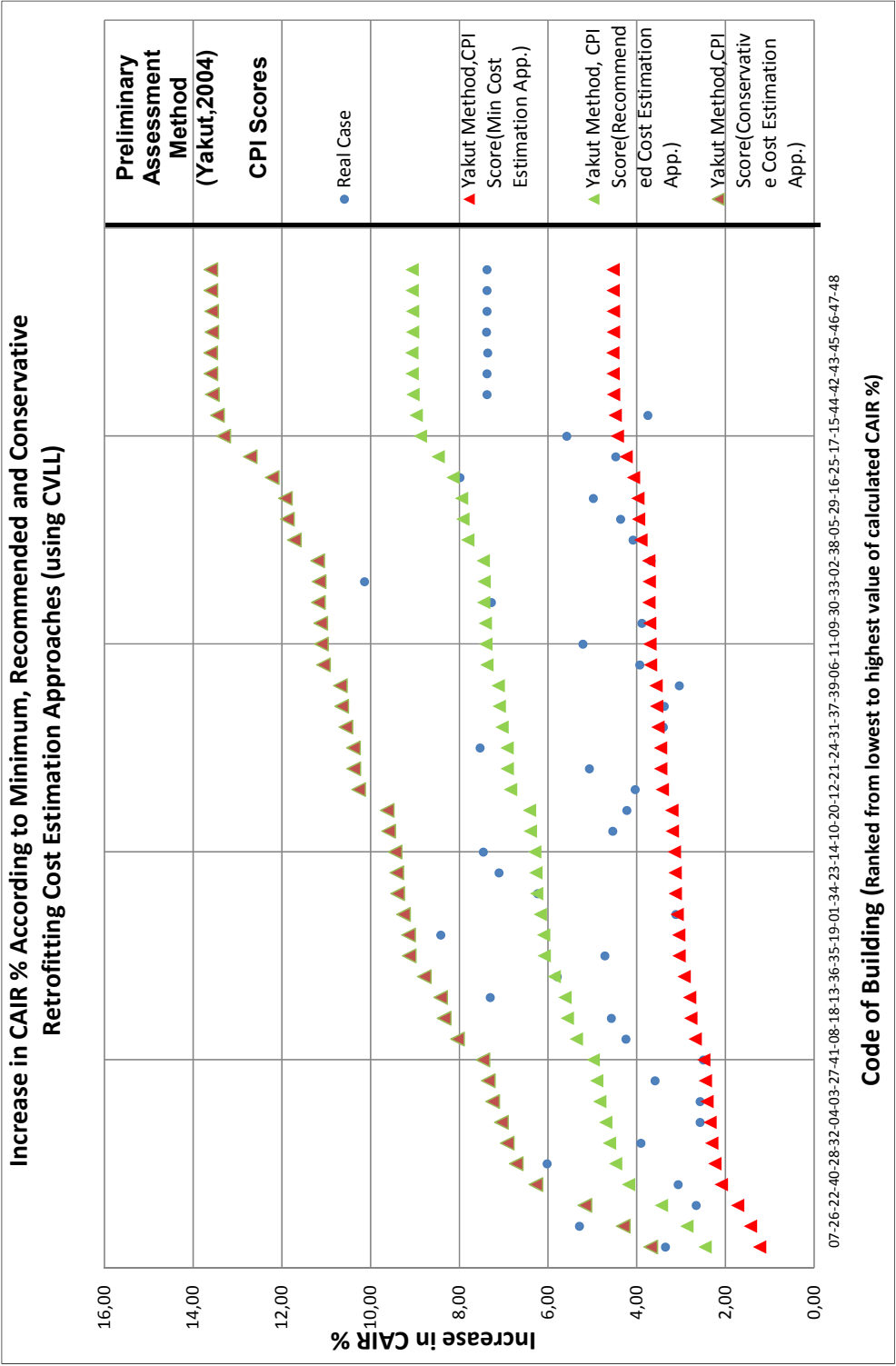


Fig. 6.16f. Real CAIR % increases compared with calculated CAIR % increases according to minimum, recommended and conservative retrofitting cost estimation methods (CPI(x) and CPI(y) scores)

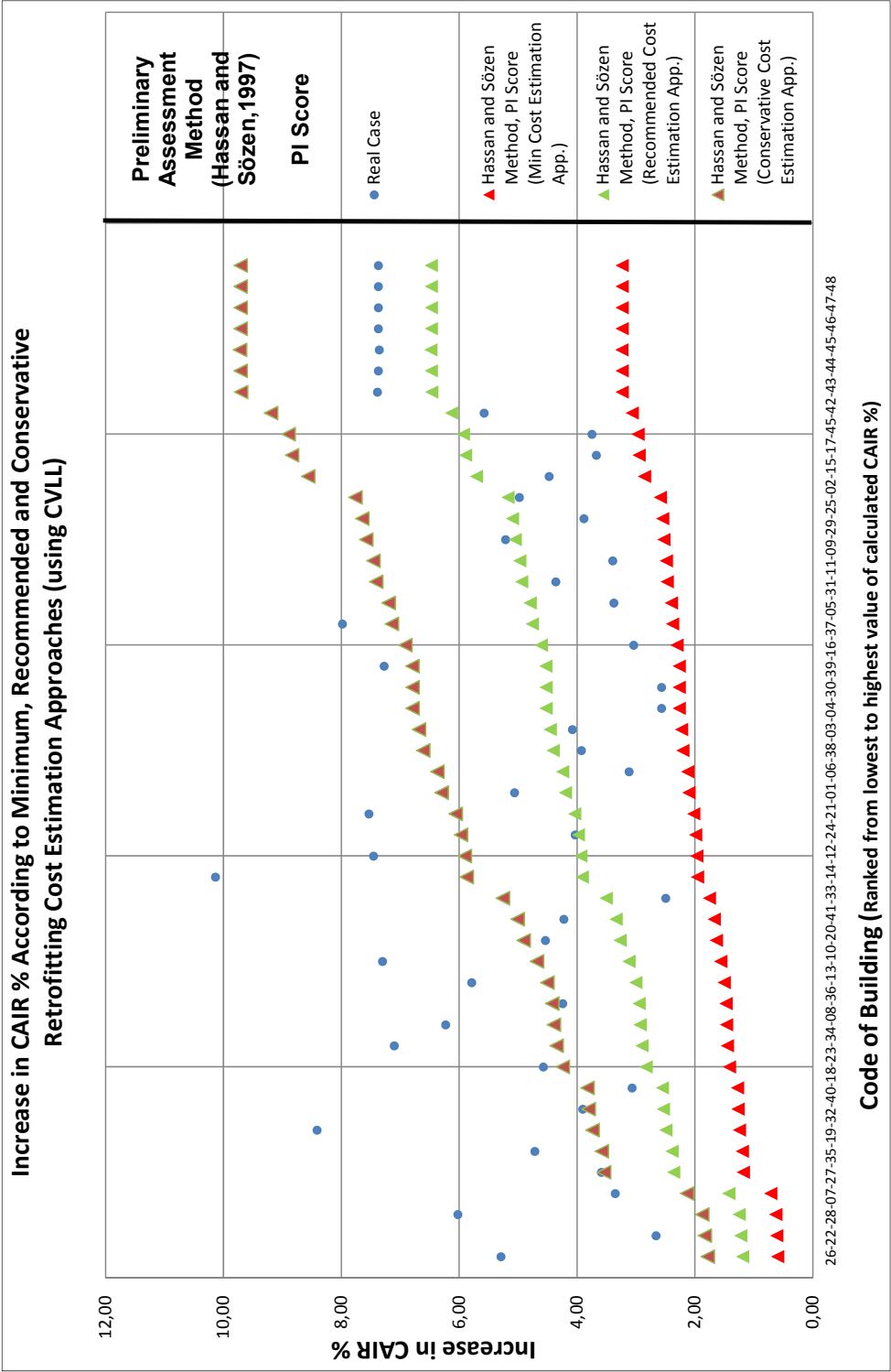


Fig. 6.16g. Real CAIR % increases compared with calculated CAIR % increases according to minimum, recommended and conservative retrofitting cost estimation methods (PIx and Ply scores)

In these figures, it is observed that increase in CAIR %, varies among the preliminary assessment methods, where the evaluation is done according to the minimum estimate method. It is seen that increases in CAIR % found through calculations, proportionally represent actual CAIR % increases after retrofitting. For example, calculated increases in CAIR % with respect to MERC are observed to reflect real (post-retrofitting) increases in CAIR % with a ratio of 2 - 78 % in the method proposed by Özcebe *et al.* (2003), for the CI-IO score. Increases in CAIR % calculated through MERC are observed to determine actual CAIR % increases inadequately. However, the amount of increases in CAIR % may provide important information for the seismic assessment of buildings. Comparing retrofitting cost for a given building and the cost of demolishing and then reconstructing the building may be useful in deciding whether to apply retrofitting or rebuilt it. In our country, though there are differences among the practices of public institutions, general understanding is that if the cost of retrofitting is less than 40% - 50% of reconstruction of the building, then retrofitting is considered to be feasible in economic terms. Institutions or building owners may set up their financial limit in making such economic assessments. If the cost of increasing CAIR % based on MERC exceeds this limit, then it can be decided, without any further detailed analyses, that retrofitting would not be economically feasible. This is due to fact that minimum estimate of retrofitting will always be lower than the actual retrofitting cost.

On the other hand, RERC predicts the necessary increases in CAIR % closer to the actual increases. This would enable more realistic evaluation of retrofitting cost. Increases in CAIR % calculated through this method are observed to vary between 4 % and 157 % of actual CAIR % increases in Özcebe *et al.* (2003) preliminary seismic assessment method, for the CI-IO score. It is to be noted that this range is between 6 % and 234 % for calculations made through the CERC.

Due to the orientation of the cutoff value limit line (CVLL) obtained for the method proposed by Gülay *et al.* (2008), cost estimation approaches do not yield reasonable estimates. Therefore, they are not suitable for the estimation of different levels of retrofitting costs but could be used to identify safe and unsafe structures.

Retrofitting costs, derived from CAIR % increases are calculated for each building considered in the study through the three different retrofitting cost estimation approaches are presented in Appendix F.

CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 Summary

Two tasks are carried out in this study. First is the estimation of whether a mid-rise reinforced concrete frame building is safe or not according to the Turkish Seismic Code (TSC-2007) criteria by using different preliminary seismic assessment methods. The other is the estimation of how much the retrofitting process would cost in order to elevate the safety of the reinforced concrete buildings, which are determined to be unsafe through simple assessment methods, to a degree to be considered as safe according to TSC-2007 criteria.

For this purpose, four different preliminary seismic assessment methods were applied to 48 reinforced concrete buildings – both in their original and retrofitted conditions. The relationship between the results of preliminary assessment methods applied to both original and retrofitted conditions of the buildings and the percentages of vertical load bearing members' cross-sectional areas (CAIR %) of buildings were analyzed.

The methods proposed by Özcebe *et al.* (2003), Gülay *et al.*, (2008), Yakut (2004) and Hassan and Sözen (1997) were utilized as the preliminary seismic assessment methods.

Regarding the detailed analyses of buildings according to the Turkish Seismic Code (TSC-2007), mode superposition method, which is one of the linear assessment methods, was applied. Through detailed analyses conducted, it was determined that none of the buildings satisfied the Turkish Seismic Code performance targets and thus required retrofitting. According to these findings, retrofitting designs were prepared for all buildings and they have been brought to the level of performance foreseen by the Turkish Seismic Code (TSC, 2007) through these designs.

Regarding the retrofitting methods, addition of infill reinforced concrete structural walls to the load-bearing system and reinforced concrete column jacketing methods were applied, which are the most commonly used methods in Turkey. In some buildings, retrofitting applications were realized through FRP wrapping of structurally weak beams, but these were few in number.

Partition lines were drawn on the CAIR % versus preliminary assessment score (PAS) graphs in order to separate the safe and unsafe zones and classify the buildings accordingly. To achieve this, the discriminant analysis technique of multivariate statistics was used. CAIR % and PAS values were selected as the discriminator variables. Separate cutoff value limits were defined for each preliminary assessment method using the results obtained from this technique. In addition to this, it is known that a structure that was designed according to TSC-2007 and hence has a higher PAS value can be safe with a lower CAIR%. To remove this contradiction, a secondary criterion was defined on the graphs. The resulting limit values are named as the secondary boundary limits. The equations of limit lines associated with each preliminary seismic assessment method are obtained.

For the determination of the increase in CAIR % for any building that is rated as unsafe, so that it can be moved to the safe zone, three different approaches, yielding to the minimum, recommended and conservative estimates of retrofitting cost, have been developed. The first approach gives the minimum estimate of retrofitting cost (MERC). In this approach, the minimum increase in CAIR % required for elevating the building to the safe state is obtained.

Although this approach provides a practical procedure for the estimation of the minimum retrofitting costs, it may not reflect the actual retrofitting costs. On the other hand, the method yielding to the recommended estimate of retrofitting cost (RERC) gives more realistic (most likely) increases in CAIR %. Another alternative, which gives a conservative estimate of retrofitting cost (CERC) is also proposed. The resulting cost can be considered as an upper bound of the retrofitting cost for all practical purposes.

The relationship between the increase in CAIR % and the corresponding reinforced concrete construction cost is used to estimate the total retrofitting cost. In cases where foundations are rated insufficient, the cost of adding reinforced concrete sections or layers to the foundation are also taken into consideration. In addition to these construction work items, buildings which include specific architectural details that may receive partial damage or completely destroyed during a possible retrofitting work or buildings which include special equipment and apparatus must be assessed taking into account all such matters. In these cases, the total cost should be increased in appropriate proportions.

The retrofitting cost estimation approaches developed in the study, enables the estimation of the retrofitting costs for buildings based on the preliminary assessment methods, without requiring assessment based on detailed analyses.

7.2 Conclusions

The discriminant-based criteria and the resulting boundary conditions performed satisfactorily in classifying buildings as safe or unsafe in all of the preliminary assessment methods, except the method proposed by Hassan and Sözen (1997). The safety evaluation is made with respect to the Turkish Seismic Code (TSC-2007).

Three practical approaches were developed for estimating the increase in CAIR% necessary to bring a building in the unsafe zone to the safe zone and consequently the total cost of retrofitting.

Due to the orientation of the cutoff value limit line (CVLL) obtained for the method proposed by Gülay *et al.* (2008), cost estimation approaches developed in this study do not yield reasonable estimates according to this method. Therefore, they are not suitable for the estimation of different levels of retrofitting costs but could be used to identify safe and unsafe structures.

It should be noted that, there would be practical advantages of using the three retrofitting estimation approaches. Among these, especially the one giving minimum estimate of retrofitting cost (MERC), can be utilized as a preliminary evaluation criterion. The minimum retrofitting cost of mid-rise RC structures that are located in the 1st and 2nd degree earthquake zones can be determined by using the basic structural conditions evaluation criteria (such as structural geometric properties, vertical load-bearing members' cross-sectional areas and the ground floor allocation of vertical load-bearing members and the ground conditions on which they are founded, etc.) without the need to perform a detailed performance analysis.

Comparison of the minimum retrofitting cost with the reconstruction cost of the building may provide important information to the owners in deciding on the feasibility of the retrofitting operation. When the minimum retrofitting cost, which is calculated according to this method, is higher than the cost of demolishing and reconstruction of the building, the owners may decide to take it down and then rebuilt without further analyses. Such a situation will save time, labor and money, when it is used for the evaluation of building stocks involving larger number of buildings and in urban transformation operations.

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APPENDIX A

PROPERTIES OF BUILDINGS EVALUATED IN THE STUDY

Properties of buildings are summarized in Table A.1.

Table A-1. Properties of the buildings evaluated in the study.

Building ID	PROPERTIES OF BUILDING STOCK										
	A	B	C	D	E	F	H	I	J	K	L
	Location	Number of Storeys (including basement(s))	EQ Zone	Total Story Area (without basement floor area)	Ground Story Area	Total Building Height	Total Building Height (including Basements)	Characteristic Concrete Compressive Strength	Soil Classification	Local Soil Type	Depth of Foundation
				(m ²)	(m ²)	(m)	(m)	(MPa)			(m)
01-01-1-Z3-2	ADALAR	2	1	197,75	93,75	5,80	5,80	8	C	Z3	1,00
02-01-1-Z3-2	ADALAR	2	1	182,25	86,04	6,05	6,05	11	C	Z3	1,00
03-01-1-Z2-2	ADALAR	3	1	289,92	144,96	5,40	8,10	10	C	Z2	3,50
04-01-1-Z2-2	ADALAR	3	1	289,92	144,96	5,40	8,10	11	C	Z2	3,50
05-02-1-Z3-4	AVCILAR	6	1	2270,91	516,54	13,20	15,60	15	C	Z3	3,20
06-03-1-Z3-5	BAKIRKÖY	6	1	1615,67	349,73	15,25	18,00	13	C	Z3	3,45
07-03-1-Z3-5	BAKIRKÖY	6	1	1335,17	223,17	14,10	16,97	11	C	Z3	4,87
08-03-1-Z2-4	BAKIRKÖY	5	1	1403,93	345,68	11,96	14,77	12	B	Z2	2,56
09-03-1-Z3-2	BAKIRKÖY	3	1	354,09	145,09	6,06	8,79	16	C	Z3	3,45
10-03-1-Z3-3	BAKIRKÖY	4	1	347,62	101,44	9,31	11,23	11	C	Z3	2,52
11-03-1-Z2-4	BAKIRKÖY	5	1	1185,25	227,68	11,60	14,50	9	B	Z2	4,00
12-04-1-Z3-4	B.ÇEKMECE	5	1	1955,48	401,30	13,70	14,60	15	C	Z3	1,60
13-04-2-Z3-5	B.ÇEKMECE	6	2	1130,49	178,85	17,75	21,08	12	C	Z3	4,10
14-05-1-Z2-3	EMİNÖNÜ	4	1	356,34	118,78	8,50	11,30	10	B	Z2	3,60
15-05-1-Z3-3	EMİNÖNÜ	5	1	611,90	182,36	8,40	14,20	11	C	Z3	6,00
16-06-2-Z3-7	FATİH	8	2	955,62	115,62	23,50	27,00	15	C	Z3	4,10
17-06-2-Z3-4	FATİH	5	2	444,16	132,47	10,86	12,89	11	C	Z3	2,78
18-06-2-Z3-6	FATİH	7	1	1586,95	235,10	17,27	20,02	11	C	Z3	3,75
19-06-2-Z3-6	FATİH	7	1	614,04	98,44	16,95	18,92	11	C	Z3	2,77
20-06-2-Z3-4	FATİH	5	1	749,16	187,29	11,15	13,50	9	D	Z3	2,65
21-06-2-Z2-4	FATİH	5	1	438,63	104,46	11,27	12,96	13	B	Z2	2,19
22-06-2-Z3-5	FATİH	6	1	1332,65	266,53	14,25	14,25	13	C	Z3	1,20
23-06-2-Z3-5	FATİH	6	2	297,05	59,41	13,07	15,08	10	C	Z3	2,71
24-06-2-Z3-4	FATİH	5	2	384,48	96,12	11,40	13,17	12	C	Z3	2,67
25-07-2-Z3-7	GÜNGÖREN	7	2	1069,92	178,32	21,30	24,35	14	C	Z3	4,05
26-07-2-Z3-5	GÜNGÖREN	6	2	1762,00	256,19	14,75	17,60	12	C	Z3	3,55
27-08-1-Z2-6	KADIKÖY	7	1	2147,34	262,64	18,00	21,00	13	B	Z2	4,20
28-08-1-Z2-5	KADIKÖY	6	1	1287,00	213,56	14,51	16,89	16	B	Z2	3,28
29-08-1-Z2-4	KADIKÖY	6	1	1674,06	245,83	11,60	14,60	14	B	Z2	3,70
30-08-1-Z3-5	KADIKÖY	6	1	635,66	125,30	14,90	17,88	7	C	Z3	3,98
31-08-1-Z3-2	KADIKÖY	3	1	360,20	163,16	6,00	9,00	13	C	Z3	1,60
32-08-1-Z2-5	KADIKÖY	6	1	2477,44	378,00	14,35	18,75	10	C	Z2	5,60
33-08-1-Z2-4	KADIKÖY	5	1	412,98	74,04	12,00	15,00	10	C	Z2	4,00
34-10-1-Z2-4	KARTAL	4	1	472,52	118,13	12,81	12,81	8	B	Z2	1,05
35-09-1-Z3-5	MALTEPE	7	1	1417,42	272,54	14,00	19,60	13	C	Z3	6,60
36-09-1-Z3-4	MALTEPE	5	1	665,14	121,36	12,00	14,70	9	C	Z3	3,50
37-12-2-Z4-4	SİLİVRİ	4	1	1657,40	414,35	11,39	11,39	8	D	Z4	1,85
38-13-2-Z3-5	ŞİŞLİ	6	2	1161,30	232,26	14,15	16,00	12	C	Z3	2,85
39-14-1-Z2-4	PENDİK	5	1	1745,44	408,40	11,36	14,20	16	B	Z2	3,24
40-14-1-Z2-2	PENDİK	4	1	241,56	107,99	6,10	9,05	12	B	Z2	3,45
41-15-1-Z2-4	ÜSKÜDAR	5	1	2776,76	565,94	12,00	14,98	10	B	Z2	3,98
42-15-1-Z2-5	ÜSKÜDAR	6	1	628,65	125,73	13,25	14,75	10	B	Z2	2,30
43-15-1-Z2-5	ÜSKÜDAR	6	1	754,38	126,00	13,25	14,75	10	B	Z2	2,30
44-15-1-Z2-5	ÜSKÜDAR	6	1	628,65	125,73	13,25	14,75	11	B	Z2	2,30
45-15-1-Z2-5	ÜSKÜDAR	6	1	627,50	125,50	13,25	14,75	10	B	Z2	2,30
46-15-1-Z2-5	ÜSKÜDAR	6	1	628,65	125,73	13,25	14,75	10	B	Z2	2,30
47-15-1-Z2-5	ÜSKÜDAR	6	1	628,65	125,73	13,25	14,75	10	B	Z2	2,30
48-15-1-Z2-5	ÜSKÜDAR	6	1	628,65	125,73	13,25	14,75	10	B	Z2	2,30

APPENDIX B

CRITICAL STOREY STRUCTURAL SYSTEM PROPERTIES OF BUILDINGS

Critical storey (ground storey) structural system properties of buildings are summarized in Table B.1

Table B-1 : Critical storey(ground storey) structural system properties.

Building ID	CRITICAL STOREY (GROUND STOREY) STRUCTURAL SYSTEM PROPERTIES											
	A	B	C	D	E	F	G	H	I	J	K	L
	Before retrofitting (existing condition of buildings)						After retrofitting (retrofitted condition of buildings)					
	CAI in x and y directions	CAI in x direction	CAI in y direction	CAIR % in x and y direction	CAIR % in x direction	CAIR % in y direction	CAI in x and y directions	CAI in x direction	CAI in y direction	CAIR % in x and y directions	CAIR % in x direction	CAIR % in y direction
	(m2)	(m2)	(m2)	(%)	(%)	(%)	(m2)	(m2)	(m2)	(%)	(%)	(%)
01-01-1-Z3-2	2,20	1,09	1,11	2,34	1,16	1,18	5,12	2,43	2,69	5,46	2,59	2,87
02-01-1-Z3-2	1,37	0,67	0,70	1,59	0,78	0,81	4,53	2,05	2,48	5,26	2,38	2,88
03-01-1-Z2-2	3,88	1,57	2,31	2,67	1,08	1,59	7,59	3,56	4,03	5,24	2,46	2,78
04-01-1-Z2-2	3,88	1,57	2,31	2,67	1,08	1,59	7,59	3,56	4,03	5,24	2,46	2,78
05-02-1-Z3-4	10,66	4,28	6,39	2,06	0,83	1,24	33,18	14,50	18,68	6,42	2,81	3,62
06-03-1-Z3-5	8,21	3,96	4,25	2,35	1,13	1,21	21,93	10,35	11,59	6,27	2,96	3,31
07-03-1-Z3-5	11,19	3,90	7,29	5,02	1,75	3,27	18,66	8,44	10,23	8,36	3,78	4,58
08-03-1-Z2-4	11,53	6,27	5,26	3,33	1,81	1,52	26,18	14,80	11,38	7,57	4,28	3,29
09-03-1-Z3-2	2,84	1,44	1,40	1,95	0,99	0,96	8,47	3,96	4,51	5,83	2,73	3,10
10-03-1-Z3-3	2,83	1,35	1,47	2,78	1,33	1,45	7,42	3,44	3,98	7,32	3,39	3,93
11-03-1-Z2-4	5,66	1,45	4,22	2,49	0,64	1,85	17,52	8,45	9,08	7,70	3,71	3,99
12-04-1-Z3-4	9,88	4,46	5,42	2,46	1,11	1,35	26,05	11,56	14,49	6,49	2,88	3,61
13-04-2-Z3-5	6,15	3,99	2,16	3,44	2,23	1,21	19,20	10,83	8,37	10,74	6,05	4,68
14-05-1-Z2-3	3,26	1,19	2,07	2,75	1,00	1,74	12,11	4,84	7,27	10,20	4,07	6,12
15-05-1-Z3-3	2,87	1,47	1,40	1,57	0,81	0,77	9,70	5,31	4,39	5,32	2,91	2,41
16-06-2-Z3-7	2,44	0,99	1,44	2,11	0,86	1,25	11,66	4,54	7,12	10,08	3,92	6,16
17-06-2-Z3-4	1,97	0,89	1,08	1,48	0,67	0,81	9,35	4,10	5,25	7,06	3,10	3,96
18-06-2-Z3-6	7,96	4,11	3,85	3,51	1,81	1,70	18,70	9,65	9,05	8,25	4,26	3,99
19-06-2-Z3-6	3,09	1,42	1,68	3,14	1,44	1,70	11,37	4,50	6,87	11,55	4,57	6,98
20-06-2-Z3-4	5,16	2,65	2,51	2,75	1,41	1,34	13,06	6,06	7,00	6,97	3,24	3,74
21-06-2-Z2-4	2,47	0,88	1,59	2,36	0,84	1,52	7,75	3,33	4,43	7,42	3,18	4,24
22-06-2-Z3-5	11,21	5,51	5,70	4,20	2,07	2,14	18,28	8,94	9,34	6,86	3,35	3,51
23-06-2-Z3-5	1,76	0,80	0,96	2,95	1,35	1,61	5,97	3,06	2,91	10,05	5,16	4,89
24-06-2-Z3-4	2,34	0,88	1,46	2,43	0,92	1,52	9,57	4,45	5,12	9,96	4,63	5,33
25-07-2-Z3-7	3,40	1,60	1,81	1,91	0,89	1,01	11,37	6,10	5,28	6,38	3,42	2,96
26-07-2-Z3-5	12,32	5,32	7,00	4,63	2,00	2,63	25,86	12,18	13,68	9,72	4,58	5,14
27-08-1-Z2-6	10,20	3,77	6,43	3,88	1,44	2,45	19,61	8,53	11,08	7,46	3,25	4,22
28-08-1-Z2-5	8,62	4,73	3,89	4,04	2,21	1,82	21,47	10,99	10,48	10,05	5,14	4,91
29-08-1-Z2-4	5,26	3,39	1,87	2,14	1,38	0,76	17,48	9,24	8,25	7,11	3,76	3,35
30-08-1-Z3-5	3,12	1,21	1,91	2,49	0,96	1,52	12,22	5,89	6,34	9,75	4,70	5,06
31-08-1-Z3-2	3,28	1,54	1,75	2,01	0,94	1,07	8,81	3,92	4,90	5,40	2,40	3,00
32-08-1-Z2-5	14,90	6,62	8,28	3,94	1,75	2,19	29,64	14,86	14,78	7,84	3,93	3,91
33-08-1-Z2-4	1,85	0,84	1,01	2,49	1,13	1,36	9,35	5,39	3,96	12,63	7,27	5,35
34-10-1-Z2-4	3,47	1,53	1,95	2,94	1,29	1,65	10,83	4,19	6,64	9,17	3,55	5,62
35-09-1-Z3-5	8,69	4,43	4,25	3,19	1,63	1,56	21,53	9,97	11,56	7,90	3,66	4,24
36-09-1-Z3-4	4,08	2,63	1,46	3,36	2,17	1,20	11,10	5,80	5,30	9,15	4,78	4,37
37-12-2-Z4-4	9,62	2,92	6,70	2,32	0,70	1,62	23,59	8,80	14,79	5,69	2,12	3,57
38-13-2-Z3-5	5,22	2,36	2,86	2,25	1,02	1,23	14,68	7,14	7,54	6,32	3,07	3,24
39-14-1-Z2-4	9,82	4,68	5,14	2,40	1,15	1,26	22,22	11,32	10,89	5,44	2,77	2,67
40-14-1-Z2-2	3,52	1,33	2,18	3,26	1,24	2,02	6,83	3,00	3,82	6,32	2,78	3,54
41-15-1-Z2-4	20,40	9,44	10,96	3,60	1,67	1,94	34,50	15,96	18,54	6,10	2,82	3,28
42-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	8,98	5,40	3,58
43-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	8,98	5,40	3,58
44-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	8,98	5,40	3,58
45-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	9,00	5,41	3,58
46-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	8,98	5,40	3,58
47-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	8,98	5,40	3,58
48-15-1-Z2-5	2,03	1,44	0,59	1,61	1,15	0,47	11,29	6,80	4,50	8,98	5,40	3,58

APPENDIX C

RESULTS OF SEISMIC PERFORMANCE ANALYSIS ACCORDING TO TSC-2007 FOR ORIGINAL AND RETROFITTED CONDITIONS OF BUILDINGS

Results of seismic performance analysis according to TSC-2007 for both original and retrofitted conditions of all selected buildings are summarized in Tables C.1-1 to C.1-96.

In these tables,

- n : No of storey
- MD % : Percentage of structural members in minimum damage state according to TSC-2007
- SD % : Percentage of structural members in significant damage state according to TSC-2007
- ED % : Percentage of structural members in extreme damage state according to TSC-2007
- CD % : Percentage of structural members in collapse state according to TSC-2007
- +E(x) : Earthquake loading in +x direction
- E(x) : Earthquake loading in -x direction
- +E(y) : Earthquake loading in +y direction
- E(y) : Earthquake loading in -y direction

Table C-1-1 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 01.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	85	15			1	Beam	85	15			1	Beam	90	10			1	Beam	90	10		
	Column		36	29	36		Column		43	21	36		Column	14	43	43			Column		64	36	
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	56	33	11		0	Beam	56	39	6		0	Beam	50	22	28		0	Beam	44	22	33	
	Column		21	50	29		Column		14	50	36		Column		57	43			Column		57	43	
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-2 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 01.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	90	5	5		1	Beam	90	10			1	Beam	90	10			1	Beam	90	10		
	Column	86	14				Column	93	7				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	89	11			0	Beam	89	11			0	Beam	89	11			0	Beam	89	11		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-3 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 02.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	100				1	Beam	100				1	Beam	100				1	Beam	100			
	Column		33	8	58		Column		25	33	42		Column			58	42		Column		17	33	50
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	67	28	6		0	Beam	67	28	6		0	Beam	56	39	6		0	Beam	56	39	6	
	Column			25	75		Column			33	67		Column			50	50		Column		8	25	67
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-4 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 02.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	94	6			1	Beam	88	12			1	Beam	100				1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	94	6			0	Beam	94	6			0	Beam	100				0	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-5 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 03.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	93		7		1	Beam	93		7		1	Beam	78	19	4		1	Beam	85	11	4	
	Column	53	41	6			Column	53	41	6			Column	53	47				Column	35	35	18	12
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	85	15			0	Beam	85	15			0	Beam	70	19	11		0	Beam	78	15	7	
	Column	76	24				Column	76	18	6			Column	100					Column	82	18		
	RC Walls	100					RC Walls	100					RC Walls	33	67				RC Walls	33	67		
-1	Beam	83	14	3		-1	Beam	83	14	3		-1	Beam	79	7	14		-1	Beam	76	21	3	
	Column	100					Column	94	6				Column	94		6			Column	94		6	
	RC Walls	67		33			RC Walls	67		33			RC Walls	33	67				RC Walls	33	67		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-6 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 03.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	93	7			1	Beam	93	7			1	Beam	85	7	7		1	Beam	81	15	4	
	Column	100					Column	100					Column	88	12				Column	65	29	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	93	7			0	Beam	93	7			0	Beam	78	11	11		0	Beam	74	22	4	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	93	3	3		-1	Beam	93	3	3		-1	Beam	83	10	7		-1	Beam	79	14	7	
	Column	100					Column	100					Column	94	6				Column	94	6		
	RC Walls	100					RC Walls	100					RC Walls	71	29				RC Walls	71	29		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-7 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 04.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	100				1	Beam	100				1	Beam	78	22			1	Beam	85	15		
	Column	47	47	6			Column	47	47	6			Column	53	47				Column	29	35	24	12
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	81	19			0	Beam	81	19			0	Beam	70	22	7		0	Beam	67	19	15	
	Column	76	18	6			Column	76	18	6			Column	100					Column	88	12		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	86	14			-1	Beam	86	14			-1	Beam	79	14	7		-1	Beam	79	17	3	
	Column	88	12				Column	88	12				Column	100					Column	100			
	RC Walls	67			33		RC Walls	67			33		RC Walls	33		67			RC Walls	33		67	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-8 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 04.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	93	7			1	Beam	93	7			1	Beam	81	11	7		1	Beam	81	15	4	
	Column	100					Column	100					Column	82	18				Column	59	35	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	93	7			0	Beam	93	7			0	Beam	67	26	7		0	Beam	74	26		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	93	7			-1	Beam	93	7			-1	Beam	83	7	10		-1	Beam	83	14	3	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	71	29				RC Walls	71	29		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-9 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 05.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	96	5	1		3	Beam	91	8	1		3	Beam	88	12			3	Beam	90	10		
	Column	20	39	39	2		Column	17	37	43	2		Column	24	67	9			Column	13	78	9	
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	62	36	3		2	Beam	60	38	1		2	Beam	60	37	3		2	Beam	62	36	3	
	Column		39	59	2		Column		41	57	2		Column		70	30			Column		78	22	
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
1	Beam	55	40	5		1	Beam	54	42	4		1	Beam	56	41	3		1	Beam	59	38	3	
	Column		41	50	9		Column		43	46	11		Column		65	35			Column		72	28	
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls		100		
0	Beam	55	45			0	Beam	55	44	1		0	Beam	58	42			0	Beam	56	44		
	Column		41	35	24		Column		35	39	26		Column		37	46	17		Column		39	52	9
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
-1	Beam	59		10	31	-1	Beam	59		10	31	-1	Beam	41	7	19	32	-1	Beam	38	13	13	35
	Column		41	13	46		Column		43	9	48		Column	2	20	52	26		Column		22	54	24
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
-2	Beam	59		30	48	-2	Beam	59		10	31	-2	Beam	44	7	24	25	-2	Beam	38	15	22	25
	Column	7	15	30	48		Column	7	17	33	43		Column	9	9	48	35		Column	9	13	41	37
	RC Walls		100				RC Walls		100				RC Walls			100			RC Walls				100

Table C-1-10 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 05.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	92				3	Beam	91	9			3	Beam	87	13			3	Beam	85	14	1	
	Column	74					Column	74	17	9			Column	67	33				Column	70	30		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86				2	Beam	86	13	1		2	Beam	72	23	5		2	Beam	74	21	5	
	Column	85					Column	85	15				Column	87	13				Column	89	11		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	81	7			1	Beam	81	18	1		1	Beam	65	29	5		1	Beam	71	24	5	
	Column	93					Column	91	9				Column	91	9				Column	91	9		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	77	7			0	Beam	82	17	1		0	Beam	65	29	5		0	Beam	67	28	5	
	Column	91					Column	91	4	4			Column	83	17				Column	83	17		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	63	7			-1	Beam	63	21	16		-1	Beam	50	21	29		-1	Beam	44	31	25	
	Column	93					Column	93	7				Column	96	4				Column	96	4		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-2	Beam	75				-2	Beam	75	19	6		-2	Beam	68	25	7		-2	Beam	68	26	6	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			

Table C-1-11 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 06.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	71	29			4	Beam	75	25			4	Beam	96	4			4	Beam	96	4		
	Column		6	31	63		Column		6	31	63		Column	6		38	56		Column	6		25	69
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	63	37			3	Beam	70	30			3	Beam	72	28			3	Beam	69	31		
	Column		19	16	66		Column		9	28	63		Column		25	3	72		Column		28	19	53
	RC Walls		33	67			RC Walls		33	67			RC Walls		100				RC Walls		100		
2	Beam	59	41			2	Beam	59	41			2	Beam	56	43	2		2	Beam	59	41		
	Column		19	16	66		Column		19	25	56		Column		34	3	63		Column		31	13	56
	RC Walls		67	33			RC Walls		33	67			RC Walls		100				RC Walls		100		
1	Beam	56	44			1	Beam	63	37			1	Beam	50	48	2		1	Beam	54	46		
	Column		22	16	63		Column		25	22	53		Column		34	6	59		Column		34	9	56
	RC Walls		50	50			RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	57	41	2		0	Beam	56	44			0	Beam	50	48	2		0	Beam	54	46		
	Column		31	31	38		Column		31	31	38		Column	3	13	47	38		Column	3	13	44	41
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
-1	Beam	68	32			-1	Beam	71	29			-1	Beam	65	35			-1	Beam	74	26		
	Column		97		3		Column		97		3		Column		97	3			Column		94	6	
	RC Walls		50	14	9		27	RC Walls		50	14		9	27	RC Walls		55		9	14	23	RC Walls	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-12 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 06.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	75	25			4	Beam	75	25			4	Beam	96	4			4	Beam	89	11		
	Column		56	44			Column		56	31	13		Column		56	13	31		Column		50	19	31
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
3	Beam	70	30			3	Beam	67	33			3	Beam	85	15			3	Beam	93	7		
	Column		84	13	3		Column		84	13	3		Column		72	22	6		Column		72	19	9
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
2	Beam	65	35			2	Beam	65	35			2	Beam	78	22			2	Beam	89	11		
	Column		88	9	3		Column		88	13			Column		84	16			Column		78	19	3
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
1	Beam	69	31			1	Beam	69	31			1	Beam	76	24			1	Beam	91	9		
	Column		91	9			Column		91	9			Column		91	9			Column		88	13	
	RC Walls		67	33			RC Walls		67	33			RC Walls		89	11			RC Walls		89	11	
0	Beam	63	37			0	Beam	61	39			0	Beam	74	26			0	Beam	91	9		
	Column		88	13			Column		91	9			Column		88	13			Column		91	9	
	RC Walls		67	33			RC Walls		67	33			RC Walls		67	33			RC Walls		67	33	
-1	Beam	71	29			-1	Beam	74	26			-1	Beam	91	9			-1	Beam	100			
	Column		100				Column		100				Column		100				Column		100		
	RC Walls		50	50			RC Walls		50	50			RC Walls		50	50			RC Walls		50	50	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-13 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 07.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	75	14	11		4	Beam	75	13	13		4	Beam	81	10	8	2	4	Beam	76	19	5	
	Column		56	19	25		Column		56	13	31		Column	44	44	13			Column	75	13	13	
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	73	13	14		3	Beam	70	13	17		3	Beam	84	6	6	3	3	Beam	83	13	5	
	Column		69	19	13		Column		75	6	19		Column	94	6				Column	88	13		
	RC Walls	13	88				RC Walls	13	88				RC Walls	100					RC Walls	100			
2	Beam	70	17	13		2	Beam	68	14	17		2	Beam	81	10	6	3	2	Beam	81	16	3	
	Column		69	19	13		Column		76	6	19		Column	94	6				Column	94	6		
	RC Walls	13	88				RC Walls		100				RC Walls	100					RC Walls	100			
1	Beam	70	14	16		1	Beam	67	14	19		1	Beam	83	10	5	3	1	Beam	79	17	3	
	Column		19	63	19		Column		19	56	25		Column	81	6	6	6		Column	81		13	6
	RC Walls		100				RC Walls	13	88				RC Walls	88	13				RC Walls	88	13		
0	Beam	53	18	29		0	Beam	53	12	35		0	Beam	62	29	9		0	Beam	71	26	3	
	Column	13	13	31	44		Column	13	13	38	38		Column	88	6	6			Column	88	6		6
	RC Walls	63		38			RC Walls	63		38			RC Walls	75	13	13			RC Walls	75	13	13	
-1	Beam	68	18	14		-1	Beam	64	21	14		-1	Beam	75	18	7		-1	Beam	79	18	4	
	Column	50	25	19	6		Column	50	25	19	6		Column	94	6				Column	94		6	
	RC Walls	71	5	10	14		RC Walls	62	10	14	14		RC Walls	48	19	10	24		RC Walls	52	14	10	24
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-14 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 07.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	78	2	21		4	Beam	76	6	17		4	Beam	76	17	6		4	Beam	76	17	6	
	Column	94	6				Column	88	6	6			Column	75	19	6			Column	81	13	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	76	6	17		3	Beam	76	6	17		3	Beam	75	21	5		3	Beam	76	13	11	
	Column	100					Column	100					Column	94	6				Column	94	6		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	78	6	16		2	Beam	76	6	17		2	Beam	71	21	8		2	Beam	76	14	10	
	Column	100					Column	100					Column	94	6				Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	92	8		
1	Beam	76	6	17		1	Beam	76	8	16		1	Beam	71	22	6		1	Beam	76	13	11	
	Column	88	13				Column	94	6				Column	94	6				Column	100			
	RC Walls	92	8				RC Walls	92	8				RC Walls	92	8				RC Walls	85	15		
0	Beam	67	11	22		0	Beam	64	14	22		0	Beam	61	25	14		0	Beam	72	11	17	
	Column	81	19				Column	88	13				Column	100					Column	100			
	RC Walls	69	31				RC Walls	69	31				RC Walls	85	15				RC Walls	85	15		
-1	Beam	66	10	24		-1	Beam	66	14	21		-1	Beam	72	17	10		-1	Beam	72	14	14	
	Column	88	13				Column	88	13				Column	100					Column	100			
	RC Walls	68	32				RC Walls	68	32				RC Walls	72	28				RC Walls	72	28		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-15 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 08.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	84	4	4	8	3	Beam	74	10	10	7	3	Beam	63	19	11	7	3	Beam	67	10	11	12
	Column	50	33	14	3		Column	50	44	6			Column	25	33	25	17		Column	19	47	25	8
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	73	12	3	12	2	Beam	64	12	8	15	2	Beam	48	16	8	27	2	Beam	51	16	5	27
	Column	72	28				Column	83	17				Column	31	39	19	11		Column	31	39	25	6
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	71	14	1	14	1	Beam	60	14	8	18	1	Beam	47	12	12	29	1	Beam	47	15	8	30
	Column	92	6	3			Column	94	6				Column	31	36	25	8		Column	25	53	14	8
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	73	11	4	12	0	Beam	62	14	11	14	0	Beam	45	15	10	30	0	Beam	45	16	8	30
	Column	97	3				Column	97	3				Column	28	44	22	6		Column	28	47	22	3
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	77	8	3	12	-1	Beam	65	15	12	8	-1	Beam	50	14	8	29	-1	Beam	53	11	8	29
	Column	97	3				Column	97	3				Column	19	33	42	6		Column	22	31	42	6
	RC Walls	50			50		RC Walls	50			50		RC Walls	50		50			RC Walls	50		50	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-16 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 08.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	89	8	3		3	Beam	90	7	3		3	Beam	83	8	8		3	Beam	78	14	8	
	Column	81	17	3			Column	89	11				Column	78	6	17			Column	81	14	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	13	1		2	Beam	88	10	3		2	Beam	74	11	15		2	Beam	72	10	18	
	Column	100					Column	100					Column	89	8	3			Column	89	8	3	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	88	12			1	Beam	89	11			1	Beam	71	14	15		1	Beam	73	8	19	
	Column	100					Column	100					Column	92	6	3			Column	89	8	3	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	88	11	1		0	Beam	89	10	1		0	Beam	71	10	19		0	Beam	71	10	19	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	70	30				RC Walls	80	20		
-1	Beam	97	2	2		-1	Beam	94	5	2		-1	Beam	80	11	9		-1	Beam	80	11	9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	50	50				RC Walls	50	50				RC Walls	80	20				RC Walls	80	20		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-17 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 09.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	59	3	9	28	1	Beam	59	3	13	25	1	Beam	47	13	6	34	1	Beam	53	6	13	28
	Column		20	7	73		Column		13	33	53		Column		27	7	67		Column		20	7	73
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	60	2	9	30	0	Beam	60	9	4	28	0	Beam	64	6	6	23	0	Beam	64	9	4	23
	Column		24	29	47		Column		29	29	41		Column		18	29	53		Column		18	47	35
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	41	3	14	41	-1	Beam	34	14	14	38	-1	Beam	55		3	41	-1	Beam	55		3	41
	Column		29	29	41		Column		29	35	35		Column			65	25		Column			47	53
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-18 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 09.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	93	7			1	Beam	93	7			1	Beam	97	3			1	Beam	100			
	Column	87	13				Column	73	27				Column	93	7				Column	80	20		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	96	4			0	Beam	91	6	2		0	Beam	96	4			0	Beam	96	4		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	93	7			-1	Beam	97	3			-1	Beam	93	7			-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	50	50				RC Walls	50	50				RC Walls	50	50				RC Walls	50	50		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-19 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 10.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	78	7	15		2	Beam	70	11	19		2	Beam	81	7	7	4	2	Beam	74	15	7	
	Column	8	15	62	15		Column	8	31	15	46		Column	15	38	15	31		Column	15	23	62	
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	67	7	4	22	1	Beam	67	4	11	19	1	Beam	70	7	11	11	1	Beam	63	11	4	22
	Column	8	15	38	38		Column		38	23	38		Column	8	46	31	15		Column	15	31	56	8
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	67	7		26	0	Beam	63	4	11	22	0	Beam	67	11	11	11	0	Beam	59	11	7	22
	Column		15	54	31		Column		8	54	38		Column		62	38			Column		54	46	
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	60				-1	Beam	50		30	20	-1	Beam	60	20	20		-1	Beam	60	10	20	10
	Column	92	8				Column	100					Column	85	15				Column	85	15		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-20 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 10.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	78	15	7		2	Beam	78	15	7		2	Beam	96	4			2	Beam	100			
	Column	38	38	23			Column	62	15	23			Column	85	8	8			Column	92	8		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	70	11	19		1	Beam	70	19	11		1	Beam	96	4			1	Beam	96	4		
	Column	69	31				Column	77	23				Column	92	8				Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	74	19	7		0	Beam	74	15	11		0	Beam	96	4			0	Beam	96	4		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	75	25				RC Walls	75	25				RC Walls	100					RC Walls	100			
-1	Beam	70	30			-1	Beam	90	10			-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	91	9				RC Walls	91	9		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-21 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 11.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	73	5	5	17	3	Beam	72	5	3	20	3	Beam	83	3	2	12	3	Beam	85	3	5	7
	Column		12	53	35		Column		24	47	29		Column	65	24	6	6		Column	47	35	12	6
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	60	5	8	27	2	Beam	58	7	8	27	2	Beam	78	5	3	13	2	Beam	75	7	7	12
	Column			6	94		Column			6	94		Column	59	24	12	6		Column	53	29	18	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	58	2	7	33	1	Beam	60		5	35	1	Beam	80	5	2	13	1	Beam	77	8	3	12
	Column				100		Column				100		Column	47	29	18	6		Column	35	35	24	6
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	58	2	7	33	0	Beam	60		3	37	0	Beam	82	3	3	12	0	Beam	80	3	5	12
	Column				100		Column				100		Column	24	59	6	12		Column	29	47	18	6
	RC Walls	100					RC Walls	110					RC Walls	100					RC Walls	100			
-1	Beam	48	5	10	38	-1	Beam	48	5	5	43	-1	Beam	52	5	14	29	-1	Beam	48	5	14	33
	Column	41	6		53		Column	41	6		53		Column	82	6		12		Column	82	12		6
	RC Walls	71		6	24		RC Walls	71		6	24		RC Walls	29	12	12	47		RC Walls	29	12	12	47
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-22 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 11.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	100				3	Beam	100				3	Beam	95	5			3	Beam	97	2	2	
	Column	100					Column	100					Column	88	6	6			Column	82	18		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	93	7			2	Beam	92	8			2	Beam	92	5	3		2	Beam	92	5	3	
	Column	100					Column	100					Column	94	6				Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	95	5			1	Beam	93	7			1	Beam	92	5	3		1	Beam	92	7	2	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	97	3			0	Beam	97	3			0	Beam	95	5			0	Beam	93	7		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	90	10				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	90	10			-1	Beam	86	14		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	78	22				RC Walls	78	22				RC Walls	56	44				RC Walls	56	44		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-23 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 12.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	83	8	9		3	Beam	80	11	6	3	3	Beam	86	9	5		3	Beam	86	11	3	
	Column	20	40	33	8		Column	10	57	25	8		Column	43	25	18	15		Column	50	18	15	18
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	73	12	15		2	Beam	73	15	12		2	Beam	72	18	10		2	Beam	72	16	12	
	Column	12	55	33			Column	12	50	33	5		Column	36	45	14	5		Column	36	45	14	5
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	60	33	7		1	Beam	70	25	4		1	Beam	64	24	12		1	Beam	64	25	10	
	Column	10	38	43	10		Column	14	33	43	10		Column	40	38	12	10		Column	43	36	12	10
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	56	33	11		0	Beam	62	26	12		0	Beam	59	24	17		0	Beam	59	24	17	
	Column	19	45	12	24		Column	10	57	14	19		Column	36	36	17	12		Column	38	36	17	10
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	55	31	13		-1	Beam	61	24	15		-1	Beam	61	24	15		-1	Beam	63	22	15	
	Column	29	29	29	14		Column	31	24	36	10		Column	24	29	40	7		Column	24	31	38	7
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-24 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 12.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	91	9			3	Beam	97	3			3	Beam	100				3	Beam	100			
	Column	90	10				Column	93	8				Column	88	13				Column	90	10		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	91	9			2	Beam	94	6			2	Beam	100				2	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	91	9			1	Beam	94	6			1	Beam	100				1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	91	8	2		0	Beam	91	9			0	Beam	98	2			0	Beam	98	2		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	97	3			-1	Beam	100				-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-25 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 13.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	65	10	10	16	5	Beam	59	18	8	16	5	Beam	84	2		14	5	Beam	76	6	2	16
	Column	29	47	12	12		Column	29	41	12	18		Column		35	47	18		Column	18	6	59	18
	RC Walls	60	40				RC Walls	60	40				RC Walls	60	40				RC Walls	80	20		
4	Beam	57	8	10	25	4	Beam	51	16	14	20	4	Beam	61	10	12	18	4	Beam	63	8	8	22
	Column	47	47	6			Column	47	41	6	6		Column		12	65	24		Column		24	35	41
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	80		20	
3	Beam	57	6	6	31	3	Beam	53	6	8	33	3	Beam	57	8	8	27	3	Beam	59	4	8	29
	Column	29	29	24	18		Column	29	29	18	24		Column			59	41		Column		6	24	71
	RC Walls	100					RC Walls	100					RC Walls	20	80				RC Walls		100		
2	Beam	55	6	4	35	2	Beam	53	6	6	35	2	Beam	53	8	6	33	2	Beam	53	8	8	31
	Column	6	59	18	18		Column	12	47	18	24		Column			24	76		Column		6	12	82
	RC Walls	80	20				RC Walls	100					RC Walls	20	80				RC Walls		100		
1	Beam	53	8	2	37	1	Beam	53	6	4	37	1	Beam	47	10	10	33	1	Beam	53	6	6	35
	Column		41	24	35		Column	6	18	53	24		Column				100		Column				100
	RC Walls	80	20				RC Walls	80	20				RC Walls	20	80				RC Walls		100		
0	Beam	57	4	4	35	0	Beam	55	4	6	35	0	Beam	45	13	8	35	0	Beam	49	8	6	37
	Column		18	53	29		Column		18	53	29		Column				100		Column				100
	RC Walls	80	20				RC Walls	80	20				RC Walls	20	80				RC Walls		100		
-1	Beam	44	6	6	44	-1	Beam	44	9	6	41	-1	Beam	31	3	9	56	-1	Beam	31	6	3	59
	Column	6	12	24	59		Column	6	12	29	53		Column			6	94		Column			12	88
	RC Walls	40			60		RC Walls	40			60		RC Walls	60			40		RC Walls	60			40
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-26 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 13.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	75	8	18		5	Beam	75	10	16		5	Beam	76	20	4		5	Beam	75	24	2	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	93	7		
4	Beam	76	6	18		4	Beam	75	4	22		4	Beam	73	4	24		4	Beam	73	2	25	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	75	8	18		3	Beam	73	10	18		3	Beam	73	4	24		3	Beam	73	2	25	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	75	10	16		2	Beam	76	6	18		2	Beam	71	6	24		2	Beam	73	4	24	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	78	6	16		1	Beam	76	8	16		1	Beam	75	4	22		1	Beam	75	6	20	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	87	13				RC Walls	87	13				RC Walls	100					RC Walls	100			
0	Beam	80	4	16		0	Beam	80	4	16		0	Beam	73	4	24		0	Beam	73	6	22	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	87	13				RC Walls	87	13				RC Walls	100					RC Walls	100			
-1	Beam	72	9	19		-1	Beam	75	6	19		-1	Beam	59	25	16		-1	Beam	59	22	19	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	53	47				RC Walls	53	47				RC Walls	93	7				RC Walls	93	7		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-27 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-14.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	80	12	8		2	Beam	84	8	8		2	Beam	72	20	4	4	2	Beam	76	20	4	
	Column	14	14	29	43		Column	29	14	36	21		Column	21	29	36	14		Column	14	14	36	36
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	72	16	12		1	Beam	60	28	12		1	Beam	56	28	12	4	1	Beam	68	20	12	
	Column		14	50	36		Column		21	57	21		Column	14	43	36	7		Column	21	43	21	14
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	67	21	13		0	Beam	63	21	17		0	Beam	58	21	21		0	Beam	63	21	17	
	Column	7	14	50	29		Column		29	29	43		Column	14	29	36	21		Column	14	36	14	36
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-1	Beam	67	21	13		-1	Beam	63	17	21		-1	Beam	54	29	17		-1	Beam	58	25	17	
	Column		14	14	71		Column		7	29	64		Column	21	21	29	29		Column	21	7	29	43
	RC Walls	100					RC Walls	100					RC Walls				100		RC Walls				100
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-28 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-14.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	92	4	4		2	Beam	92	4	4		2	Beam	84	16			2	Beam	80	16	4	
	Column	93	7				Column	93	7				Column	93	7				Column	86	14		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	88	8	4		1	Beam	88	8	4		1	Beam	80	20			1	Beam	72	24	4	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	79	17	4		0	Beam	83	8	8		0	Beam	75	25			0	Beam	75	21	4	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	96	4			-1	Beam	96	4			-1	Beam	88	13			-1	Beam	88	12		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	89	11				RC Walls	89	11		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-29 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-15.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	77	12	12		2	Beam	79	12	7	2	2	Beam	84	9	7		2	Beam	81	9	9	
	Column		25	25	50		Column	6	25	19	50		Column		25	31	44		Column		19	19	63
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	72	7	21		1	Beam	77	9	14		1	Beam	74	12	14		1	Beam	11	9	14	
	Column		13	44	44		Column		25	13	63		Column	6	13	31	50		Column		25	6	69
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	74	5	21		0	Beam	74	12	14		0	Beam	74	19	7		0	Beam	11	9	14	
	Column		19	31	50		Column		13	13	75		Column			19	81		Column		6	13	81
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	58	25	17		-1	Beam	58	33	8		-1	Beam	50	50			-1	Beam	58	33	8	
	Column	63	19	13	6		Column	50	13	25	13		Column	81	6	6	6		Column	75	19	6	
	RC Walls	75	17	8			RC Walls	75	17	8			RC Walls	33	25	42			RC Walls	33	25	42	
-2	Beam	100				-2	Beam	100				-2	Beam	100				-2	Beam	100			
	Column	81	6		13		Column	81	6	6	6		Column	94			6		Column	94			6
	RC Walls	67	25	8			RC Walls	67	25	8			RC Walls	25	33	25	17		RC Walls	25	33	25	17

Table C-1-30 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-15.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	88	7	5		2	Beam	88	5	7		2	Beam	86	5	9		2	Beam	81	14	5	
	Column	69	31				Column	94		6			Column	69	19	13			Column	69	25	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	88	5	7		1	Beam	88	5	7		1	Beam	81	9	9		1	Beam	81	7	12	
	Column	94	6				Column	94	6				Column	88	13				Column	88	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	88	7	5		0	Beam	88	5	7		0	Beam	81	9	9		0	Beam	81	5	14	
	Column	88	13				Column	94	6				Column	88	13				Column	88	13		
	RC Walls	100					RC Walls	100					RC Walls	75	25				RC Walls	75	25		
-1	Beam	83	8	8		-1	Beam	83	8	8		-1	Beam	75	17	8		-1	Beam	67	25	8	
	Column	100					Column	100					Column	100					Column	94	6		
	RC Walls	93	7				RC Walls	93	7				RC Walls	50	50				RC Walls	50	50		
-2	Beam	100				-2	Beam	100				-2	Beam	100				-2	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	79	21				RC Walls	79	21				RC Walls	43	57				RC Walls	43	57		

Table C-1-31 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-16.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam	86	6	6	3	6	Beam	89	9	3		6	Beam	91	6		3	6	Beam	94	3		3
	Column	17	67	11	6		Column	28	39	28	6		Column	28	61	6	6		Column	22	56	11	11
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	71	20	9		5	Beam	71	23	6		5	Beam	80	17	3		5	Beam	77	23		
	Column		50	44	6		Column		44	44	11		Column		78	22			Column		56	39	6
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	63	23	14		4	Beam	71	14	14		4	Beam	69	20	11		4	Beam	69	23	9	
	Column		11	28	61		Column		17	33	50		Column		39	28	33		Column		17	44	39
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	60	26	14		3	Beam	66	20	14		3	Beam	66	20	14		3	Beam	63	26	11	
	Column			22	78		Column		11	39	50		Column		22	6	72		Column		17	28	56
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	66	14	20		2	Beam	66	17	17		2	Beam	66	17	14	3	2	Beam	66	20	14	
	Column		6	6	89		Column		6	6	89		Column		6	44	50		Column		11	17	72
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	66	14	20		1	Beam	69	11	20		1	Beam	69	17	14		1	Beam	69	11	20	
	Column		6	6	89		Column		6	6	89		Column		6	28	67		Column		6	11	83
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	62	10	28		0	Beam	62	17	21		0	Beam	62	28	10		0	Beam	62	24	14	
	Column			6	94		Column				100		Column		6	28	67		Column		6	17	78
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	67	33			-1	Beam	73	27			-1	Beam	53	47			-1	Beam	60	27	13	
	Column	83		17			Column	78	6	11	6		Column	61	17	11	11		Column	67	11	17	6
	RC Walls	47	7	27	20		RC Walls	47	7	27	20		RC Walls	60		13	27		RC Walls	67		7	27
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-32 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-16.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam	77	11	11		6	Beam	77	11	11		6	Beam	80	14	6		6	Beam	86	11	3	
	Column	72	17	11			Column	78	6	17			Column	83		17			Column	83	11	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
5	Beam	74	9	17		5	Beam	74	3	23		5	Beam	80	9	11		5	Beam	77	11	11	
	Column	83	17				Column	83	11	6			Column	83	11	6			Column	83	17		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
4	Beam	74	9	17		4	Beam	74	3	23		4	Beam	80	9	11		4	Beam	77	17	6	
	Column	89	11				Column	83	17				Column	89	11				Column	89	11		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	74	14	11		3	Beam	71	11	17		3	Beam	80	11	9		3	Beam	77	20	3	
	Column	89	11				Column	89	11				Column	89	11				Column	89	11		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	71	11	17		2	Beam	77	3	20		2	Beam	80	11	9		2	Beam	77	17	6	
	Column	100					Column	100					Column	89	11				Column	94	6		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	6	17		1	Beam	71	11	17		1	Beam	80	11	9		1	Beam	77	17	6	
	Column	100					Column	100					Column	94	6				Column	100			
	RC Walls	86	14				RC Walls	86	14				RC Walls	100					RC Walls	100			
0	Beam	72	7	21		0	Beam	72	10	17		0	Beam	83	11	6		0	Beam	79	14	7	
	Column	100					Column	100					Column	94	6				Column	100			
	RC Walls	71	29				RC Walls	71	29				RC Walls	100					RC Walls	86	14		
-1	Beam	86	14			-1	Beam	79	21			-1	Beam	83	10	7		-1	Beam	79	21		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	53	47				RC Walls	53	47				RC Walls	86	14				RC Walls	67	33		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-33 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-17.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	82	18			3	Beam	88	6	6		3	Beam	76	24			3	Beam	76	24		
	Column	17	17	42	25		Column	8	50	33	8		Column	8	50	42			Column	8	42	50	
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	53	41	6		2	Beam	53	24	24		2	Beam	53	29	18		2	Beam	53	18	29	
	Column		33	42	25		Column		33	67			Column		33	50	17		Column		25	67	8
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	55	27	18		1	Beam	55	23	23		1	Beam	45	18	36		1	Beam	45	23	32	
	Column		27	40	33		Column		33	40	27		Column		13	47	40		Column		27	60	13
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	57	17	26		0	Beam	57	22	22		0	Beam	48	30	22		0	Beam	48	30	22	
	Column		13	20	67		Column		13	20	67		Column			27	73		Column		20	13	67
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	45	45	9		-1	Beam	55	36	9		-1	Beam	82	18			-1	Beam	73	9	18	
	Column	93		7			Column	93		7			Column	93		7			Column	93	7		
	RC Walls	67	33				RC Walls	67	33				RC Walls	50	50				RC Walls	58	42		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-34 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-17.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	76	12	12		3	Beam	65	29	6		3	Beam	76	24			3	Beam	88	12		
	Column	75	17	8			Column	92		8			Column	83	17				Column	92	8		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	71	29			2	Beam	71	24	6		2	Beam	71	29			2	Beam	82	18		
	Column	75	17	8			Column	92		8			Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	73	27			1	Beam	77	23			1	Beam	82	9	9		1	Beam	77	14	9	
	Column	80	20				Column	87	13				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	84	12	4		0	Beam	84	12	4		0	Beam	84	12	4		0	Beam	84	12	4	
	Column	87	13				Column	93	7				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	82	9	9		-1	Beam	73	18	9		-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	78	22				RC Walls	78	22				RC Walls	67	33				RC Walls	67	33		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-35 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-18.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	86	14			5	Beam	90	10			5	Beam	86	12	2		5	Beam	90	6	4	
	Column	15	30	44	11		Column	7	44	33	15		Column	19	48	26	7		Column	15	56	26	4
	RC Walls	67		33			RC Walls	67		33			RC Walls	33	67				RC Walls	33	67		
4	Beam	73	20	6		4	Beam	67	31	2		4	Beam	69	31			4	Beam	82	18		
	Column	22	52	26			Column	26	44	30			Column	22	44	33			Column	19	78	4	
	RC Walls	67	33				RC Walls	67	33				RC Walls	67	33				RC Walls	67	33		
3	Beam	65	29	6		3	Beam	67	29	4		3	Beam	67	33			3	Beam	71	27	2	
	Column	11	70	19			Column	15	52	33			Column	19	33	37	11		Column	22	41	22	15
	RC Walls	67	33				RC Walls	67	33				RC Walls	33	67				RC Walls	33	67		
2	Beam	58	22	20		2	Beam	60	30	10		2	Beam	68	26	6		2	Beam	72	20	8	
	Column	7	52	41			Column	19	44	33	4		Column	30	19	37	15		Column	19	33	41	7
	RC Walls	100					RC Walls	100					RC Walls	33	67				RC Walls	33	67		
1	Beam	56	18	26		1	Beam	58	18	24		1	Beam	72	22	6		1	Beam	80	18	2	
	Column	4	44	48	4		Column	11	41	44	4		Column	22	19	33	26		Column	15	22	37	26
	RC Walls	67	33				RC Walls	67	33				RC Walls	33	67				RC Walls	33	67		
0	Beam	56	16	28		0	Beam	58	20	22		0	Beam	74	24	2		0	Beam	78	18	4	
	Column	11	48	30	11		Column	19	33	41	7		Column	22	15	41	22		Column	19	19	37	26
	RC Walls	67		33			RC Walls	67		33			RC Walls	33	67				RC Walls	33	67		
-1	Beam	61	24	14		-1	Beam	61	33	6		-1	Beam	78	19	4		-1	Beam	78	18	4	
	Column	59	33	7			Column	56	37	7			Column	44	18	19	19		Column	44	19	19	19
	RC Walls	67			33		RC Walls	67			33		RC Walls	33		67			RC Walls	33		67	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-36 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 18.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	80	14	6		5	Beam	76	20	4		5	Beam	84	16			5	Beam	86	12	2	
	Column	67	19	15			Column	74	15	11			Column	81	7	11			Column	78	19	4	
	RC Walls	100					RC Walls	100					RC Walls	90	10				RC Walls	90	10		
4	Beam	71	8	20		4	Beam	63	12	24		4	Beam	71	10	18		4	Beam	71	22	6	
	Column	78	19	4			Column	81	15	4			Column	85	15				Column	85	15		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	71	10	18		3	Beam	63	10	27		3	Beam	71	16	12		3	Beam	73	16	10	
	Column	81	11	7			Column	85	11	4			Column	85	15				Column	89	7	4	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	62	14	24		2	Beam	62	10	28		2	Beam	74	6	20		2	Beam	74	12	14	
	Column	81	15	4			Column	81	15	4			Column	85	15				Column	89	7	4	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	60	20	20		1	Beam	62	10	28		1	Beam	74	10	16		1	Beam	74	12	14	
	Column	78	15	7			Column	78	15	7			Column	85	15				Column	89	11		
	RC Walls	100					RC Walls	100					RC Walls	90	10				RC Walls	90	10		
0	Beam	64	16	20		0	Beam	62	14	24		0	Beam	74	14	12		0	Beam	78	14	8	
	Column	81	15	4			Column	85	11	4			Column	93	7				Column	89	11		
	RC Walls	80	20				RC Walls	80	20				RC Walls	80	20				RC Walls	80	20		
-1	Beam	70	24	6		-1	Beam	68	26	6		-1	Beam	86	10	4		-1	Beam	88	10	2	
	Column	96	4				Column	96	4				Column	100					Column	100			
	RC Walls	50	50				RC Walls	50	50				RC Walls	70	30				RC Walls	70	30		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-37 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 19.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	83	13	4		5	Beam	88	8	4		5	Beam	96		4		5	Beam	79	17		4
	Column	27	60	7	7		Column	27	47	20	7		Column	7	60	27	7		Column	33	27	27	13
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	58	21	8	13	4	Beam	63	17	8	13	4	Beam	54	8	25	13	4	Beam	54		29	17
	Column	13	53	33			Column	20	47	27	7		Column	7	40	47	7		Column	7	53	20	20
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	50	8	21	21	3	Beam	54	8	21	17	3	Beam	46	8	17	29	3	Beam	50	8		42
	Column	7	33	53	7		Column	7	40	53			Column		47	27	27		Column		40	33	27
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	54	8	13	25	2	Beam	54	8	8	29	2	Beam	50	4	8	38	2	Beam	50	4		46
	Column		20	60	20		Column		20	67	13		Column		20	60	20		Column		7	67	27
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	54	4	13	29	1	Beam	54	4	8	33	1	Beam	50	4	4	42	1	Beam	50	4		46
	Column		33	40	27		Column		33	40	27		Column		20	67	13		Column		47	33	27
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	54	4	13	29	0	Beam	54	4	8	33	0	Beam	50	4	8	38	0	Beam	54			46
	Column		33	27	40		Column		33	27	40		Column		13	60	27		Column		7	60	33
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	54		38	8	-1	Beam	54		23	23	-1	Beam	62	15	23		-1	Beam	62	8		31
	Column	93					Column	87	7	7			Column	100					Column	100			
	RC Walls	55	9	18	18		RC Walls	55		9	36		RC Walls	45		55			RC Walls	45		55	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-38 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 19.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	83	17			5	Beam	78	17	4		5	Beam	87	13			5	Beam	87	13		
	Column	87	7	7			Column	87	7	7			Column	87	13				Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
4	Beam	74	13	13		4	Beam	74	13	13		4	Beam	87	4	9		4	Beam	78	17	4	
	Column	87	13				Column	87	13				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	70	17	13		3	Beam	65	22	13		3	Beam	87	9	4		3	Beam	78	22		
	Column	80	20				Column	80	20				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	57	26	17		2	Beam	57	22	22		2	Beam	74	22	4		2	Beam	74	26		
	Column	80	13	7			Column	80	20				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	57	26	17		1	Beam	57	22	22		1	Beam	74	26			1	Beam	74	26		
	Column	87	13				Column	80	20				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	57	26	17		0	Beam	57	26	17		0	Beam	83	17			0	Beam	78	22		
	Column	93	7				Column	93	7				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	83	17			-1	Beam	83	8	8		-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	86	14				RC Walls	86	14		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-39 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-20.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	91	6	3		3	Beam	89	9	3		3	Beam	83	14	3		3	Beam	86	11	3	
	Column	32	64	5			Column	55	41	5			Column	36	59	5			Column	32	45	18	5
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	74	20	6		2	Beam	71	17	11		2	Beam	74	17	9		2	Beam	63	31	6	
	Column	23	68	9			Column	41	50	9			Column	32	64	5			Column	23	73	5	
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	66	31	3		1	Beam	69	20	11		1	Beam	66	23	11		1	Beam	63	23	14	
	Column	27	41	27	5		Column	36	32	32			Column	23	55	23			Column	18	41	36	5
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	69	11	19		0	Beam	69	17	14		0	Beam	67	22	11		0	Beam	61	22	17	
	Column		32	36	32		Column	14	32	27	27		Column	5	41	45	9		Column	5	32	36	27
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	89	11			-1	Beam	89	11			-1	Beam	85	7	4	4	-1	Beam	85	11	4	
	Column	95		5			Column	100					Column	91	5	5			Column	86	9	5	
	RC Walls	40	27	33			RC Walls	47	20	27	7		RC Walls	60		40			RC Walls	60		40	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-40 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-20.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	97	3			3	Beam	94	6			3	Beam	97	3			3	Beam	97	3		
	Column	59	41				Column	73	27				Column	95	5				Column	95	5		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	11	3		2	Beam	80	20			2	Beam	91	6	3		2	Beam	94	6		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	83	14	3		1	Beam	80	20			1	Beam	94	3	3		1	Beam	94	6		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	83	17			0	Beam	89	8	3		0	Beam	94	6			0	Beam	97	3		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	100				-1	Beam	100				-1	Beam	96	4			-1	Beam	96	4		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	47	53				RC Walls	47	53				RC Walls	80	20				RC Walls	80	20		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-41 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-21.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	86	9	5		3	Beam	86	9	5		3	Beam	77	14	9		3	Beam	82	18		
	Column	23	38	31	8		Column	23	38	15	23		Column	46	31	8	15		Column	38	54	8	
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	68	18	14		2	Beam	68	18	14		2	Beam	64	14	23		2	Beam	64	23	14	
	Column		38	62			Column		31	54	15		Column	54	23	15	8		Column	46	38	8	8
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	74	13	13		1	Beam	74	9	17		1	Beam	61	13	26		1	Beam	57	30	13	
	Column		23	62	15		Column		38	23	38		Column	38	38	15	8		Column	38	31	23	8
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	59	18	23		0	Beam	59	18	23		0	Beam	55	32	14		0	Beam	55	18	27	
	Column		46	31	23		Column		31	38	31		Column	8	54	38			Column	15	54	23	8
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	81	19			-1	Beam	81	19			-1	Beam	69	19	13		-1	Beam	81	13	6	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	50	50				RC Walls	50	50		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-42 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-21.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	95		5		3	Beam	91	5	5		3	Beam	95	5			3	Beam	100			
	Column	77	15	8			Column	69	31				Column	92	8				Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	91	5	5		2	Beam	91	5	5		2	Beam	95	5			2	Beam	95	5		
	Column	100					Column	92	8				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	86	9	5		1	Beam	91	5	5		1	Beam	91	9			1	Beam	95	5		
	Column	92	8				Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	95		5		0	Beam	86	9	5		0	Beam	95	5			0	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	100				-1	Beam	100				-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	67	33				RC Walls	67	33				RC Walls	78	22				RC Walls	78	22		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-43 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-22.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	74	14	9	2	4	Beam	67	19	12	2	4	Beam	93	5	2		4	Beam	91	7	2	
	Column	23	27	36	14		Column	18	23	45	14		Column	18	27	36	18		Column	14	41	32	14
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	64	16	14	7	3	Beam	61	14	16	9	3	Beam	66	23	11		3	Beam	73	9	14	5
	Column	41	50	9			Column	32	55	14			Column	27	32	41			Column	27	50	23	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	64	14	14	9	2	Beam	57	14	14	16	2	Beam	66	11	14	9	2	Beam	68	14	11	7
	Column	45	50	5			Column	41	50	9			Column	23	45	32			Column	27	64	9	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	61	11	11	16	1	Beam	55	14	18	14	1	Beam	66	9	14	11	1	Beam	64	14	7	16
	Column	59	36	5			Column	59	36	5			Column	27	41	27	5		Column	32	41	23	5
	RC Walls	75	25				RC Walls	75	25				RC Walls	100					RC Walls	100			
0	Beam	59	15	15	12	0	Beam	56	22	7	15	0	Beam	63	2	24	10	0	Beam	66	5	15	15
	Column	68	27	5			Column	68	27	5			Column	41	41	18			Column	50	27	18	5
	RC Walls	50	50				RC Walls	50	25	25			RC Walls	100					RC Walls	100			
-1	Beam	65	15	15	4	-1	Beam	65	15	12	8	-1	Beam	50	15	27	8	-1	Beam	50	12	31	8
	Column	100					Column	100					Column	86	14				Column	77	23		
	RC Walls	50	6	6	38		RC Walls	44	13	6	38		RC Walls	50	13	13	25		RC Walls	50	13	13	25
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-44 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-22.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	74	19	7		4	Beam	77	16	7		4	Beam	91	7	2		4	Beam	88	7	5	
	Column	45	41	14			Column	45	32	23			Column	50	23	27			Column	45	27	27	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	73	9	18		3	Beam	66	16	18		3	Beam	75	18	7		3	Beam	75	14	11	
	Column	73	27				Column	68	32				Column	59	32	9			Column	59	36	5	
	RC Walls	100					RC Walls	0					RC Walls	100					RC Walls	100			
2	Beam	73	9	18		2	Beam	66	16	18		2	Beam	75	16	9		2	Beam	73	18	9	
	Column	86	9	5			Column	86	14				Column	68	32				Column	82	18		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	68	18	14		1	Beam	66	23	11		1	Beam	73	14	14		1	Beam	73	11	16	
	Column	91	9				Column	91	9				Column	77	18	5			Column	86	9	5	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	71	20	10		0	Beam	73	10	17		0	Beam	66	22	12		0	Beam	68	22	10	
	Column	100					Column	100					Column	91	9				Column	95	5		
	RC Walls	89	11				RC Walls	89	11				RC Walls	100					RC Walls	100			
-1	Beam	81	11	7		-1	Beam	85	7	7		-1	Beam	63	33	4		-1	Beam	63	30	7	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	60	40				RC Walls	60	40				RC Walls	65	35				RC Walls	65	35		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-45 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-23.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	89	11			4	Beam	89	11			4	Beam	89	11			4	Beam	94		6	
	Column	8	46	23	23		Column	15	31	38	15		Column	23	31	15	31		Column	15	31	38	15
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	67	11	22		3	Beam	56	22	11	11	3	Beam	56	11	33		3	Beam	67	11	22	
	Column		23	46	31		Column		31	46	23		Column	8	38	23	31		Column		38	46	15
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	62	10	29		2	Beam	62	19	19		2	Beam	57	10	24	10	2	Beam	57	14	29	
	Column	8	15	23	54		Column		15	31	54		Column	15	23	15	46		Column	15	23	23	38
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	47	26	26		1	Beam	42	32	26		1	Beam	32	47	21		1	Beam	42	21	37	
	Column	8	8	23	62		Column	15		23	62		Column	8	8	46	38		Column	15		62	23
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	55	15	30		0	Beam	55	25	20		0	Beam	60	15	20	5	0	Beam	70	20	10	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	100				-1	Beam	100				-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-46 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-23.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	83	11	6		4	Beam	89	11			4	Beam	89	6	6		4	Beam	94		6	
	Column	92	8				Column	100					Column	77	23				Column	92	8		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	78	22			3	Beam	72	28			3	Beam	72	22	6		3	Beam	67	22	11	
	Column	85	15				Column	85	15				Column	69	23	8			Column	92	8		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	80	15	5		2	Beam	75	25			2	Beam	70	25	5		2	Beam	65	30	5	
	Column	85	15				Column	92	8				Column	85	15				Column	85	15		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	75	25			1	Beam	75	25			1	Beam	70	20	10		1	Beam	65	20	15	
	Column	92	8				Column	92	8				Column	85	15				Column	85	15		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	70	30			0	Beam	70	30			0	Beam	70	20	10		0	Beam	65	30	5	
	Column	100					Column	100					Column	92	8				Column	92	8		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	84	11	5		-1	Beam	74	21	5	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	50	50				RC Walls	50	50				RC Walls	75	25				RC Walls	75	25		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-47 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-24.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	100				3	Beam	95	5			3	Beam	100				3	Beam	100			
	Column		50	14	36		Column	7	50	7	36		Column	14	57	21	7		Column	29	43	21	7
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	62	33	5		2	Beam	62	29	10		2	Beam	76	24			2	Beam	71	19	10	
	Column		43	21	36		Column		36	43	21		Column	21	36	36	7		Column		64	36	
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	62	5	33		1	Beam	62	14	24		1	Beam	52	38	10		1	Beam	57	29	14	
	Column		36	43	21		Column		50	36	14		Column	36	36	29			Column	36	36	29	
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	62	14	24		0	Beam	62	5	33		0	Beam	57	24	19		0	Beam	62	24	14	
	Column		21	50	29		Column		21	50	29		Column	21	64	14			Column	29	57	14	
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	75	13	13		-1	Beam	63	25	13		-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	77		23			RC Walls	77		15	8		RC Walls	69	31				RC Walls	69	31		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-48 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-24.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	90	10			3	Beam	86	14			3	Beam	86	10	5		3	Beam	90	10		
	Column	79	21				Column	86	7	7			Column	86	14				Column	86	14		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	81	10	10		2	Beam	81	14	5		2	Beam	71	24	5		2	Beam	71	24	5	
	Column	100					Column	93	7				Column	93	7				Column	93	7		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	76	14	10		1	Beam	76	10	14		1	Beam	67	29	5		1	Beam	67	29	5	
	Column	100					Column	100					Column	93	7				Column	93	7		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	76	14	10		0	Beam	81	5	14		0	Beam	71	24	5		0	Beam	67	29	5	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	63	38			-1	Beam	75	25			-1	Beam	100				-1	Beam	88	13		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	89	11				RC Walls	89	11				RC Walls	56	44				RC Walls	56	44		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-49 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-25.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam	33			67	6	Beam	33			67	6	Beam	67	33			6	Beam	67	33		
	Column		14	71	14		Column		14	57	29		Column	29	57		14		Column	14	29	14	43
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	56	44			5	Beam	56	44			5	Beam	61	28	6	6	5	Beam	72	17	11	
	Column	8	50	25	17		Column		58	25	17		Column		33	25	42		Column		17	33	50
	RC Walls	33	67				RC Walls	33	67				RC Walls		100				RC Walls		100		
4	Beam	50	50			4	Beam	50	50			4	Beam	67	22	11		4	Beam	56	39	6	
	Column		67	8	25		Column		58	17	25		Column		42	25	33		Column		25	25	50
	RC Walls	33	67				RC Walls		67	33			RC Walls		100				RC Walls		100		
3	Beam	56	44			3	Beam	56	44			3	Beam	56	33	11		3	Beam	56	39	6	
	Column		33	33	33		Column		33	33	33		Column		25	25	50		Column		17	17	67
	RC Walls	33	67				RC Walls		67	33			RC Walls		100				RC Walls		100		
2	Beam	56	44			2	Beam	56	44			2	Beam	61	33	6		2	Beam	61	39		
	Column		17	50	33		Column		25	42	33		Column		17	25	58		Column			42	58
	RC Walls	33	67				RC Walls		100				RC Walls		100				RC Walls		100		
1	Beam	56	44			1	Beam	56	44			1	Beam	61	33	6		1	Beam	61	39		
	Column			67	33		Column			42	58		Column		8	17	75		Column			33	67
	RC Walls		67	33			RC Walls		67	33			RC Walls		33	67			RC Walls		33	67	
0	Beam	56	44			0	Beam	56	44			0	Beam	56	44			0	Beam	56	44		
	Column				100		Column			8	92		Column			17	83		Column			17	83
	RC Walls		67		33		RC Walls		67		33		RC Walls	33			67		RC Walls	33			67
-1	Beam	92	8			-1	Beam	92	8			-1	Beam	100				-1	Beam	100			
	Column	67	17	17			Column	67	17	17			Column	50	17	25	8		Column	50	17	25	8
	RC Walls	87	7	7			RC Walls	87		7	7		RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-50 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-25.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	61	39			5	Beam	61	39			5	Beam	67	33			5	Beam	72	28		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	83	17				RC Walls	83	17				RC Walls	100					RC Walls	100			
4	Beam	61	39			4	Beam	61	39			4	Beam	67	33			4	Beam	72	28		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	61	39			3	Beam	61	39			3	Beam	67	33			3	Beam	72	28		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	61	39			2	Beam	61	39			2	Beam	67	33			2	Beam	72	28		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	61	39			1	Beam	61	39			1	Beam	67	33			1	Beam	72	28		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	67	33				RC Walls	67	33				RC Walls	83	17				RC Walls	83	17		
0	Beam	67	33			0	Beam	67	33			0	Beam	72	28			0	Beam	72	28		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	67	33				RC Walls	67	33				RC Walls	50	50				RC Walls	50	50		
-1	Beam	92	8			-1	Beam	100				-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	59	41				RC Walls	59	41				RC Walls	53	47				RC Walls	53	47		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-51 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 26.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	84	11	5		4	Beam	83	15	3		4	Beam	71	13	16		4	Beam	75	9	16	
	Column	50	17	8	25		Column	50	21	4	25		Column	17	21	38	25		Column	17	17	42	25
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	69	24	8		3	Beam	73	20	8		3	Beam	65	20	15		3	Beam	70	19	11	
	Column	50	21	21	8		Column	50	21	21	8		Column	50	29	21			Column	50	33	17	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	76	15	9		2	Beam	76	15	9		2	Beam	69	21	10		2	Beam	71	24	5	
	Column	50	25	21	4		Column	50	25	21	4		Column	54	29	17			Column	58	29	13	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	74	18	9		1	Beam	76	16	8		1	Beam	75	19	6		1	Beam	78	15	8	
	Column	50	29	13	8		Column	50	33	8	8		Column	46	29	25			Column	50	25	25	
	RC Walls	100					RC Walls	100					RC Walls	67	33				RC Walls	67	33		
0	Beam	73	21	6		0	Beam	73	21	6		0	Beam	70	15	15		0	Beam	73	19	9	
	Column	38	17	25	21		Column	33	21	25	21		Column	46	21	33			Column	46	21	33	
	RC Walls	83	17				RC Walls	83	17				RC Walls	33	67				RC Walls	33	67		
-1	Beam	60	36	4		-1	Beam	64	28	9		-1	Beam	64	26	11		-1	Beam	57	28	15	
	Column	42	21	21	17		Column	42	17	17	25		Column	75	25				Column	79	21		
	RC Walls	67			33		RC Walls	67			33		RC Walls	33		67			RC Walls	33		67	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-52 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 26.

After Retrofitting Design (CAN GÜVENLİĞİ)																							
Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	76	16	8		4	Beam	79	14	7		4	Beam	74	13	13		4	Beam	74	13	13	
	Column	83	17				Column	83	13	4			Column	79	17	4			Column	79	13	8	
	RC Walls	92	8				RC Walls	92	8				RC Walls	100					RC Walls	100			
3	Beam	71	12	17		3	Beam	75	8	17		3	Beam	76	8	16		3	Beam	76	8	16	
	Column	83	17				Column	83	17				Column	96	4				Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	70	12	18		2	Beam	71	11	18		2	Beam	78	9	13		2	Beam	78	8	14	
	Column	83	17				Column	83	17				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	71	14	14		1	Beam	72	12	16		1	Beam	78	8	14		1	Beam	78	9	13	
	Column	88	13				Column	88	13				Column	96	4				Column	96	4		
	RC Walls	100					RC Walls	10					RC Walls	100					RC Walls	100			
0	Beam	66	16	18		0	Beam	70	13	17		0	Beam	82	9	9		0	Beam	80	11	9	
	Column	83	17				Column	92	8				Column	96	4				Column	96	4		
	RC Walls	83	17				RC Walls	83	17	23			RC Walls	67	33				RC Walls	67	33		
-1	Beam	53	26	21		-1	Beam	58	19			-1	Beam	63	28	9		-1	Beam	58	33	9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	67	33				RC Walls	67	33				RC Walls	33	67				RC Walls	33	67		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-53 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building 27.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	84	10	6		5	Beam	84	10	6		5	Beam	90	10			5	Beam	90	8	2	
	Column	50	22	17	11		Column	50	22	17			Column	33	44	22			Column	22	56	11	11
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
4	Beam	79	6	15		4	Beam	79	6	15		4	Beam	89	5	3	3	4	Beam	85	5	10	6
	Column	44	33	17	6		Column	44	33	17			Column	78	11	11			Column	78	6	11	
	RC Walls	60	40				RC Walls	60	40				RC Walls	100					RC Walls	100			
3	Beam	77	8	15		3	Beam	77	8	15		3	Beam	87	5	8		3	Beam	81	10	10	
	Column		72	22	6		Column		72	22			Column	94	6				Column	94	6		
	RC Walls	20	80				RC Walls	20	80				RC Walls	100					RC Walls	100			
2	Beam	77	5	15	3	2	Beam	76	8	11		2	Beam	87	10	3		2	Beam	87	10	3	
	Column		67	33			Column		61	39			Column	83	17				Column	89	11		
	RC Walls	20	80				RC Walls	20	80				RC Walls	100					RC Walls	100			
1	Beam	79	8	10	3	1	Beam	81	6	10		1	Beam	87	10	3		1	Beam	89	6	5	
	Column		50	39	11		Column		50	39			Column	67	33				Column	67	33		
	RC Walls	20	80				RC Walls	20	80				RC Walls	100					RC Walls	100			
0	Beam	79	5	13	3	0	Beam	77	6	13		0	Beam	87	6	6		0	Beam	85	8	6	
	Column		6	39	56		Column		6	44			Column	67	17	11	6		Column	67	22	11	
	RC Walls	40	60				RC Walls	40	60				RC Walls	60	40				RC Walls	100			
-1	Beam	63	16	21		-1	Beam	63	11	26		-1	Beam	84	11	5		-1	Beam	84	11	5	
	Column	33		39	28		Column	33		44			Column	72	17	11			Column	50	28	17	6
	RC Walls	80		20			RC Walls	80		20			RC Walls	60	40				RC Walls	60	40		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-54 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building 27.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	85	13	2		5	Beam	85	13	2		5	Beam	87	6	6		5	Beam	85	8	6	
	Column	78	22				Column	78	22				Column	78	22				Column	78	22		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
4	Beam	77	18	5		4	Beam	77	18	5		4	Beam	89	2	10		4	Beam	89	2	10	
	Column	89	11				Column	89	11				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	76	18	6		3	Beam	76	19	5		3	Beam	89	2	10		3	Beam	85	5	10	
	Column	89	11				Column	89	11				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	74	18	8		2	Beam	74	19	6		2	Beam	87	3	10		2	Beam	84	10	6	
	Column	94	6				Column	94	6				Column	100					Column	100			
	RC Walls	82	18				RC Walls	82	18				RC Walls	100					RC Walls	100			
1	Beam	74	18	8		1	Beam	74	19	6		1	Beam	87	3	10		1	Beam	81	10	10	
	Column	94	6				Column	94	6				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	77	18	5		0	Beam	77	18	5		0	Beam	90	3	6		0	Beam	90	3	6	
	Column	67	33				Column	67	33				Column	100					Column	100			
	RC Walls	91	9				RC Walls	91	9				RC Walls	100					RC Walls	100			
-1	Beam	68	24	8		-1	Beam	66	26	8		-1	Beam	79		21		-1	Beam	79		21	
	Column	72	28				Column	72	28				Column	89	11				Column	89	11		
	RC Walls	91	9				RC Walls	91	9				RC Walls	82	18				RC Walls	82	18		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-55 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-28.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	81	9	5	5	4	Beam	85	5	4	6	4	Beam	78	14	6	1	4	Beam	80	14	5	1
	Column	25	61	11	4		Column	32	46	21			Column	32	25	32	11		Column	21	50	21	7
	RC Walls	50	50				RC Walls	50	50				RC Walls	100					RC Walls	100			
3	Beam	72	14	5	9	3	Beam	75	11	4	10	3	Beam	71	5	8	16	3	Beam	71	5	5	19
	Column	32	61	4	4		Column	36	57	7			Column	18	39	21	21		Column	11	50	25	14
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	67	15	5	13	2	Beam	75	8	4	14	2	Beam	71	1	5	23	2	Beam	68	6	1	24
	Column	39	54	4	4		Column	36	61	4			Column	25	25	29	21		Column	11	46	29	14
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	66	15	5	14	1	Beam	71	10	4	15	1	Beam	71	1	3	25	1	Beam	67	9		24
	Column	39	57	4			Column	39	57	4			Column	11	39	39	11		Column	7	39	46	7
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	52	19	10	19	0	Beam	50	19	8	23	0	Beam	52	4	8	35	0	Beam	50	10		40
	Column	61	36	4			Column	61	36	4			Column		32	54	14		Column		29	61	11
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	57	18	11	14	-1	Beam	57	11	18	14	-1	Beam	46	7	7	39	-1	Beam	50	4	11	36
	Column	100					Column	100					Column	93	7				Column	93	7		
	RC Walls	45		23	32		RC Walls	45		23	32		RC Walls	64	5		32		RC Walls	64	5		32
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-56 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-28.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	94	3	4		4	Beam	91	6	3		4	Beam	90	9	1		4	Beam	86	11	3	
	Column	71	25	4			Column	86	11	4			Column	86	11	4			Column	79	18	4	
	RC Walls	89	11				RC Walls	89	11				RC Walls	100					RC Walls	100			
3	Beam	84	13	4		3	Beam	86	9	5		3	Beam	82	10	8		3	Beam	81	9	10	
	Column	86	14				Column	86	14				Column	89	7	4			Column	89	11		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	84	13	4		2	Beam	85	10	5		2	Beam	82	9	9		2	Beam	80	10	10	
	Column	93	7				Column	93	7				Column	89	7	4			Column	93	7		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	84	11	5		1	Beam	86	9	5		1	Beam	85	8	8		1	Beam	84	9	8	
	Column	96	4				Column	96	4				Column	89	11				Column	93	7		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	75	19	6		0	Beam	79	15	6		0	Beam	73	15	13		0	Beam	73	10	17	
	Column	100					Column	100					Column	96	4				Column	100			
	RC Walls	78	22				RC Walls	78	22				RC Walls	67	33				RC Walls	78	22		
-1	Beam	82	11	7		-1	Beam	82	7	11		-1	Beam	46	46	7		-1	Beam	57	29	14	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	67	33				RC Walls	67	33				RC Walls	75	25				RC Walls	75	25		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-57 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-29.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	94	5	1		5	Beam	93	7			5	Beam	99	1			5	Beam	99	1		
	Column		17	61	22		Column	4	65		30		Column		4	57	39		Column		4	65	30
	RC Walls	33	67				RC Walls	33	33		33		RC Walls	67	33				RC Walls	67	33		
4	Beam	82	12	6		4	Beam	82	17	1		4	Beam	82	18			4	Beam	84	16		
	Column		30	48	22		Column		43	22	35		Column			26	74		Column			35	65
	RC Walls	67		33			RC Walls	33	33		33		RC Walls	33	67				RC Walls	33	67		
3	Beam	79	15	6		3	Beam	79	13	7		3	Beam	79	12	9		3	Beam	78	15	7	
	Column				100		Column			43	57		Column			9	91		Column			9	91
	RC Walls	33	67				RC Walls		100				RC Walls	33	67				RC Walls	33	67		
2	Beam	72	5	23		2	Beam	72	5	19	5	2	Beam	53	21	26		2	Beam	53	16	30	
	Column		17	9	74		Column		26	30	43		Column				100		Column				100
	RC Walls	33	67				RC Walls		100				RC Walls		100				RC Walls		100		
1	Beam	70	7	23		1	Beam	74		26		1	Beam	51	16	33		1	Beam	53	12	35	
	Column			22	78		Column			48	52		Column			4	96		Column				100
	RC Walls	33		67			RC Walls	33		67			RC Walls	67			33		RC Walls	67			33
0	Beam	52	22	26		0	Beam	52	48			0	Beam	78	22			0	Beam	78	22		
	Column	22	61	9			Column	35	35	26	4		Column	91	4		4		Column	91	4		4
	RC Walls	91	9				RC Walls	91	4	4			RC Walls	39	52		9		RC Walls	39		52	9
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-58 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-29.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam	86	5	9		5	Beam	83	12	5		5	Beam	82	16	3		5	Beam	84	13	3	
	Column	87	13				Column	91	4	4			Column	87	4	9			Column	87	4	9	
	RC Walls	91	9				RC Walls	91	9				RC Walls	100					RC Walls	100			
4	Beam	84	3	13		4	Beam	84	5	10		4	Beam	79	8	13		4	Beam	78	14	8	
	Column	96	4				Column	96		4			Column	87	13				Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	84	3	13		3	Beam	84	7	9		3	Beam	84	8	8		3	Beam	84	9	7	
	Column	96	4				Column	96	4				Column	87	13				Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	74	12	14		2	Beam	74	12	14		2	Beam	72	9	19		2	Beam	70	14	16	
	Column	96	4				Column	96	4				Column	87	13				Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	74	16	9		1	Beam	74	14	12		1	Beam	67	12	21		1	Beam	65	16	19	
	Column	100					Column	96	4				Column	96	4				Column	96	4		
	RC Walls	64	36				RC Walls	64	36				RC Walls	64	36				RC Walls	64	36		
0	Beam	86	14			0	Beam	71	24	5		0	Beam	81	19			0	Beam	81	19		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	78	22				RC Walls	78	22				RC Walls	48	52				RC Walls	48	52		
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-59 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-30.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	56	11	11	22	4	Beam	67	6	17	11	4	Beam	44	17	17	22	4	Beam	56	11	11	22
	Column		23	31	46		Column		38	15	46		Column		15	46	38		Column		8	31	62
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	33	6	11	50	3	Beam	33	6	6	56	3	Beam	17	28	11	44	3	Beam	44	6	6	44
	Column			23	77		Column		15	15	69		Column		15	31	54		Column		15	31	54
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
2	Beam	33	6		61	2	Beam	28	11		61	2	Beam	22	22	6	50	2	Beam	44	6		50
	Column			8	92		Column		15		85		Column		8	23	69		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls		100		
1	Beam	33	6		61	1	Beam	28	11		61	1	Beam	28	17	6	50	1	Beam	39	11		50
	Column			8	92		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	33	6	6	56	0	Beam	28	6	6	61	0	Beam	28	17	6	50	0	Beam	39	11		50
	Column				100		Column				100		Column		8	23	69		Column			23	77
	RC Walls		100				RC Walls		100				RC Walls			100			RC Walls				100
-1	Beam	39		6	56	-1	Beam	33		11	56	-1	Beam	39	6	17	39	-1	Beam	44	6	6	44
	Column	8			92		Column	15			85		Column			23	77		Column			23	77
	RC Walls	100					RC Walls	100					RC Walls			100			RC Walls				100
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-60 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-30.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	84	11	5		4	Beam	74	16	11		4	Beam	68	21	11		4	Beam	68	21	11	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	68	16	16		3	Beam	63	16	21		3	Beam	68	26	5		3	Beam	68	21	11	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	63	21	16		2	Beam	63	16	21		2	Beam	68	26	5		2	Beam	68	21	11	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	79	5	16		1	Beam	63	16	21		1	Beam	68	11	21		1	Beam	68	16	16	
	Column	100					Column	100					Column	92	8				Column	92	8		
	RC Walls	100					RC Walls	100					RC Walls	71	29				RC Walls	71	29		
0	Beam	74	16	11		0	Beam	79	11	11		0	Beam	74	21	5		0	Beam	68	26	5	
	Column	100					Column	100					Column	92	8				Column	92	8		
	RC Walls	86	14				RC Walls	71	29				RC Walls	71	29				RC Walls	71	29		
-1	Beam	89	11			-1	Beam	95	5			-1	Beam	89	11			-1	Beam	89	5	5	
	Column	100					Column	100					Column	92	8				Column	92	8		
	RC Walls	57	43				RC Walls	57	43				RC Walls	57	43				RC Walls	57	43		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-61 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-31.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	76	3	18	3	1	Beam	71	11	11	8	1	Beam	71	11	13	5	1	Beam	66	13	8	13
	Column	5	26	47	21		Column		42	47	11		Column	16	16	42	26		Column	11	37	16	37
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	63	3	11	24	0	Beam	63		8	29	0	Beam	63	5	3	29	0	Beam	61		3	37
	Column	5	21	63	11		Column		37	47	16		Column		47	26	26		Column		53	16	32
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	55	3	7	34	-1	Beam	52		14	34	-1	Beam	55		3	41	-1	Beam	52		7	41
	Column		58	37	5		Column		58	37	5		Column		37	47	16		Column		37	47	16
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-62 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-31.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	92	8			1	Beam	97	3			1	Beam	100				1	Beam	100			
	Column	63	37				Column	68	32				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	87	11	3		0	Beam	89	11			0	Beam	100				0	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	100				-1	Beam	97	3			-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-63 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-32.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	69	21	4	6	4	Beam	70	21	4	4	4	Beam	82	6	9	3	4	Beam	81	9	7	3
	Column	16	42	23	19		Column	16	42	23	19		Column	39	48	10	3		Column	39	48	13	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	55	15	9	21	3	Beam	55	12	13	19	3	Beam	76	10	7	6	3	Beam	75	10	6	9
	Column	39	39	13	10		Column	39	42	10	10		Column	87	13				Column	90	10		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	54	9	12	25	2	Beam	54	7	15	24	2	Beam	72	13	9	6	2	Beam	72	13	9	6
	Column	26	39	29	6		Column	29	39	26	6		Column	84	10	6			Column	84	10	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	52	4	15	28	1	Beam	54	1	18	27	1	Beam	67	13	9	10	1	Beam	67	10	10	12
	Column	13	42	35	10		Column	13	42	35	10		Column	74	13	6	6		Column	74	13	6	6
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	54	3	15	28	0	Beam	54	6	15	25	0	Beam	66	18	8	7	0	Beam	69	17	3	11
	Column	13	61	19	6		Column	13	58	23	6		Column	90	3	3	3		Column	90	3	3	3
	RC Walls	100					RC Walls	75	25				RC Walls	100					RC Walls	100			
-1	Beam	48	18	13	21	-1	Beam	48	15	16	21	-1	Beam	77	13	8	2	-1	Beam	76	11	3	
	Column	35	32	26	6		Column	35	32	26	6		Column	87	6	6			Column	90	3	6	
	RC Walls	50			50		RC Walls	50			50		RC Walls	50		50			RC Walls	50		50	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-64 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-32.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	7	10		4	Beam	84	9	7		4	Beam	90	4			4	Beam	90	3	7	
	Column	62	23	10			Column	68	23	10			Column	81	13				Column	81	13	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	75	13	12		3	Beam	75	13	12		3	Beam	84	10			3	Beam	84	12	4	
	Column	81	16	3			Column	81	16	3			Column	87	13				Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	72	18	10		2	Beam	72	18	10		2	Beam	82	12			2	Beam	82	12	6	
	Column	87	13				Column	87	13				Column	94	6				Column	94	6		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	70	13	16		1	Beam	70	16	13		1	Beam	78	16			1	Beam	78	19	3	
	Column	81	19				Column	84	16				Column	90	10				Column	90	10		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	75	13	13		0	Beam	72	17	11		0	Beam	79	18			0	Beam	79	17	4	
	Column	97	3				Column	94	6				Column	94	6				Column	94	6		
	RC Walls	86	14				RC Walls	86	14				RC Walls	100					RC Walls	100			
-1	Beam	75	21	5		-1	Beam	78	17	5		-1	Beam	84	13			-1	Beam	83	11	6	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	71	29				RC Walls	71	29				RC Walls	71	29				RC Walls	71	29		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-65 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-33.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	90	10			3	Beam	94	3	3		3	Beam	87	13			3	Beam	90	10		
	Column		17	33	50		Column		17	33	50		Column	8	25		67		Column			83	17
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	71	10	19		2	Beam	68	13	19		2	Beam	77	6	16		2	Beam	68	16	16	
	Column				100		Column				100		Column		8	33	58		Column			67	33
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	71	13	16		1	Beam	74	13	13		1	Beam	94	3	3		1	Beam	87	13		
	Column		8	8	83		Column		8		92		Column			33	67		Column				100
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	77	6	16		0	Beam	74	16	10		0	Beam	94	6			0	Beam	87	13		
	Column				100		Column				100		Column				100		Column				100
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	71	29			-1	Beam	57	43			-1	Beam	71	29			-1	Beam	71	29		
	Column	50	8	8	33		Column	42	17	8	33		Column	25	25	17	33		Column	17	33	8	42
	RC Walls	40	60				RC Walls	40	60				RC Walls	60			40		RC Walls	60			40
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-66 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-33.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %	#	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	97	3			3	Beam	97	3			3	Beam	87		13		3	Beam	87		13	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	84	16			2	Beam	84	16			2	Beam	94		6		2	Beam	84	10	6	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	94	6			1	Beam	94	6			1	Beam	90		10		1	Beam	81	10	10	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	97	3			0	Beam	97	3			0	Beam	90		10		0	Beam	84	6	10	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	50	50				RC Walls	50	50				RC Walls	50	50				RC Walls	50	50		
-1	Beam	100				-1	Beam	100				-1	Beam	71		29		-1	Beam	71		29	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	45	55				RC Walls	45	55				RC Walls	64	36				RC Walls	64	36		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-67 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-34.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	62	35	4		3	Beam	65	35			3	Beam	65	35			3	Beam	69	27	4	
	Column	27	23	23	27		Column	27	18	27	27		Column	23	32	45			Column	18	41	41	
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	69	8	23		2	Beam	69	8	23		2	Beam	42	15	42		2	Beam	42	19	38	
	Column		32	23	45		Column		36	18	45		Column	9	14	45	32		Column	9	14	45	32
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	73	4	23		1	Beam	73	4	23		1	Beam	58		42		1	Beam	58	4	38	
	Column		18	14	68		Column		32	14	55		Column		14	9	77		Column		9	23	68
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	73	4	23		0	Beam	73	4	23		0	Beam	65	4	31		0	Beam	65	4	31	
	Column			14	86		Column	5		14	82		Column		9	9	82		Column		9	9	82
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-68 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-34.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	85	12	4		3	Beam	85	12	4		3	Beam	88	8	4		3	Beam	81	15	4	
	Column	73	14	14			Column	73	18	9			Column	86	14				Column	82	18		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	73	15	12		2	Beam	73	19	8		2	Beam	62	35	4		2	Beam	73	19	8	
	Column	86	9	5			Column	82	18				Column	100					Column	100			
	RC Walls	67	33				RC Walls	67	33				RC Walls	100					RC Walls	100			
1	Beam	85	15	9		1	Beam	85	15			1	Beam	69	31			1	Beam	81	8	12	
	Column	82	9				Column	82	9	9			Column	100					Column	100			
	RC Walls	83	17	4			RC Walls	83	17				RC Walls	100					RC Walls	100			
0	Beam	81	15			0	Beam	81	19			0	Beam	88	12			0	Beam	85	15		
	Column	91	9				Column	95	5				Column	100					Column	100			
	RC Walls	83	17				RC Walls	83	17				RC Walls	67	33				RC Walls	67	33		
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-69 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-35.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	79	13	8		4	Beam	77	17	6		4	Beam	83	17			4	Beam	90	6	4	
	Column	32	16	35	16		Column	32	13	26	29		Column	23	45	23			Column	26	35	19	19
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	67	14	14	4	3	Beam	61	22	16		3	Beam	63	16	16		3	Beam	65	14	12	8
	Column	6	48	26	19		Column	13	35	23	29		Column	16	32	39			Column	19	23	39	19
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	58	21	8	13	2	Beam	52	25	8	15	2	Beam	56	10	19		2	Beam	56	13	10	21
	Column	19	29	23	29		Column	19	19	29	32		Column	6	35	32			Column	6	32	35	26
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	55	21	2	21	1	Beam	47	30	4	19	1	Beam	55	13	2		1	Beam	57	9	4	30
	Column	3	45	23	29		Column	3	39	26	32		Column	6	35	23			Column	6	35	23	35
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	58	15	6	21	0	Beam	48	27	6	19	0	Beam	52	10	4		0	Beam	54	6	8	31
	Column		32	29	39		Column		29	26	45		Column	6	29	23			Column	6	26	26	42
	RC Walls						RC Walls						RC Walls						RC Walls				
-1	Beam	54	19	6	21	-1	Beam	46	29	4	21	-1	Beam	54	8	4		-1	Beam	52	6	10	31
	Column	6	13	42	39		Column	6	16	35	42		Column	3	23	26			Column	3	26	26	45
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam	56	23		21	-2	Beam	58	21		21	-2	Beam	56	8	2		-2	Beam	54	8	6	31
	Column	10	23	35	32		Column	10	23	39	29		Column	10	6	19			Column	10	13	23	55
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-70 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-35.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	80	4	16		4	Beam	76	16	9		4	Beam	84	16			4	Beam	87	13		
	Column	55	39	6			Column	55	39	6			Column	71	16	13			Column	77	3	19	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	70	13	17		3	Beam	67	15	17		3	Beam	74	15	11		3	Beam	72	22	7	
	Column	55	23	23			Column	55	23	23			Column	71	29				Column	71	29		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	69	9	22		2	Beam	67	13	20		2	Beam	69	22	9		2	Beam	69	24	7	
	Column	61	19	19			Column	61	23	16			Column	81	19				Column	81	19		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	68	7	25		1	Beam	66	11	23		1	Beam	66	30	5		1	Beam	66	27	7	
	Column	61	35	3			Column	61	32	6			Column	90	6	3			Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	69	9	22		0	Beam	67	11	22		0	Beam	67	24	9		0	Beam	69	22	9	
	Column	61	32	6			Column	61	35	3			Column	90	10				Column	87	13		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	71	9	20		-1	Beam	67	13	20		-1	Beam	73	20	7		-1	Beam	73	24	2	
	Column	74	23	3			Column	74	23	3			Column	97	3				Column	97	3		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-2	Beam	76	11	13		-2	Beam	76	11	13		-2	Beam	91	7	2		-2	Beam	87	13		
	Column	87	13				Column	87	10	3			Column	100					Column	100			
	RC Walls	88	13				RC Walls	88	13				RC Walls	100					RC Walls	100			

Table C-1-71 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-36.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	86	5	7	2	3	Beam	88	7	4	2	3	Beam	93	2	4	2	3	Beam	86	5	4	5
	Column	25	50	13	13		Column	13	56	6	25		Column		13	19	69		Column		6	31	63
	RC Walls	50	50				RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	80	7	7	5	2	Beam	82	2	11	5	2	Beam	80	4	9	7	2	Beam	77	11	2	11
	Column	19	31	31	19		Column	19	25	31	25		Column			6	94		Column			6	94
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	80	2	11	7	1	Beam	80	2	11	7	1	Beam	75	5	7	13	1	Beam	73	5	9	13
	Column	31	13	25	31		Column	25	6	31	38		Column		6		94		Column				100
	RC Walls	50	50				RC Walls	50	50				RC Walls		100				RC Walls		100		
0	Beam	77	6	6	11	0	Beam	75	6	8	11	0	Beam	72	0,11	4	13	0	Beam	68	9	9	13
	Column	19	13	44	25		Column	13	6	50	31		Column	13	6	6	75		Column	6		19	75
	RC Walls		50	50			RC Walls		50	50			RC Walls		100				RC Walls		100		
-1	Beam	56	22	7	15	-1	Beam	59	22	4	15	-1	Beam	41	11	7	41	-1	Beam	41	11	4	44
	Column	19	19	31	31		Column	6	13	31	50		Column	13			88		Column	6	6		88
	RC Walls						RC Walls		50		50		RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-72 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-36.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	93	4	4		3	Beam	93	4	4		3	Beam	98	2			3	Beam	94	6		
	Column	94	6				Column	88	13				Column	81	13	6			Column	88	6	6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	87	4	9		2	Beam	89	2	9		2	Beam	85	11	4		2	Beam	89	4	7	
	Column	100					Column	94	6				Column	81		19			Column	94		6	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	89	4	7		1	Beam	85	6	9		1	Beam	85	9	6		1	Beam	83	9	7	
	Column	94	6				Column	88	6	6			Column	81	6	13			Column	94	6		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	86	6	8		0	Beam	88	4	8		0	Beam	90	4	6		0	Beam	84	10	6	
	Column	100					Column	100					Column	88	13				Column	88	13		
	RC Walls	100					RC Walls	100					RC Walls	83	17				RC Walls	67	33		
-1	Beam	85	7	7		-1	Beam	81	11	7		-1	Beam	85	7	7		-1	Beam	85	15		
	Column	88	13				Column	94	6				Column	100					Column	94	6		
	RC Walls	50	50				RC Walls	50	50				RC Walls	67	33				RC Walls	67	33		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-73 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-37.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	79	21			3	Beam	76	24			3	Beam	76	21	3		3	Beam	83	14	3	
	Column	14	54	32			Column	29	32	39			Column	46	50	4			Column	36	61	4	
	RC Walls	100					RC Walls	100					RC Walls	83	17				RC Walls	100			
2	Beam	53	24	22		2	Beam	53	24	22		2	Beam	66	26	9		2	Beam	66	29	5	
	Column	7	39	50	4		Column	4	39	54	4		Column	54	43		4		Column	54	43	4	
	RC Walls	100					RC Walls	100					RC Walls	83	17				RC Walls	100			
1	Beam	52	17	31		1	Beam	53	12	34		1	Beam	64	24	12		1	Beam	62	34	3	
	Column	4	43	46	7		Column	4	29	61	7		Column	43	36	18	4		Column	50	29	18	4
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	53	17	29		0	Beam	53	19	28		0	Beam	66	29	5		0	Beam	66	33	2	
	Column			32	68		Column			43	57		Column	18	29	50	4		Column	14	36	46	4
	RC Walls	100					RC Walls	100					RC Walls		83	17			RC Walls		83	17	
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-74 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-37.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	91	9			3	Beam	90	10			3	Beam	98	2			3	Beam	98	2		
	Column	93	7				Column	93	7				Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	81	19			2	Beam	81	19			2	Beam	95	5			2	Beam	97	3		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	83	17			1	Beam	83	17			1	Beam	97	3			1	Beam	97	3		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	91	9			0	Beam	91	9			0	Beam	100				0	Beam	98	2		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	88	12				RC Walls	88	12				RC Walls	100					RC Walls	100			
-1	Beam					-1	Beam					-1	Beam					-1	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-75 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-38.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	97	3			4	Beam	97		3		4	Beam	100				4	Beam	100			
	Column	32	32	23	14		Column	36	41	9	14		Column	27	45	27			Column	18	59	23	
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	82	15	3		3	Beam	76	18	6		3	Beam	71	24	6		3	Beam	65	29	6	
	Column	23	41	23	14		Column	14	64	14	9		Column	9	45	45			Column	14	41	45	
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam	71	21	9		2	Beam	68	24	9		2	Beam	56	21	24		2	Beam	56	35	9	
	Column	18	36	32	14		Column	14	32	45	9		Column	9	14	59	18		Column	9	23	50	18
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	74	21	6		1	Beam	74	18	9		1	Beam	56	21	24		1	Beam	50	35	15	
	Column	18	18	27	36		Column	18	5	45	32		Column	9	5	36	50		Column	9	18	27	45
	RC Walls						RC Walls						RC Walls						RC Walls				
0	Beam	79	18	3		0	Beam	82	15	3		0	Beam	59	21	21		0	Beam	56	35	9	
	Column		9	32	59		Column			45	55		Column			14	86		Column		5	18	77
	RC Walls						RC Walls						RC Walls						RC Walls		30		
-1	Beam	70	30			-1	Beam	75	25			-1	Beam	75	25			-1	Beam	70	9		
	Column	64	14	9	14		Column	68		9	23		Column	68	14	9	9		Column	68		18	5
	RC Walls	43	14	14	29		RC Walls	43	14	14	29		RC Walls	57	21	21			RC Walls	57		43	
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-76 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-38.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	91	9			4	Beam	91	9			4	Beam	91	9			4	Beam	91	9		
	Column	91	9				Column	91	9				Column	82	9	9			Column	77	14	9	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	65	29	6		3	Beam	74	21	6		3	Beam	62	38			3	Beam	74	24	3	
	Column	91	9				Column	91	9				Column	91	9				Column	91	9		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	68	26	6		2	Beam	74	18	9		2	Beam	62	38			2	Beam	71	26	3	
	Column	95	5				Column	91	9				Column	95	5				Column	95	5		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	69	22	8		1	Beam	75	17	8		1	Beam	64	33	3		1	Beam	72	25	3	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	80	20				RC Walls	80	20		
0	Beam	74	21	6		0	Beam	76	21	3		0	Beam	74	26			0	Beam	85	15		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	60	40				RC Walls	80	20				RC Walls	60	40				RC Walls	60	40		
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	100				-1	Beam	100			
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	60	40				RC Walls	53	47				RC Walls	60	40				RC Walls	60	40		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-77 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-39.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	79	9	12		3	Beam	78	16	7		3	Beam	79	14	7		3	Beam	74	17	9	
	Column	3	41	28	28		Column	10	31	24	34		Column		28	34	38		Column	7	17	52	24
	RC Walls	67	33				RC Walls	67	33				RC Walls	33	67				RC Walls	33	67		
2	Beam	76	10	14		2	Beam	76	12	12		2	Beam	69	21	10		2	Beam	72	16	12	
	Column	7	62	24	7		Column	17	38	34	10		Column	3	45	38	14		Column	7	52	34	7
	RC Walls	67	33				RC Walls	67	33				RC Walls	100					RC Walls	67	33		
1	Beam	71	14	16		1	Beam	74	14	12		1	Beam	67	17	16		1	Beam	71	12	17	
	Column	10	69	21			Column	24	48	28			Column	7	41	48	3		Column	14	34	45	7
	RC Walls	67	33				RC Walls	67	33				RC Walls	67	33				RC Walls	100			
0	Beam	72	6	12		0	Beam	74	14	12		0	Beam	72	12	16		0	Beam	72	10	17	
	Column		48	38	14		Column	10	41	38	10		Column	7	55	31	7		Column	3	62	28	7
	RC Walls	67		33			RC Walls	67		33			RC Walls	33		67			RC Walls	67		33	
-1	Beam	65	17	19		-1	Beam	67	17	17		-1	Beam	65	25	10		-1	Beam	65	19	17	
	Column	28	17	31	24		Column	28	21	31	21		Column	34	28	28	10		Column	38	38	24	
	RC Walls	67		33			RC Walls	67		33			RC Walls	33			67		RC Walls	33			67
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-78 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-39.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	91	9			3	Beam	91	7	2		3	Beam	88	9	3		3	Beam	90	9	2	
	Column	72	24	3			Column	72	28				Column	66	24	10			Column	48	48	3	
	RC Walls	100					RC Walls	100					RC Walls	91	9				RC Walls	100			
2	Beam	90	7	3		2	Beam	86	10	3		2	Beam	81	12	7		2	Beam	76	16	9	
	Column	97	3				Column	100					Column	86	14				Column	93	7		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	90	7	3		1	Beam	88	10	2		1	Beam	84	9	7		1	Beam	79	12	9	
	Column	100					Column	100					Column	93	7				Column	97	3		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	90	10			0	Beam	88	10	2		0	Beam	84	12	3		0	Beam	83	10	7	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	73	27				RC Walls	73	27				RC Walls	73	27				RC Walls	73	27		
-1	Beam	98	2			-1	Beam	98	2			-1	Beam	90	10			-1	Beam	88	13		
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	55	45				RC Walls	55	45				RC Walls	45	55				RC Walls	45	55		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-79 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-40.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	90	10			1	Beam	87	13			1	Beam	92	8			1	Beam	95	5		
	Column	6	53	18			Column	6	29	6	59		Column	29	53	6	12		Column	41	47	6	6
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	77	23			0	Beam	81	19			0	Beam	73	27			0	Beam	88	12		
	Column		71	29			Column		41	41	18		Column	59	29	12			Column	53	35	12	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
-1	Beam	73	27			-1	Beam	65	35		12	-1	Beam	77	23			-1	Beam	77	23		
	Column	53	35				Column	59	29				Column	53	41	6			Column	53	41	6	
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-80 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-40.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam					3	Beam					3	Beam					3	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
2	Beam					2	Beam					2	Beam					2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
1	Beam	100				1	Beam	97	3			1	Beam	97	3			1	Beam	100			
	Column	65	24	12			Column	41	29	29			Column	65	35				Column	76	24		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	92	8			0	Beam	100				0	Beam	96	4			0	Beam	92	8		
	Column	100					Column	100					Column	100					Column	94	6		
	RC Walls	100					RC Walls	80	20				RC Walls	100					RC Walls	100			
-1	Beam	100				-1	Beam	100				-1	Beam	100				-1	Beam	100			
	Column	94	6				Column	88	12				Column	100					Column	100			
	RC Walls	80	20				RC Walls	80	20				RC Walls	60	40				RC Walls	80	20		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-81 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-41.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	48	11	15	25	3	Beam	49	10	17	24	3	Beam	64	16	11	8	3	Beam	64	17	10	9
	Column	19	8	33	39		Column	19	14	28	39		Column	50	17	22	11		Column	50	17	22	11
	RC Walls	83	17				RC Walls	83	17				RC Walls	100					RC Walls	100			
2	Beam	42	11	8	38	2	Beam	42	11	8	39	2	Beam	53	14	19	14	2	Beam	52	14	19	15
	Column	33	11	39	17		Column	28	17	39	17		Column	61	22	17			Column	61	22	17	
	RC Walls	100					RC Walls	100					RC Walls	100		15			RC Walls	100			
1	Beam	41	11	9	39	1	Beam	41	11	9	39	1	Beam	55	16	15	14	1	Beam	54	17	15	14
	Column	22	11	33	33		Column	22	11	38	33		Column	61	28		11		Column	64	25		11
	RC Walls	42	58				RC Walls	42	58				RC Walls	83	17				RC Walls	83	17		
0	Beam	31	14	13	42	0	Beam	31	14	13	42	0	Beam	48	16	19	18	0	Beam	48	16	19	18
	Column	5	31	36	29		Column	5	26	43	26		Column	64	12	14	10		Column	67	10	14	10
	RC Walls	33	33	33			RC Walls	33	33	33			RC Walls	67	33				RC Walls	67	33		
-1	Beam	55	13	13	19	-1	Beam	52	20	9	19	-1	Beam	52	24	15	9	-1	Beam	51	25	15	9
	Column	74	14	5	7		Column	74	12	5	10		Column	83	2		14		Column	83	2		14
	RC Walls	34	29	2	34		RC Walls	34	32		34		RC Walls	68	12	5	15		RC Walls	71	10	7	12
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-82 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-41.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam					4	Beam					4	Beam					4	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
3	Beam	73	15	12		3	Beam	73	15	12		3	Beam	92	2	6		3	Beam	91	3	6	
	Column	69	8	22			Column	67	17	17			Column	75	22	3			Column	75	22	3	
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	72	9	19		2	Beam	73	8	19		2	Beam	89	5	6		2	Beam	87	7	6	
	Column	78	22				Column	78	22				Column	83	17				Column	83	17		
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	68	11	21		1	Beam	70	11	20		1	Beam	85	9	6		1	Beam	86	8	6	
	Column	72	28				Column	72	28				Column	83	17				Column	83	17		
	RC Walls	100					RC Walls	100					RC Walls	92	8				RC Walls	92	8		
0	Beam	54	25	21		0	Beam	58	22	20		0	Beam	83	11	6		0	Beam	83	10	6	
	Column	90	5	5			Column	90	5	5			Column	93	7				Column	95	5		
	RC Walls	83	17				RC Walls	83	17				RC Walls	83	17				RC Walls	83	17		
-1	Beam	68	22	10		-1	Beam	68	23	9		-1	Beam	83	13	5		-1	Beam	80	15	5	
	Column	98	2				Column	98	2				Column	95	5				Column	95	5		
	RC Walls	68	32				RC Walls	68	32				RC Walls	81	19				RC Walls	81	19		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-83 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-42.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	55	27		18	4	Beam	55	27		18	4	Beam	73	9	9	9	4	Beam	77	9	9	5
	Column		15	62	23		Column		23	54	23		Column	15	23	46	15		Column	15	31	23	31
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	32	27	23	18	3	Beam	32	27	23	18	3	Beam	59			41	3	Beam	59		9	32
	Column		38	46	15		Column		38	46	15		Column		15	23	62		Column		15		85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	23	23	23	32	2	Beam	23	23	23	32	2	Beam	59			41	2	Beam	59			41
	Column			23	77		Column			23	77		Column			15	85		Column			15	85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	18	32	9	41	1	Beam	18	32	9	41	1	Beam	59			41	1	Beam	59			41
	Column				100		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	27	18	14	41	0	Beam	27	18	14	41	0	Beam	59			41	0	Beam	59			41
	Column				100		Column				100		Column				100		Column				100
	RC Walls				100		RC Walls				100		RC Walls		100				RC Walls		100		
-1	Beam	77	14		9	-1	Beam	77	14		9	-1	Beam	59		9	32	-1	Beam	59		18	23
	Column		8	38	54		Column		8	38	54		Column	23			77		Column	15			85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-84 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-42.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-85 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-43.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	55	27		18	4	Beam	55	27		18	4	Beam	73	9	9	9	4	Beam	77	9	9	5
	Column		15	62	23		Column		23	54	23		Column	15	23	46	15		Column	15	31	23	31
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	32	27	23	18	3	Beam	32	27	23	18	3	Beam	59			41	3	Beam	59		9	32
	Column		38	46	15		Column		38	46	15		Column		15	23	62		Column		15		85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	23	23	23	32	2	Beam	23	23	23	32	2	Beam	59			41	2	Beam	59			41
	Column			23	77		Column			23	77		Column			15	85		Column			15	85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	18	32	9	41	1	Beam	18	32	9	41	1	Beam	59			41	1	Beam	59			41
	Column				100		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	27	18	14	41	0	Beam	27	18	14	41	0	Beam	59			41	0	Beam	59			41
	Column				100		Column				100		Column				100		Column				100
	RC Walls				100		RC Walls				100		RC Walls		100				RC Walls		100		
-1	Beam	77	14		9	-1	Beam	77	14		9	-1	Beam	59		9	32	-1	Beam	59		18	23
	Column		8	38	54		Column		8	38	54		Column	23			77		Column	15			85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-86 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-43.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-87 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-44.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	73	14	9	5	4	Beam	73	14	9	5	4	Beam	73	18	9		4	Beam	77	18		5
	Column	23	69		8		Column	23	69		8		Column	38	46		15		Column	46	38		15
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	36	50	5	9	3	Beam	36	50	5	9	3	Beam	59	9	14	18	3	Beam	59	18	9	14
	Column	31	62		8		Column	31	62		8		Column		69	15	15		Column		69	15	15
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	27	45	14	14	2	Beam	27	45	14	14	2	Beam	59			41	2	Beam	59		9	32
	Column		62	23	15		Column		62	23	15		Column		15	38	46		Column		15	31	54
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	27	36	18	18	1	Beam	27	36	18	18	1	Beam	59			41	1	Beam	59			41
	Column		62	23	15		Column		62	23	15		Column		15	31	54		Column		15	31	54
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
0	Beam	36	18	27	18	0	Beam	36	18	27	18	0	Beam	59			41	0	Beam	59			41
	Column		69	15	15		Column		69	15	15		Column		15	31	54		Column		15		85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
-1	Beam	73	18		9	-1	Beam	73	18		9	-1	Beam	59	9	5	27	-1	Beam	59	18	9	14
	Column	8	62		31		Column	8	62		31		Column	8		15	77		Column	15		15	69
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-88 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-44.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Wall						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Wall						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Wall	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Wall	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Wall	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Wall	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Wall	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-89 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-45.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	55	27		18	4	Beam	55	27		18	4	Beam	73	9	9	9	4	Beam	77	9	9	5
	Column		15	62	23		Column		23	54	23		Column	15	23	46	15		Column	15	31	23	31
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	32	27	23	18	3	Beam	32	27	23	18	3	Beam	59			41	3	Beam	59		9	32
	Column		38	46	15		Column		38	46	15		Column		15	23	62		Column		15		85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	23	23	23	32	2	Beam	23	23	23	32	2	Beam	59			41	2	Beam	59			41
	Column			23	77		Column			23	77		Column			15	85		Column			15	85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	18	32	9	41	1	Beam	18	32	9	41	1	Beam	59			41	1	Beam	59			41
	Column				100		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	27	18	14	41	0	Beam	27	18	14	41	0	Beam	59			41	0	Beam	59			41
	Column				100		Column				100		Column				100		Column				100
	RC Walls				100		RC Walls				100		RC Walls		100				RC Walls		100		
-1	Beam	77	14		9	-1	Beam	77	14		9	-1	Beam	59		9	32	-1	Beam	59		18	23
	Column		8	38	54		Column		8	38	54		Column	23			77		Column	15			85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-90 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-45.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-91 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-46.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	55	27		18	4	Beam	55	27		18	4	Beam	73	9	9	9	4	Beam	77	9	9	5
	Column		15	62	23		Column		23	54	23		Column	15	23	46	15		Column	15	31	23	31
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	32	27	23	18	3	Beam	32	27	23	18	3	Beam	59			41	3	Beam	59		9	32
	Column		38	46	15		Column		38	46	15		Column		15	23	62		Column		15		85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	23	23	23	32	2	Beam	23	23	23	32	2	Beam	59			41	2	Beam	59			41
	Column			23	77		Column			23	77		Column			15	85		Column			15	85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	18	32	9	41	1	Beam	18	32	9	41	1	Beam	59			41	1	Beam	59			41
	Column				100		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	27	18	14	41	0	Beam	27	18	14	41	0	Beam	59			41	0	Beam	59			41
	Column				100		Column				100		Column				100		Column				100
	RC Walls				100		RC Walls				100		RC Walls		100				RC Walls		100		
-1	Beam	77	14		9	-1	Beam	77	14		9	-1	Beam	59		9	32	-1	Beam	59		18	23
	Column		8	38	54		Column		8	38	54		Column	23			77		Column	15			85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-92 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-46.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-93 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-47.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	55	27		18	4	Beam	55	27		18	4	Beam	73	9	9	9	4	Beam	77	9	9	5
	Column		15	62	23		Column		23	54	23		Column	15	23	46	15		Column	15	31	23	31
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	32	27	23	18	3	Beam	32	27	23	18	3	Beam	59			41	3	Beam	59		9	32
	Column		38	46	15		Column		38	46	15		Column		15	23	62		Column		15		85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	23	23	23	32	2	Beam	23	23	23	32	2	Beam	59			41	2	Beam	59			41
	Column			23	77		Column			23	77		Column			15	85		Column			15	85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	18	32	9	41	1	Beam	18	32	9	41	1	Beam	59			41	1	Beam	59			41
	Column				100		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	27	18	14	41	0	Beam	27	18	14	41	0	Beam	59			41	0	Beam	59			41
	Column				100		Column				100		Column				100		Column				100
	RC Walls				100		RC Walls				100		RC Walls		100				RC Walls		100		
-1	Beam	77	14		9	-1	Beam	77	14		9	-1	Beam	59		9	32	-1	Beam	59		18	23
	Column		8	38	54		Column		8	38	54		Column	23			77		Column	15			85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-94 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-47.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %	n	Structural Members	MD %	SD %	ED %	CD %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-95 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for original condition of Building-48.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	55	27		18	4	Beam	55	27		18	4	Beam	73	9	9	9	4	Beam	77	9	9	5
	Column		15	62	23		Column		23	54	23		Column	15	23	46	15		Column	15	31	23	31
	RC Walls		100				RC Walls		100				RC Walls	100					RC Walls	100			
3	Beam	32	27	23	18	3	Beam	32	27	23	18	3	Beam	59			41	3	Beam	59		9	32
	Column		38	46	15		Column		38	46	15		Column		15	23	62		Column		15		85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
2	Beam	23	23	23	32	2	Beam	23	23	23	32	2	Beam	59			41	2	Beam	59			41
	Column			23	77		Column			23	77		Column			15	85		Column			15	85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
1	Beam	18	32	9	41	1	Beam	18	32	9	41	1	Beam	59			41	1	Beam	59			41
	Column				100		Column				100		Column			15	85		Column			15	85
	RC Walls		100				RC Walls		100				RC Walls		100				RC Walls		100		
0	Beam	27	18	14	41	0	Beam	27	18	14	41	0	Beam	59			41	0	Beam	59			41
	Column				100		Column				100		Column				100		Column				100
	RC Walls				100		RC Walls				100		RC Walls		100				RC Walls		100		
-1	Beam	77	14		9	-1	Beam	77	14		9	-1	Beam	59		9	32	-1	Beam	59		18	23
	Column		8	38	54		Column		8	38	54		Column	23			77		Column	15			85
	RC Walls	100					RC Walls	100					RC Walls		100				RC Walls		100		
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

Table C-1-96 Results of reinforced concrete member's seismic performances according to TSC-2007 linear assessment procedures for retrofitted condition of Building-48.

Earthquake Loading +E(x)						Earthquake Loading -E(x)						Earthquake Loading +E(y)						Earthquake Loading -E(y)					
n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %	n	Structural Members	MD %	SD %	ED %	CD. %
6	Beam					6	Beam					6	Beam					6	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
5	Beam					5	Beam					5	Beam					5	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				
4	Beam	82	9	9		4	Beam	82	9	9		4	Beam	64	18	18		4	Beam	64	9	27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
3	Beam	86	14			3	Beam	91	9			3	Beam	73	5	23		3	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
2	Beam	86	14			2	Beam	86	14			2	Beam	73		27		2	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
1	Beam	77	23			1	Beam	82	18			1	Beam	73		27		1	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	100					RC Walls	100					RC Walls	100					RC Walls	100			
0	Beam	82	9	9		0	Beam	82	9	9		0	Beam	73		27		0	Beam	73		27	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	93	7				RC Walls	93	7				RC Walls	100					RC Walls	100			
-1	Beam	95	5			-1	Beam	95	5			-1	Beam	86	5	9		-1	Beam	91		9	
	Column	100					Column	100					Column	100					Column	100			
	RC Walls	64	36				RC Walls	64	36				RC Walls	100					RC Walls	100			
-2	Beam					-2	Beam					-2	Beam					-2	Beam				
	Column						Column						Column						Column				
	RC Walls						RC Walls						RC Walls						RC Walls				

APPENDIX D

RESULTS OF PRELIMINARY SEISMIC ASSESSMENT METHODS FOR BOTH ORIGINAL AND RETROFITTED CONDITIONS OF BUILDINGS

Results of preliminary seismic assessment methods for both original and retrofitted condition of buildings are summarized in Tables D.1 to D.8.

Table D.1. Parameters and results of preliminary seismic assessment method proposed by Özcebe *et al.*(2003) for original(existing) condition of buildings.

01-01-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1.09	1.11	0.00	0.00	0.00	0.00	0.03	0.04	0.00	0.00	197.75	5.50	5.60	0.14	0.20
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
02-01-1-Z3-2	5.50	0.14	0.93	1.00	0.11	0.40	1.00	-1.83	-1.64	1.97	0.98	0	0	SAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0.67	0.70	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	182.25	3.68	3.84	0.07	0.07
03-01-1-Z3-2	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3.68	0.07	1.00	0.98	0.12	1.74	3.00	-2.91	-2.77	2.12	1.06	0	0	SAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
03-01-1-Z3-2	1.01	1.27	0.56	1.04	0.00	0.00	0.02	0.05	2.33	1.18	289.92	5.41	7.96	8.12	4.23
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	5.41	4.23	0.82	1.00	0.00	0.17	1.00	-3.12	-3.42	1.75	0.87	0	0	SAFE	
04-01-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1.01	1.27	0.56	1.04	0.00	0.00	0.02	0.05	2.33	1.18	289.92	5.41	7.96	8.12	4.23
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
04-01-1-Z3-2	5.41	4.23	0.82	1.00	0.00	0.17	1.00	-3.12	-3.42	1.75	0.87	0	0	SAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	4.28	5.90	0.00	0.49	0.00	0.00	0.24	0.34	0.00	0.15	2270.91	1.88	2.81	0.11	0.22
05-02-1-Z3-4	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	1.88	0.11	1.24	1.00	0.13	0.97	2.00	-0.56	-0.23	0.03	-0.76	0	1	?	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
06-03-1-Z3-5	3.63	3.92	0.33	0.33	0.00	0.00	0.16	0.15	0.08	0.08	1615.67	2.45	2.63	0.14	0.14
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2.45	0.14	1.24	1.00	0.11	0.86	2.00	-0.11	0.43	0.61	0.00	0	1	?	
07-03-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2.02	1.73	1.88	5.55	0.00	0.00	0.32	0.06	1.88	12.52	1335.17	2.92	5.46	1.64	9.42
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
08-03-1-Z3-4	2.92	1.64	1.24	1.10	0.25	0.90	2.00	0.11	0.45	0.61	0.00	0	1	?	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	4.05	4.15	2.22	1.11	0.00	0.00	0.35	0.29	10.14	1.28	1403.93	4.46	3.74	7.47	1.12
08-03-1-Z3-4	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3.74	1.12	1.53	1.00	0.02	0.87	2.00	-1.45	-1.20	0.03	-0.93	0	0	SAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
09-03-1-Z3-2	1.44	1.40	0.00	0.00	0.00	0.00	0.06	0.04	0.00	0.00	354.09	4.07	3.94	0.17	0.12
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3.94	0.12	1.53	1.00	0.44	1.55	3.00	-2.04	-1.56	3.25	1.62	0	0	SAFE	
10-03-1-Z3-3	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1.35	1.47	0.00	0.00	0.00	0.00	0.05	0.12	0.00	0.00	347.62	3.89	4.24	0.15	0.34
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
11-03-1-Z3-4	3.89	0.15	1.53	1.00	0.21	0.37	1.00	-0.64	-0.26	0.59	-0.65	0	1	?	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1.45	1.42	0.00	2.80	0.00	0.00	0.04	0.06	0.01	11.43	1185.25	1.22	3.56	0.04	9.70
12-04-1-Z3-4	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	1.22	0.04	1.53	1.00	0.40	0.11	1.00	1.01	1.60	0.03	-0.93	1	1	UNSAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
12-04-1-Z3-4	4.46	5.42	0.00	0.00	0.00	0.00	0.56	0.58	0.00	0.00	1955.48	2.28	2.77	0.29	0.30
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2.28	0.29	2.10	1.00	0.00	1.25	3.00	-1.74	-1.53	0.04	-1.28	0	0	SAFE	
13-04-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2.08	1.56	1.91	0.60	0.00	0.00	0.13	0.06	1.87	0.20	1130.49	3.53	1.91	1.77	0.23
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
14-05-1-Z3-3	1.91	0.23	2.10	1.15	0.33	1.26	3.00	0.35	0.70	1.04	0.00	0	1	?	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1.19	1.32	0.00	0.75	0.00	0.00	0.06	0.06	0.00	0.56	356.34	3.33	5.82	0.17	1.75
15-05-1-Z3-3	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3.33	0.17	1.13	1.00	0.00	1.26	3.00	-2.52	-2.41	0.43	-0.48	0	0	SAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
15-05-1-Z3-3	1.47	1.40	0.00	0.00	0.00	0.00	0.29	0.16	0.00	0.00	611.90	2.40	2.29	0.47	0.26
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2.29	0.26	1.64	1.00	0.18	2.74	3.00	-1.87	-1.64	0.63	-0.70	0	0	SAFE	
16-06-2-Z3-7	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0.99	1.44	0.00	0.00	0.00	0.00	0.02	0.07	0.00	0.00	955.62	1.04	1.51	0.02	0.07
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
17-06-2-Z3-4	1.04	0.02	2.10	1.00	0.04	1.30	3.00	0.52	1.26	3.76	3.26	0	0	SAFE	
	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0.89	1.08													

Table D.1. Parameters and results of preliminary seismic assessment method proposed by Özcebe *et al.*(2003) for original(existing) condition of buildings (Cont.)

18-06-2-Z3-6	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,01	2,72	1,11	1,13	0,00	0,00	0,18	0,11	1,26	0,48	1586,95	2,59	2,43	0,90	0,37
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,43	0,37	2,10	1,02	0,00	1,32	3,00	-0,49	0,05	2,66	1,87	0	0	SAFE	
19-06-2-Z3-6	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,42	1,68	0,00	0,00	0,00	0,00	0,08	0,08	0,00	0,00	614,04	2,30	2,73	0,13	0,13
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,30	0,13	2,10	1,05	0,05	1,52	3,00	-0,16	0,35	2,66	1,87	0	0	SAFE	
20-06-2-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2,65	2,51	0,00	0,00	0,00	0,00	0,60	0,35	0,00	0,00	749,16	3,53	3,35	0,80	0,46
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3,35	0,46	2,53	1,13	0,00	1,07	3,00	-1,55	-1,64	0,05	-1,54	0	0	SAFE	
21-06-2-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0,88	1,59	0,00	0,00	0,00	0,00	0,02	0,08	0,00	0,00	438,63	2,01	3,61	0,06	0,18
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,01	0,06	2,10	1,00	0,07	0,96	2,00	-0,76	-0,48	0,04	-1,28	0	1	?	
22-06-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	4,32	3,78	1,19	1,92	0,00	0,00	1,96	0,22	1,59	2,33	1332,65	4,13	4,28	2,66	1,92
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	4,13	1,92	1,53	1,04	0,00	0,09	1,00	-0,34	-0,07	0,76	0,00	0	0	SAFE	
23-06-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0,80	0,96	0,00	0,00	0,00	0,00	0,02	0,02	0,00	0,00	297,05	2,69	3,21	0,08	0,07
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,69	0,07	2,10	1,55	0,00	1,68	3,00	0,66	-0,41	1,04	0,00	0	0	SAFE	
24-06-2-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0,88	1,46	0,00	0,00	0,00	0,00	0,02	0,06	0,00	0,00	384,48	2,29	3,80	0,06	0,15
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,29	0,06	2,10	1,00	0,00	0,65	2,00	-0,98	-0,77	0,04	-1,28	0	1	?	
25-07-2-Z3-7	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,27	1,13	0,32	0,68	0,00	0,00	0,06	0,04	0,41	0,49	1069,92	1,49	1,69	0,44	0,50
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	1,49	0,44	2,10	1,00	0,00	0,84	2,00	0,93	1,62	3,76	3,26	0	0	SAFE	
26-07-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,07	2,50	2,25	4,50	0,00	0,00	0,40	0,13	2,67	5,29	1762,00	3,02	3,97	1,74	3,07
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3,02	1,74	2,10	1,18	0,41	0,94	2,00	0,77	1,07	1,04	0,00	0	1	?	
27-08-1-Z2-6	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,08	2,81	0,69	3,62	0,00	0,00	0,85	0,19	7,38	10,05	2147,34	1,76	2,99	3,84	4,77
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	1,76	3,84	1,13	1,00	0,44	1,43	3,00	-0,09	0,65	1,43	1,00	0	0	SAFE	
28-08-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,03	3,89	1,70	0,00	0,00	0,00	0,23	0,26	1,27	0,01	1287,00	3,67	3,02	1,16	0,22
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	3,02	0,22	1,13	1,18	0,26	1,17	3,00	0,06	0,31	0,56	0,00	0	1	?	
29-08-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2,54	1,43	0,85	0,44	0,00	0,00	0,08	0,04	0,22	0,99	1674,06	2,02	1,12	0,18	0,62
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	1,12	0,18	1,13	1,00	0,27	1,42	3,00	-0,76	-0,32	0,02	-0,69	0	1	?	
30-08-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,21	1,08	0,00	0,83	0,00	0,00	0,06	0,04	0,00	0,75	635,66	1,90	3,00	0,10	1,24
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	1,90	0,10	1,64	1,00	0,02	0,30	1,00	0,45	0,83	0,81	0,00	0	1	?	
31-08-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,54	1,75	0,00	0,00	0,00	0,00	0,06	0,06	0,00	0,00	360,20	4,26	4,84	0,16	0,16
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	4,26	0,16	1,64	1,00	0,21	1,38	3,00	-2,74	-2,51	3,48	1,74	0	0	SAFE	
32-08-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,86	3,60	2,76	4,68	0,00	0,00	0,24	0,22	4,90	23,75	2477,44	2,67	3,34	2,08	9,67
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,67	2,08	1,13	1,13	0,14	1,32	3,00	-0,84	-0,76	0,56	0,00	0	0	SAFE	
33-08-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	0,84	1,01	0,00	0,00	0,00	0,00	0,02	0,04	0,00	0,00	412,98	2,03	2,43	0,05	0,09
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	2,03	0,05	1,13	1,00	0,53	2,03	3,00	-0,20	0,62	0,02	-0,69	0	1	?	
34-10-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,53	1,95	0,00	0,00	0,00	0,00	0,05	0,06	0,00						

Table D.1. Parameters and results of preliminary seismic assessment method proposed by Özcebe *et al.*(2003) for original(existing) condition of buildings (Cont.)

35-09-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	4,43	4,25	0,00	0,00	0,00	0,00	0,79	0,30	0,00	0,00	1417,42	3,13	3,00	0,56	0,21
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
36-09-1-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,30	1,46	1,33	0,00	0,00	0,00	0,05	0,05	1,45	0,00	665,14	3,95	2,19	2,25	0,09
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
37-12-2-Z4-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	2,92	4,40	0,00	2,31	0,00	0,00	0,23	0,21	0,01	0,74	1657,40	1,76	4,04	0,14	0,57
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
38-13-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	2,36	2,86	0,00	0,00	0,00	0,00	0,13	0,13	0,00	0,00	1161,30	2,03	2,03	0,12	0,11
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
39-14-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	4,03	3,56	0,65	1,58	0,00	0,00	0,59	0,30	1,46	1,40	1745,44	2,68	2,94	1,17	0,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
40-14-1-Z2-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,33	1,81	0,00	0,38	0,00	0,00	0,20	0,29	0,00	0,07	241,56	5,52	9,04	0,83	1,51
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
41-15-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	3,44	4,39	6,00	6,57	0,00	0,00	0,11	0,41	3,31	16,54	2776,76	3,40	3,95	1,23	6,11
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
42-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	628,65	2,29	0,93	0,93	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
43-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	754,38	1,91	0,78	0,78	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
44-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	628,65	2,29	0,93	0,93	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
45-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	627,50	2,29	0,93	0,93	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
46-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	628,65	2,29	0,93	0,93	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
47-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	628,65	2,29	0,93	0,93	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
48-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	0,59	0,59	0,86	0,00	0,00	0,00	0,01	0,01	0,58	0,01	628,65	2,29	0,93	0,93	0,02
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	

Table D.2. Parameters and results of preliminary seismic assessment method proposed by Özcebe *et al.*(2003) for retrofitted condition of buildings.

01-01-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,63	1,89	0,80	0,80	0,00	0,00	0,02	0,03	0,80	0,88	197,75	12,28	13,59	4,14	4,57
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	12,28	4,14	0,93	1,00	0,11	0,40	1,00	-4,05	-3,70	1,97	0,98	0	0	SAFE	
02-01-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,05	1,27	1,00	1,21	0,00	0,00	0,01	0,01	0,88	3,22	182,25	11,23	13,61	4,87	17,71
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	11,23	4,87	1,00	0,98	0,12	1,74	3,00	-5,47	-5,18	2,12	1,06	0	0	SAFE	
03-01-1-Z2-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,48	1,82	2,08	2,21	0,00	0,00	0,02	0,04	6,40	2,18	289,92	12,28	13,91	22,12	7,65
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	12,28	7,65	0,82	1,00	0,00	0,17	1,00	-5,21	-5,30	1,75	0,87	0	0	SAFE	
04-01-1-Z2-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,48	1,82	2,08	2,21	0,00	0,00	0,02	0,04	6,40	2,18	289,92	12,28	13,91	22,12	7,65
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	12,28	7,65	0,82	1,00	0,00	0,17	1,00	-5,21	-5,30	1,75	0,87	0	0	SAFE	
05-02-1-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	9,49	11,95	5,01	6,73	0,00	0,00	0,37	0,38	43,45	49,95	2270,91	6,39	8,22	19,30	22,16
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	6,39	19,30	1,24	1,00	0,13	0,97	2,00	-6,10	-7,12	0,03	-0,76	0	0	SAFE	
06-03-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	6,98	6,75	3,36	4,84	0,00	0,00	0,38	0,29	22,00	33,13	1615,67	6,40	7,17	13,85	20,68
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	6,40	13,85	1,24	1,00	0,11	0,86	2,00	-4,20	-4,57	0,61	0,00	0	0	SAFE	
07-03-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	3,91	3,86	4,52	6,37	0,00	0,00	0,41	0,19	14,30	14,16	1335,17	6,32	7,66	11,01	10,75
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	6,32	10,75	1,24	1,10	0,25	0,90	2,00	-2,75	-2,96	0,61	0,00	0	0	SAFE	
08-03-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	7,85	8,12	6,95	3,26	0,00	0,00	0,73	0,51	49,47	20,88	1403,93	10,54	8,10	35,76	15,24
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	8,10	15,24	1,53	1,00	0,02	0,87	2,00	-5,72	-6,38	0,03	-0,93	0	0	SAFE	
09-03-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	2,34	2,63	1,63	1,88	0,00	0,00	0,04	0,04	12,58	13,57	354,09	11,19	12,72	35,63	38,43
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	11,19	35,63	1,53	1,00	0,44	1,55	3,00	-12,09	-14,19	3,25	1,62	0	0	SAFE	
10-03-1-Z3-3	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,96	2,00	1,48	1,98	0,00	0,00	0,04	0,12	6,04	14,87	347,62	9,90	11,46	17,48	43,12
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	9,90	17,48	1,53	1,00	0,21	0,37	1,00	-5,99	-6,69	0,59	-0,65	0	0	SAFE	
11-03-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	3,10	3,02	5,34	6,06	0,00	0,00	0,05	0,09	39,61	26,95	1185,25	7,13	7,66	33,46	22,81
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	7,13	22,81	1,53	1,00	0,40	0,11	1,00	-5,67	-6,63	0,03	-0,93	0	0	SAFE	
12-04-1-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	6,28	7,68	5,28	6,81	0,00	0,00	0,19	0,44	33,72	56,28	1955,48	5,91	7,41	17,34	29,01
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	5,91	17,34	2,10	1,00	0,00	1,25	3,00	-6,59	-7,61	0,04	-1,28	0	0	SAFE	
13-04-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	5,71	4,34	5,12	4,04	0,00	0,00	0,28	0,13	81,83	14,41	1130,49	9,58	7,41	72,63	12,86
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	7,41	12,86	2,10	1,15	0,33	1,26	3,00	-3,75	-4,11	1,04	0,00	0	0	SAFE	
14-05-1-Z2-3	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	2,62	3,01	2,22	4,27	0,00	0,00	0,01	0,01	9,73	14,53	356,34	13,58	20,40	27,33	40,81
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	13,58	27,33	1,13	1,00	0,00	1,26	3,00	-11,07	-12,58	0,43	-0,48	0	0	SAFE	
15-05-1-Z3-3	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	2,55	2,44	2,76	1,95	0,00	0,00	0,31	0,19	14,13	14,21	611,90	8,68	7,17	23,60	23,54
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	7,17	23,54	1,64	1,00	0,18	2,74	3,00	-8,48	-9,94	0,63	-0,70	0	0	SAFE	
16-06-2-Z3-7	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	2,28	3,18	2,26	3,94	0,00	0,00	0,08	0,16	13,43	25,82	955,62	4,75	7,45	14,14	27,19
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
	4,75	14,14	2,10	1,00	0,04	1,30	3,00	-3,63	-3,85	3,76	3,26	0	0	SAFE	
17-06-2-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mo})_x$	$\sum(A_{mo})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ny}	I_{rx}	I_{ny}
	1,73	2,31	2,37	2,94	0,00	0,									

Table D.2. Parameters and Results of preliminary seismic assessment method proposed by Özcebe *et al.*(2003) for retrofitted condition of buildings (Cont.)

18-06-2-Z3-6	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	5,54	4,91	4,11	4,13	0,00	0,00	0,26	0,22	20,27	9,08	1586,95	6,08	5,70	12,93	5,86
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
19-06-2-Z3-6	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,06	3,30	1,44	3,58	0,00	0,00	0,01	0,01	8,47	19,14	614,04	7,32	11,19	13,81	31,19
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
20-06-2-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,71	3,41	2,35	3,59	0,00	0,00	0,18	0,29	12,23	25,10	749,16	8,09	9,04	16,56	33,89
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
21-06-2-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,27	2,36	2,06	2,07	0,00	0,00	0,04	0,04	11,13	19,79	438,63	7,58	10,09	25,40	45,21
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
22-06-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	5,52	4,94	3,42	4,40	0,00	0,00	1,90	0,17	21,85	25,98	1332,65	6,71	7,01	17,82	19,63
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
23-06-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,67	1,67	1,39	1,24	0,00	0,00	0,02	0,03	3,98	1,85	297,05	10,32	9,79	13,49	6,31
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
24-06-2-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	1,66	2,81	2,80	2,32	0,00	0,00	0,01	0,02	4,68	5,37	384,48	11,58	13,32	12,19	14,00
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
25-07-2-Z3-7	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	3,38	3,11	2,72	2,16	0,00	0,00	0,24	0,12	15,12	13,65	1069,92	5,70	4,93	14,36	12,87
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
26-07-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	5,86	5,70	6,32	7,98	0,00	0,00	0,32	0,32	26,43	46,40	1762,00	6,91	7,76	15,36	26,52
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
27-08-1-Z2-6	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	4,68	5,23	3,84	5,85	0,00	0,00	0,13	0,31	44,19	32,26	2147,34	3,97	5,16	20,64	15,17
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
28-08-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	6,35	7,29	4,64	3,20	0,00	0,00	0,35	0,33	36,56	22,11	1287,00	8,54	8,14	28,68	17,44
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
29-08-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	5,06	4,35	4,18	3,89	0,00	0,00	0,19	0,14	9,56	13,60	1674,06	5,52	4,93	5,83	8,21
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
30-08-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2,74	2,38	3,14	3,96	0,00	0,00	0,16	0,05	28,23	24,67	635,66	9,26	9,97	44,66	38,89
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
31-08-1-Z3-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2,34	2,85	1,58	2,05	0,00	0,00	0,03	0,06	6,70	6,75	360,20	10,88	13,59	18,69	18,90
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
32-08-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	8,11	7,40	6,75	7,38	0,00	0,00	0,22	0,22	35,45	37,51	2477,44	6,00	5,97	14,40	15,23
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
33-08-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2,56	2,87	2,83	1,09	0,00	0,00	0,07	0,12	14,33	3,10	412,98	13,04	9,59	34,87	7,78
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	
34-10-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mme})_x$	$\sum(A_{mme})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{nx}	A_{ny}	I_{nx}	I_{ny}
	2,37	3,59	1,82	3,04	0,00	0,00	0,02	0,02	6,27	10,50	472,52	8,87	14,04	13,33	22,27
	<i>mnlsi</i>	<i>mnlstfi</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	Safe / Unsafe	

Table D.2. Parameters and results of preliminary seismic assessment method proposed by Özcebe *et al.*(2003) for retrofitted condition of buildings (Cont.)

35-09-1-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	6,60	6,18	3,37	5,37	0,00	0,00	0,42	0,16	32,10	65,12	1417,42	7,03	8,15	22,94	46,06
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,03	22,94	1,64	1,00	0,05	0,23	1,00	-6,02	-7,23	0,81	0,00	0	0	SAFE	
36-09-1-Z3-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,99	3,23	2,81	2,07	0,00	0,00	0,15	0,13	11,22	16,67	665,14	5,72	7,97	17,09	25,25
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,97	17,09	2,10	1,00	0,49	0,41	1,00	-4,16	-4,46	0,04	-1,28	0	0	SAFE	
37-12-2-Z4-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	3,86	5,88	4,94	8,91	0,00	0,00	0,16	0,08	27,75	42,78	1657,40	5,31	8,92	16,84	25,86
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	5,31	16,84	2,10	1,14	0,00	0,72	2,00	-5,19	-6,62	0,04	-1,28	0	0	SAFE	
38-13-2-Z3-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	4,84	5,15	2,30	2,39	0,00	0,00	0,26	0,16	13,60	15,23	1161,30	6,15	6,49	11,93	13,25
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	6,15	11,93	2,10	0,96	0,00	0,97	2,00	-4,10	-4,36	1,04	0,00	0	0	SAFE	
39-14-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	5,40	4,55	5,92	6,35	0,00	0,00	0,36	0,27	52,11	39,85	1745,44	6,49	6,24	30,06	22,99
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	6,24	22,99	1,64	1,00	0,09	0,55	2,00	-7,10	-8,49	0,03	-1,00	0	0	SAFE	
40-14-1-Z2-2	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	1,91	2,55	1,10	1,28	0,00	0,00	0,01	0,05	4,18	3,72	241,56	12,44	15,82	17,35	15,62
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	12,44	15,62	1,13	1,03	0,24	1,85	3,00	-7,22	-7,61	0,43	-0,48	0	0	SAFE	
41-15-1-Z2-4	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	6,36	8,55	9,60	9,99	0,00	0,00	0,21	0,45	85,59	59,12	2776,76	5,75	6,68	30,90	21,45
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	5,75	21,45	1,13	1,00	0,30	1,77	3,00	-6,75	-7,80	0,02	-0,69	0	0	SAFE	
42-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	628,65	10,81	7,15	25,14	4,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,15	4,97	1,54	1,00	0,00	1,59	3,00	-3,16	-2,80	0,76	0,00	0	0	SAFE	
43-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	754,38	9,01	5,96	20,95	4,14
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	5,96	4,14	1,54	1,00	0,00	1,59	3,00	-2,74	-2,40	0,76	0,00	0	0	SAFE	
44-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	628,65	10,81	7,15	25,14	4,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,15	4,97	1,54	1,00	0,00	1,59	3,00	-3,16	-2,80	0,76	0,00	0	0	SAFE	
45-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	627,50	10,83	7,16	25,18	4,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,16	4,97	1,54	1,00	0,00	1,59	3,00	-3,16	-2,81	0,76	0,00	0	0	SAFE	
46-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	628,65	10,81	7,15	25,14	4,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,15	4,97	1,54	1,00	0,00	1,59	3,00	-3,16	-2,80	0,76	0,00	0	0	SAFE	
47-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	628,65	10,81	7,15	25,14	4,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,15	4,97	1,54	1,00	0,00	1,59	3,00	-3,16	-2,80	0,76	0,00	0	0	SAFE	
48-15-1-Z2-5	$\sum(A_{col})_x$	$\sum(A_{col})_y$	$\sum(A_{sw})_x$	$\sum(A_{sw})_y$	$\sum(A_{mw})_x$	$\sum(A_{mw})_y$	$\sum(I_{col})_x$	$\sum(I_{col})_y$	$\sum(I_{sw})_x$	$\sum(I_{sw})_y$	$\sum A_f$	A_{rx}	A_{ry}	I_{rx}	I_{ry}
	2,03	1,40	4,77	3,10	0,00	0,00	0,03	0,03	15,77	3,10	628,65	10,81	7,15	25,14	4,97
	<i>mnlsi</i>	<i>mnlstfti</i>	<i>CM</i>	<i>ssi</i>	<i>or</i>	<i>nrr</i>	<i>nrs</i>	<i>DI_{LS}</i>	<i>DI_{IO}</i>	<i>CV_{LS}</i>	<i>CV_{IO}</i>	<i>PG_{LS}</i>	<i>PG_{IO}</i>	<i>Safe / Unsafe</i>	
	7,15	4,97	1,54	1,00	0,00	1,59	3,00	-3,16	-2,80	0,76	0,00	0	0	SAFE	

Table D.3. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.*(2008) for original(existing) condition of buildings.

01-01-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,20	2,20	1	1	93,75	4682,67	4682,67	4682,67	4682,67	4698,79	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,03	0,04	1,00	1,00	1220,70	439,45	23498,67	30889,40	23498,67	30889,40	25622,05	0,30	5,80	2,90	2,90
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	154,62	54,01	50,00	100,00	50,00	30,00	45,00	25,00	931,04	51,72	0,94	1,00	23,45		
02-01-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	1,37	1,37	1	1	92,496	2962,2903	2962,2903	2962,2903	2962,2903	2972,4926	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,01306042	0,013497917	1	1	1166,1433	435,89048	20458,369	25073,09	20458,369	25073,09	21770,659	0,3	6,05	3,00	3,05
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	121,160186	37,46310554	100	100	70	30	45	25	954,85242	53,047357	0,9478552	1	23,70		
03-01-1-Z2-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,84	3,32	1	1	144,9612	3911,3915	4573,6376	3911,3915	4573,6376	4099,9196	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	2,35276771	1,225607853	1	1	1745,3377	1756,9732	53329,795	46746,303	46746,303	53329,795	48631,342	0,3	5,4	2,70	2,70
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	288,237174	103,0499855	100	100	100	100	45	100	1492,1999	87,776467	1	1	45,00		
04-01-1-Z2-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,84	3,32	1,00	1,00	144,96	3911,39	4573,64	3911,39	4573,64	4099,92	1,00	1,00	1,00	0,40	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	2,35	1,23	1,00	1,00	1745,34	1756,97	53329,79	46746,30	46746,30	53329,79	48631,34	0,30	5,40	2,70	2,70
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	288,24	108,08	100,00	100,00	100,00	100,00	45,00	100,00	1512,32	88,96	1,00	1,00	45,00		
05-02-1-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	10,18	10,66	1	1	623,52	3263,72	3420,09	3263,72	3420,09	3314,61	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,24284635	0,491736979	1	1	25492,85	41174,44	19806,72	20722,92	19806,72	20722,92	20107,13	0,3	13,2	3,30	3,30
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	57,86	20,11	100	100	50	100	20	25	810,45	47,67	0,91	1	18,15		
06-03-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,88	7,88	1	1	355,7805	4427,4489	4427,4489	4427,4489	4427,4489	4442,6974	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,23285793	0,229429283	1	1	8518,0523	13062,484	24455,703	22384,872	22384,872	24455,703	22995,427	0,3	15,25	2,95	2,95
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	60,8434731	24,45055481	100	100	70	100	45	25	922,80222	57,675139	0,9825635	1	24,02		
07-03-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,64	9,31	1	1	283,2607	3981,8443	6575,215	3981,8443	6575,215	4775,8848	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	2,19375836	12,58235718	1	1	6248,5634	7154,8844	40748,508	56242,145	40748,508	56242,145	45250,221	0,3	14,1	2,87	2,62
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	117,522107	36,82418821	100	84,87014	80	100	45	25	996,90717	55,383732	0,965378	1	24,13		
08-03-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	10,42	9,31	1	1	396,6768	5251,1768	4691,5272	4691,5272	5251,1768	4853,1852	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	10,4846071	1,569040933	1	1	22483,853	7647,4031	43128,691	36597,722	36597,722	43128,691	38455,27	0,3	11,96	2,99	2,99
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	115,67706	39,57600235	100	100	100	100	60	100	1238,304	77,394001	1	1	39,58		
09-03-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,84	2,84	1	1	164,6152	3444,3964	3444,3964	3444,3964	3444,3964	3456,2591	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,06041875	0,043371875	1	1	1949,1318	2616,2307	25078,185	22127,708	22127,708	25078,185	22974,636	0,3	6,06	3,03	3,03
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	129,219994	45,90899567	100	100	70	100	45	25	1058,636	58,81311	0,9910983	1	24,78		
10-03-1-Z3-3	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,83	2,83	1	1	101,439	5569,8499	5569,8499	5569,8499	5569,8499	5589,0328	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,05145417	0,117944792	1	1	712,37567	1032,163	29701,083	32554,88	29701,083	32554,88	30539,445	0,3	9,31	2,82	2,82
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	119,12961	38,54752318	100	100	80	30	45	25	979,19009	54,39945	0,9579959	1	23,95		
11-03-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,86	5,66	1	1	227,7228	2514,0214	4973,1516	2514,0214	4973,1516	3311,6306	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,05044844	11,49387656	1	1	3246,6895	5752,0521	21842,955	57697,732	21842,955	57697,732	34545,407	0,3	11,6	2,90	2,90
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	103,654299	32,8345088	100	100	70	100	45	100	1106,338	69,146127	1	1	32,83		
12-04-1-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	9,88	9,88	1	1	821,031	2406,7301	2406,7301	2406,7301	2406,7301	2415,019	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,56414129	0,564886742	1	1	77150,668	40901,199	18786,23	21483,11	18786,23	21483,11	19557,812	0,3	13,7	2,90	2,90
	P														

Table D.3. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.*(2008) for original(existing) condition of buildings (Cont.).

13-04-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,55	4,24	1	1	178,848	6206,3875	4741,4564	4741,4564	6206,3875	5161,9754	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	2,001475	0,259802035	1	1	1596,5537	4450,3106	52560,964	28462,985	28462,985	52560,964	36108,999	0,3	17,75	3,30	2,87
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	82,4656689	31,45708648	100	77,77899	70	60	45	25	894,16533	49,675852	0,9225689	1,1	25,37		
14-05-1-Z2-3	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,51	3,26	1	1	155,5425	3228,571	4192,9376	3228,571	4192,9376	3504,9761	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,06174813	0,625013333	1	1	1611,4527	2522,4133	26164,428	38005,338	26164,428	38005,338	29652,285	0,3	8,5	2,85	2,85
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	118,482262	25,24776712	100	100	100	30	45	100	1065,9911	66,624442	1	1	25,25		
15-05-1-Z3-3	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,87	2,87	1	1	223,169	2573,3861	2573,3861	2573,3861	2573,3861	2582,249	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,28935544	0,15904219	1	1	4554,9258	3781,74	28948,1	26655,948	26655,948	28948,1	27336,889	0,3	8,4	2,80	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	108,048776	34,01891777	100	100	70	30	45	25	941,07567	52,281982	0,9421149	1	23,55		
16-06-2-Z3-7	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,44	2,44	1	1	121,568	4005,9884	4005,9884	4005,9884	4005,9884	4019,7853	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,01999167	0,070666667	1	1	1363,1825	1112,6552	21591,807	28946,816	21591,807	28946,816	23713,94	0,3	23,5	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	47,3392944	17,08555594	64	100	90	30	45	25	827,34222	51,708889	0,9378167	1,1	17,63		
17-06-2-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	1,97	1,97	1	1	136,98	2869,032	2869,032	2869,032	2869,032	2878,9131	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,0310375	0,024571875	1	1	924,615	2644,2665	25480,923	19708,638	19708,638	25480,923	21361,703	0,3	10,86	2,82	2,83
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	70,0814094	21,2640357	50	100	100	50	45	25	870,05614	54,378509	0,9578388	1,1	22,40		
18-06-2-Z3-6	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	6,84	6,86	1	1	237,4614	5756,7251	5773,5699	5756,7251	5773,5699	5780,753	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	1,43603517	0,594613542	1	1	7671,9049	2878,1034	35932,081	36648,455	35932,081	36648,455	36235,643	0,3	17,27	2,92	2,87
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	85,4790536	24,28888381	50	96,93894	100	60	45	25	882,97237	55,185773	0,9638933	1,1	25,75		
19-06-2-Z3-6	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	3,09	3,09	1	1	101,794	6071,0847	6071,0847	6071,0847	6071,0847	6091,994	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,07775313	0,077334375	1	1	502,94719	1482,5312	34583,512	27829,394	27829,394	34583,512	29752,396	0,3	16,95	2,95	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	73,8391986	30,24399459	100	91,03425	100	40	45	25	969,07873	53,837707	0,9537828	1,1	26,23		
20-06-2-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,16	5,16	1	1	252,8036	4079,847	4079,847	4079,847	4079,847	4093,8982	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,59931268	0,34688543	1	1	5379,669	5272,4803	32389,898	29151,89	29151,89	32389,898	30091,772	0,3	11,15	3,05	2,70
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	96,6935612	25,53983475	100	80,29991	100	30	33	25	872,05907	48,447726	0,9133579	1,1	25,12		
21-06-2-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,47	2,47	1	1	107,2144	4602,9265	4602,9265	4602,9265	4602,9265	4618,78	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,02418281	0,077451563	1	1	1256,7279	730,14436	22797,284	32074,086	22797,284	32074,086	25506,076	0,3	11,27	2,81	2,82
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	84,4580442	25,89241002	100	100	90	40	45	100	1058,5696	66,16	1	1,1	28,48		
22-06-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	9,29	10,02	1	1	295,8732	6276,3373	6773,1718	6276,3373	6773,1718	6425,3466	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	3,5480134	2,558544963	1	1	7908,8904	6728,9061	42796,075	41403,753	41403,753	42796,075	41897,584	0,3	14,25	2,90	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	112,624456	38,36380311	100	93,87891	100	60	45	25	1030,092	57,227331	0,979205	1,1	26,93		
23-06-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	1,76	1,76	1	1	62,1576	5646,9362	5646,9362	5646,9362	5646,9362	5666,3846	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,02488438	0,0207625	1	1	332,33649	311,91512	29915,739	29219,894	29219,894	29915,739	29495,436	0,3	13,07	2,82	1,82
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	87,5375378	28,81839212	100	45,4653	100	30	45	25	816,66948	45,370527	0,890279	1,1	24,48		
24-06-2-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,34	2,34	1	1	97,4078	4804,5434	4804,5434	4804,5434	4804,5434	4821,0906	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,02155	0,05795	1												

Table D.3. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.* (2008) for original(existing) condition of buildings (Cont.).

25-07-2-Z3-7	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,73	3,08	1	1	255,2576	2136,2733	2413,6402	2136,2733	2413,6402	2215,999	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,46583962	0,53422881	1	1	5005,5079	5889,8479	31245,512	31085,27	31085,27	31245,512	31232,33	0,3	18,3	3,09	3,09
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
65,5404942	16,68105428	100	100	50	60	20	25	736,72422	46,045264	0,8953395	1,1		16,43		
26-07-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,82	10,07	1	1	256,19	6100,9407	7857,4495	6100,9407	7857,4495	6603,6213	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	3,06748405	5,417190296	1	1	4007,0251	7465,5901	47623,581	47116,388	47116,388	47623,581	47405,533	0,3	14,75	3,35	2,85
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
122,702761	40,3933076	100	74,75497	70	100	45	25	960,83815	53,379897	0,9503492	1,1		26,13		
27-08-1-Z2-6	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	6,58	9,51	1	1	262,644	5010,5847	7241,7417	5010,5847	7241,7417	5666,8691	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	8,2355024	10,2442538	1	1	3642,2157	9072,8094	59141,847	51472,789	51472,789	59141,847	53663,831	0,3	18	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
117,486535	55,06707393	100	100	70	60	45	100	1200,2683	70,604017	1	1		45,00		
28-08-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,62	6,92	1	1	260,0641	6627,2123	5323,6875	5323,6875	6627,2123	5694,8907	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	1,49410469	0,276923438	1	1	8904,4409	3567,4055	35154,819	30132,242	30132,242	35154,819	31562,544	0,3	14,51	3,31	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
85,6744973	32,37642007	100	73,99358	70	100	45	100	1026,4864	64,155402	1	1		32,38		
29-08-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	4,82	4,41	1	1	246,28	3910,1835	3577,2292	3577,2292	3910,1835	3675,3376	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,30125298	1,035781994	1	1	1813,4417	14088,037	35084,52	29806,678	29806,678	35084,52	31307,98	0,3	11,6	2,90	2,90
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
95,7859233	34,13670159	100	100	70	100	45	100	1111,5468	69,471675	1	1		34,14		
30-08-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,29	3,12	1	1	133,485	3431,0971	4667,1911	3431,0971	4667,1911	3788,9601	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,06113021	0,789620833	1	1	2912,1132	757,11023	23197,411	50661,949	23197,411	50661,949	32387,671	0,3	14,9	2,98	2,98
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
81,5828977	19,06402301	40	100	100	60	45	25	861,25609	53,828506	0,9537138	1		18,18		
31-08-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	3,28	3,28	1	1	212,6572	3084,7768	3084,7768	3084,7768	3084,7768	3095,401	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,05647083	0,059095833	1	1	3639,0768	3902,7133	21837,182	21730,416	21730,416	21837,182	21831,906	0,3	6	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
123,037053	41,00217682	100	100	100	100	45	25	1099,0087	61,056039	1	1		25,00		
32-08-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	10,22	12,14	1	1	378	5404,7619	6420,6349	5404,7619	6420,6349	5693,5302	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	5,14507188	23,9654	1	1	10206	13891,5	43806,36	56026,966	43806,36	56026,966	47299,516	0,3	14,35	3,15	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
122,866329	50,5085744	64	80,8957	100	100	45	100	1188,7214	69,924789	1	1		45,00		
33-08-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	1,85	1,85	1	1	117,2666	3146,676	3146,676	3146,676	3146,676	3157,5134	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,02050313	0,0367875	1	1	2696,0774	487,08246	18934,225	29967,434	18934,225	29967,434	22268,007	0,3	12	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
67,7291421	20,17587844	100	100	70	100	45	100	1055,7035	65,98147	1	1		20,18		
34-10-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	3,47	3,47	1	1	133,0458	5220,0069	5220,0069	5220,0069	5220,0069	5237,985	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,04622031	0,061629688	1	1	428,94409	5072,727	32174,843	20794,079	20794,079	32174,843	24209,17	0,3	12,81	3,24	3,19
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
74,4708894	17,53832026	100	97,23939	100	75	45	100	1071,8714	66,991965	1	1		17,54		
35-09-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,69	8,69	1	1	319,485	5436,875	5436,875	5436,875	5436,875	5455,5999	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,79381926	0,299377956	1	1	12490,681	5792,3296	28950,568	27778,149	27778,149	28950,568	28170,503	0,3	14	2,80	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α		P	
79,4192327	15,6592592	64	100	100	100	45	25	911,63704	56,977315	0,9773299	1		15,30		
36-09-1-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}							

Table D.3. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.*(2008) for original(existing) condition of buildings (Cont.).

37-12-2-Z4-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,32	9,62	1	1	492,1296	2972,79416	3909,5393	2972,7942	3909,5393	3241,9488	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,23648854	0,941882292	1	1	31489,901	12935,5281	18886,773	29749,008	18886,773	29749,008	22164,043	0,3	11,39	3,19	2,79
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	70,6104984	20,90664428	64	78,57137	100	50	45	10	808,34069	44,907816	0,8868086	1,1	9,75		
38-13-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,22	5,22	1	1	230,461	4525,71151	4525,7115	4525,7115	4525,7115	4541,2984	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,13487396	0,127695833	1	1	3954,7588	4953,44423	25561,811	24170,403	24170,403	25561,811	24607,699	0,3	14,15	2,75	2,85
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	68,29558	26,74061537	50	100	100	50	45	25	941,96246	52,331248	0,9424844	1,1	25,92		
39-14-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,24	9,17	1	1	408,4024	4034,25641	4491,1587	4034,2564	4491,1587	4166,6946	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	2,04806475	1,695641097	1	1	11824,938	16337,733	35378,463	31934,375	31934,375	35378,463	32936,284	0,3	11,36	2,84	2,84
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	103,343362	50,41843969	100	100	80	100	45	100	1241,6738	73,039633	1	1	45,00		
40-14-1-Z2-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	3,14	3,52	1	1	109,2438	5754,10229	6440,6401	5754,1023	6440,6401	5952,4103	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,20142443	0,364856257	1	1	714,63288	1384,0179	38997,415	38479,198	38479,198	38997,415	38741,484	0,3	6,1	3,10	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	217,135626	78,22470334	100	94,26863	70	40	45	100	1330,7047	70,03709	1	1	40,00		
41-15-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	13,83	14,40	1	1	565,44	4891,7657	5093,3786	4891,7657	5093,3786	4959,6137	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	3,42009792	16,95342917	1	1	43546,419	16301,6352	30202,8	50633,188	30202,8	50633,188	36488,095	0,3	12	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	110,409452	29,29518642	70	100	70	100	45	100	1062,1807	66,386297	1	1	29,30		
42-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,169	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	23,39952982	100	100	100	60	45	100	1088,5997	68,037482	1	1	23,40		
43-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,169	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	23,63277068	100	100	100	60	45	100	1089,5311	68,095693	1	1	23,63		
44-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,169	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	24,54205344	100	100	100	60	45	100	1093,1682	68,323013	1	1	24,54		
45-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,169	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	23,74833504	100	100	100	60	45	100	1089,9933	68,124584	1	1	23,75		
46-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,169	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	23,86333975	100	100	100	60	45	100	1090,4534	68,153335	1	1	23,86		
47-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,169	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	23,39992982	100	100	100	60	45	100	1088,5997	68,037482	1	1	23,40		
48-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	277				

Table D.4. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.* (2008) for retrofitted condition of buildings.

01-01-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	4,32	4,32	1	1	93,75	9205,33	9205,33	9205,33	9205,33	9237,04	1	1	1	0,40	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,82	0,90	1,00	1,00	1220,70	439,45	46385,73	58039,20	46385,73	58039,20	49706,24	0,30	5,80	2,90	2,90
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	300,58	198,55	100,00	100,00	70,00	30,00	45,00	25,00	1599,21	88,84	1,00	1,00	25,00		
02-01-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	3,32	3,53	1	1	92,496	7167,8775	7638,1681	7167,8775	7638,1681	7312,5759	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,88786563	3,227189645	1	1	1166,1433	435,89048	47571,742	74975,508	47571,742	74975,508	55841,292	0,3	6,05	3,00	3,05
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	309,246556	162,3238553	100	100	70	30	45	25	1454,2954	80,79419	1	1	25,00		
03-01-1-Z2-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,38	5,51	1	1	144,9612	7423,3657	7605,4834	7423,3657	7605,4834	7494,7213	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	6,4120471	2,219068658	1	1	1745,3377	1756,9732	65170,859	52639,422	52639,422	65170,859	56205,97	0,3	5,4	2,70	2,70
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	348,197762	210,560789	100	100	100	100	45	100	1922,2432	113,07313	1	1	45,00		
04-01-1-Z2-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,38	5,51	1,00	1,00	144,96	7423,37	7605,48	7423,37	7605,48	7494,72	1,00	1,00	1,00	0,40	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	6,41	2,22	1,00	1,00	1745,34	1756,97	65170,86	52639,42	52639,42	65170,86	56205,97	0,30	5,40	2,70	2,70
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	348,20	210,56	100,00	100,00	100,00	100,00	45,00	100,00	1922,24	113,07	1,00	1,00	45,00		
05-02-1-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	26,45	28,17	1	1	623,5225	8484,0563	9034,9586	8484,0563	9034,9586	8653,8249	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	43,8260768	50,32943369	1	1	25492,847	41174,438	55987,728	52296,048	52296,048	55987,728	53419,889	0,3	13,2	3,30	3,30
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	153,353247	77,70849997	100	100	50	100	20	25	1040,834	61,225529	1	1	20,00		
06-03-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	17,10	18,57	1	1	355,7805	9609,8578	10438,74	9609,8578	10438,74	9856,0163	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	22,3844161	33,41119953	1	1	8518,0523	13062,484	60946,825	60618,231	60618,231	60946,825	60909,037	0,3	15,25	2,95	2,95
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	156,92004	103,6544197	100	100	70	100	45	25	1289,6177	71,645427	1	1	25,00		
07-03-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	12,30	14,14	1	1	283,2607	8681,402	9982,3237	8681,402	9982,3237	9052,9985	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	14,703697	14,35393859	1	1	6248,5634	7154,8844	59615,511	57743,578	57743,578	59615,511	58414,464	0,3	14,1	2,87	2,62
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	158,495616	84,54135433	100	84,87014	80	100	45	25	1187,7758	65,987546	1	1	25,00		
08-03-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	22,92	19,23	1	1	396,6768	11556,31	9695,8531	9695,8531	11556,31	10224,623	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	50,1985307	21,39690613	1	1	22483,853	7647,4031	58992,126	61715,947	58992,126	61715,947	59885,56	0,3	11,96	2,99	2,99
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	187,264585	104,1309147	100	100	100	100	60	100	1556,5237	91,560215	1	1	60,00		
09-03-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	6,59	6,84	1	1	164,6152	8007,766	8310,2897	8007,766	8310,2897	8111,7768	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	12,6147173	13,60779009	1	1	1949,1318	2616,2307	72985,613	69863,817	69863,817	72985,613	70895,121	0,3	6,06	3,03	3,03
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	386,26277	239,8739452	100	100	70	100	45	25	1834,4958	101,91643	1	1	25,00		
10-03-1-Z3-3	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,44	5,95	1	1	101,439	10727,629	11727,245	10727,629	11727,245	11022,144	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	6,07616184	14,99060401	1	1	712,37567	1032,163	77128,351	85791,482	77128,351	85791,482	79640,932	0,3	9,31	2,82	2,82
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	298,951346	156,4369026	100	100	80	30	45	25	1450,7476	80,597089	1	1	25,00		
11-03-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	11,47	12,18	1	1	227,7228	10071,894	10697,216	10071,894	10697,216	10265,956	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	39,6632005	27,0342787	1	1	3246,6895	5752,0521	82874,209	68461,812	68461,812	82874,209	72557,831	0,3	11,6	2,90	2,90
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	226,775314	135,1924388	100	100	70	100	45	100	1560,7698	91,809986	1	1	45,00		
12-04-1-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	19,24	20,77	1	1	821,031	4686,7901	5059,4923	4686,7901	5059,4923	4798,5083	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	33,9117672	56,72237726	1	1	77150,668	40901,199	42621,835	53633,195	42621,835	53633,195	45761,667	0,3	13,7	2,90	2,90

Table D.4. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.* (2008) for retrofitted condition of buildings (Cont.)

13-04-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	15,17	14,08	1	1	178,848	16958,535	15745,214	15745,214	16958,535	16110,319	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	82,111578	14,54217664	1	1	1596,5537	4450,3106	110477,58	63661,639	63661,639	110477,58	78223,345	0,3	17,75	3,30	2,87
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	188,492972	117,1883731	100	77,77899	70	60	45	25	1237,0905	68,727249	1	1,1	27,50		
14-05-1-Z2-3	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,84	9,89	1	1	155,5425	10087,147	12714,081	10087,147	12714,081	10836,371	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	9,7389174	14,54312204	1	1	1611,4527	2522,4133	71992,726	71317,856	71317,856	71992,726	71732,214	0,3	8,5	2,85	2,85
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	295,045866	120,8579201	100	100	100	30	45	100	1538,4317	80,970088	1	1	30,00		
15-05-1-Z3-3	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,75	6,94	1	1	223,169	6942,2724	6216,3652	6216,3652	6942,2724	6426,3381	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	14,4423603	14,40228572	1	1	4554,9258	3781,74	63279,257	65641,417	63279,257	65641,417	64093,889	0,3	8,4	2,80	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	254,673919	152,5555901	100	100	70	30	45	25	1415,2224	78,623464	1	1	25,00		
16-06-2-Z3-7	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,72	9,40	1	1	121,568	12694,953	15463,773	12694,953	15463,773	13482,042	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	13,5097084	25,9848522	1	1	1363,1825	1112,6552	79478,267	94341,315	79478,267	94341,315	83703,363	0,3	23,5	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	165,887864	107,7863496	100	100	90	30	45	25	1276,1454	70,896967	1	1,1	27,50		
17-06-2-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	6,41	6,98	1	1	136,98	9362,6807	10190,539	9362,6807	10190,539	9607,8856	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	2,09210356	6,74402547	1	1	924,615	2644,2665	59149,959	60583,281	59149,959	60583,281	59714,009	0,3	10,86	2,82	2,83
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	200,414714	83,58980899	100	100	100	50	45	25	1219,3592	67,74218	1	1,1	27,50		
18-06-2-Z3-6	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	14,57	14,59	1	1	237,4614	12270,626	12284,944	12270,626	12284,944	12316,456	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	20,5263826	9,301774567	1	1	7671,9049	2878,1034	61166,247	63521,666	61166,247	63521,666	61972,154	0,3	17,27	2,92	2,87
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	151,134334	76,73986242	100	96,93894	100	60	45	25	1192,7763	66,265349	1	1,1	27,50		
19-06-2-Z3-6	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,79	9,93	1	1	101,794	15310,333	19507,044	15310,333	19507,044	16509,189	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	8,47986502	19,14958415	1	1	502,94719	1482,5312	88390,035	83803,295	83803,295	88390,035	85257,859	0,3	16,95	2,95	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	209,639423	145,7668488	100	91,03425	100	40	45	25	1431,1702	79,509453	1	1,1	27,50		
20-06-2-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	9,47	10,71	1	1	252,8036	7492,773	8472,9806	7492,773	8472,9806	7774,4108	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	12,4058328	25,39038836	1	1	5379,669	5272,4803	59375,061	68795,633	59375,061	68795,633	62061,127	0,3	11,15	3,05	2,70
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	197,528578	98,18923696	100	80,29991	100	30	33	25	1162,6567	64,592038	1	1,1	27,50		
21-06-2-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,69	5,70	1	1	107,2144	10604,919	10627,304	10604,919	10627,304	10647,024	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	11,1418233	19,83210773	1	1	1256,7279	730,14436	77727,196	97234,867	77727,196	97234,867	83285,527	0,3	11,27	2,81	2,82
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	263,349303	126,7743316	100	100	90	40	45	100	1582,0973	83,27	1	1,1	44,00		
22-06-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	13,88	14,86	1	1	295,8732	9381,0457	10044,168	9381,0457	10044,168	9582,8788	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	23,7520023	26,15647159	1	1	7908,8904	6728,9061	62596,05	65910,853	62596,05	65910,853	63653,714	0,3	14,25	2,90	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	170,689801	86,49343066	100	93,87891	100	60	45	25	1222,6105	67,922804	1	1,1	27,50		
23-06-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	4,73	4,58	1	1	62,1576	15217,769	14735,125	14735,125	15217,769	14907,589	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	4,00755422	1,87521686	1	1	332,33649	311,91512	82659,024	71917,239	71917,239	82659,024	74985,885	0,3	13,07	2,82	1,82
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	223,79539	131,176648	100	45,4653	100	30	45	25	1226,1025	68,116806	1	1,1	27,50		
24-06-2-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,26	6,78	1	1	97,4078	14903,324	13917,777	13917,777	14903,324	14217,672	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	4,6856425	5,381066193	1	1	267,4461	2337,6322	890717								

Table D.4. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.* (2008) for retrofitted condition of buildings (Cont.).

25-07-2-Z3-7	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	9,21	8,65	1	1	255,2576	7217,0231	6779,8177	6779,8177	7217,0231	6914,6921	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	15,3617893	13,76833758	1	1	5005,5079	5889,8479	62667,867	59536,799	59536,799	62667,867	60588,967	0,3	18,3	3,09	3,09
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	132,27038	53,47163183	100	100	50	60	20	25	903,88653	53,169796	0,9487735	1,1	20,87		
26-07-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	17,88	19,54	1	1	256,19	13958,39	15254,303	13958,39	15254,303	14340,339	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	27,0559628	46,72191394	1	1	4007,0251	7465,5901	73606,841	72497,21	72497,21	73606,841	73024,935	0,3	14,75	3,35	2,85
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	198,484137	118,3266117	100	74,75497	70	100	45	25	1272,5714	70,698409	1	1,1	27,50		
27-08-1-Z2-6	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	13,75	15,76	1	1	262,644	10472,731	12002,559	10472,731	12002,559	10910,119	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	44,3229585	32,5719701	1	1	3642,2157	9072,8094	82809,967	64870,978	64870,978	82809,967	69997,088	0,3	18	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	160,212292	111,3990902	100	100	70	60	45	100	1425,5964	83,858609	1	1	45,00		
28-08-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	18,27	16,83	1	1	260,0641	14052,689	12942,963	12942,963	14052,689	13272,74	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	36,9114798	22,43996814	1	1	8904,4409	3567,4055	66763,786	72571,141	66763,786	72571,141	68486,868	0,3	14,51	3,31	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	188,008469	105,5615485	100	73,99358	70	100	45	100	1364,2269	80,248644	1	1	45,00		
29-08-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	13,59	13,30	1	1	246,28	11036,219	10803,151	10803,151	11036,219	10898,893	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	9,75908894	13,74423218	1	1	1813,4417	14088,037	70341,42	49990,099	49990,099	70341,42	55932,812	0,3	11,6	2,90	2,90
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	182,988263	93,48401657	100	100	70	100	45	100	1393,9361	81,996239	1	1	45,00		
30-08-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,27	9,08	1	1	133,485	12384,912	13607,521	12384,912	13607,521	12743,197	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	26,3882038	24,72144452	1	1	2912,1132	757,11023	79216,551	100881,83	79216,551	100881,83	85405,102	0,3	14,9	2,98	2,98
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	221,336882	122,2947068	100	100	100	60	45	25	1384,1788	76,898824	1	1	25,00		
31-08-1-Z3-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	6,77	7,24	1	1	212,6572	6365,1736	6805,3186	6365,1736	6805,3186	6499,5556	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	6,73390212	6,807430999	1	1	3639,0768	3902,7133	56817,891	56150,46	56150,46	56817,891	56510,872	0,3	6	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	311,009019	154,1809023	100	100	100	100	45	25	1551,7236	86,206867	1	1	25,00		
32-08-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	22,26	22,89	1	1	378	11777,778	12111,111	11777,778	12111,111	11902,266	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	35,6755934	37,72559608	1	1	10206	13891,5	64525,759	61348,986	61348,986	64525,759	62366,95	0,3	14,35	3,15	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	172,195912	119,7315614	100	80,8957	100	100	45	100	1501,6134	88,330198	1	1	45,00		
33-08-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,26	6,52	1	1	117,2666	14080,736	11123,372	11123,372	14080,736	11967,354	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	14,4019844	3,214328058	1	1	2696,0774	487,08246	70237,33	73270,227	70237,33	73270,227	71246,986	0,3	12	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	221,668461	117,568441	100	100	70	100	45	100	1490,2738	87,663163	1	1	45,00		
34-10-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	7,79	9,00	1	1	133,0458	11704,992	13535,94	11704,992	13535,94	12227,26	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	6,29647648	10,52392782	1	1	428,94409	5072,727	85974,444	58132,268	58132,268	85974,444	66375,743	0,3	12,81	3,24	3,19
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	198,784415	93,18988351	100	97,23939	100	75	45	100	1419,4777	83,498688	1	1	45,00		
35-09-1-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	16,15	18,16	1	1	319,485	10112,212	11368,609	10112,212	11368,609	10474,231	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	32,5171731	65,28417905	1	1	12490,681	5792,3296	60832,453	81549,43	60832,453	81549,43	66809,819	0,3	14	2,80	2,80
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	182,532002	59,32311373	100	100	100	100	45	25	1172,2925	66,127359	1	1	25,00		
36-09-1-Z3-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	

Table D.4. Parameters and results of preliminary seismic assessment method proposed by Gülay *et al.* (2008) for retrofitted condition of buildings (Cont.).

37-12-2-Z4-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	14,68	18,65	1	1	492,1296	5965,29857	7577,4755	5965,2986	7577,4755	6425,6252	1	0,9961735	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	27,9106074	42,8678991	0,9998834	0,992464	31489,901	12935,5281	49039,902	63840,988	49039,902	63840,988	53284,105	0,3	11,39	3,19	2,79
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	165,950371	109,6194561	100	78,39084	100	50	45	10	1198,6504	66,591686	1	1,1	11,00		
38-13-2-Z3-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	12,29	12,38	1	1	230,461	10668,6164	10741,514	10668,616	10741,514	10723,568	1	1	1	0,3	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	13,8598225	15,38803322	1	1	3954,7588	4953,44423	64559,109	63020,982	63020,982	64559,109	63624,736	0,3	14,15	2,75	2,85
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	174,196749	105,3129556	100	100	100	50	45	25	1306,2518	72,569546	1	1,1	27,50		
39-14-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	15,87	16,30	1	1	408,4024	7770,27755	7980,3645	7770,2775	7980,3645	7849,9087	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	52,4638176	40,1265059	1	1	11824,938	16337,733	67677,172	60128,159	60128,159	67677,172	62302,028	0,3	11,36	2,84	2,84
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	195,395014	127,8258187	100	100	80	100	45	100	1551,3033	91,253134	1	1	45,00		
40-14-1-Z2-2	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	5,55	5,73	1	1	109,2438	10161,6751	10491,213	10161,675	10491,213	10279,767	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	4,19052713	3,774064492	1	1	714,63288	1384,0179	71559,472	61399,314	61399,314	71559,472	64293,145	0,3	6,1	3,10	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	362,296374	191,4535347	100	94,26863	70	40	45	100	1783,62	93,874739	1	1	40,00		
41-15-1-Z2-4	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	24,51	24,90	1	1	565,44	8669,35484	8807,3005	8669,3548	8807,3005	8733,7855	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	85,7974479	59,57345486	1	1	43546,419	16301,6352	57535,3	65101,998	57535,3	65101,998	59708,808	0,3	12	3,00	3,00
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	182,319108	90,91452428	100	100	70	100	45	100	1383,6581	81,391653	1	1	45,00		
42-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,19	6,52	1	1	125,73	13027,917	10371,431	10371,431	13027,917	11128,737	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	15,8020147	3,121737154	1	1	2852,4994	608,369751	70750,152	69674,801	69674,801	70750,152	70184,229	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	200,296744	132,3071467	100	100	100	60	45	100	1569,2286	92,307564	1	1	45,00		
43-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,19	6,52	1	1	125,73	13027,917	10371,431	10371,431	13027,917	11128,737	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	15,8020147	3,121737154	1	1	2852,4994	608,369751	70750,152	69674,801	69674,801	70750,152	70184,229	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	200,296744	132,3071467	100	100	100	60	45	100	1569,2286	92,307564	1	1	45,00		
44-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,19	6,52	1	1	125,73	13027,917	10371,431	10371,431	13027,917	11128,737	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	15,8020147	3,121737154	1	1	2852,4994	608,369751	70750,152	69674,801	69674,801	70750,152	70184,229	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	200,296744	132,3071467	100	100	100	60	45	100	1569,2286	92,307564	1	1	45,00		
45-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	2,03	1,17	1	1	125,73	3221,18826	1861,131	1861,131	3221,1883	2283,8061	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	0,58750313	0,0151875	1	1	2852,4994	608,369751	36625,783	24015,616	24015,616	36625,783	27783,159	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	74,0634054	23,74833504	100	100	100	60	45	100	1089,9933	68,124584	1	1	23,75		
46-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,19	6,52	1	1	125,73	13027,917	10371,431	10371,431	13027,917	11128,737	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	15,8020147	3,121737154	1	1	2852,4994	608,369751	70750,152	69674,801	69674,801	70750,152	70184,229	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	200,296744	132,3071467	100	100	100	60	45	100	1569,2286	92,307564	1	1	45,00		
47-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,19	6,52	1	1	125,73	13027,917	10371,431	10371,431	13027,917	11128,737	1	1	1	0,4	1,00
	$\Sigma I_{ef,x}$	$\Sigma I_{ef,y}$	$rr(x)$	$rr(y)$	I_x	I_y	C_{Ix}	C_{Iy}	C_{Imin}	C_{Imax}	C_{IR}	n	H	h_i	h_{i+1}
	15,8020147	3,121737154	1	1	2852,4994	608,369751	70750,152	69674,801	69674,801	70750,152	70184,229	0,3	13,25	2,65	2,65
	P_0	P_1	P_2	P_3	P_4	P_5	P_6	P_7	$\Sigma w_i \times P_i$	P_w	β	α	P		
	200,296744	132,3071467	100	100	100	60	45	100	1569,2286	92,307564	1	1	45,00		
48-15-1-Z2-5	$\Sigma A_{ef,x}$	$\Sigma A_{ef,y}$	$ra(x)$	$ra(y)$	A_e	C_{Ax}	C_{Ay}	C_{Amin}	C_{Amax}	C_{AR}	r_a	r_r	t	A^0	I
	8,19	6,52	1	1	125,73	13027,917	10371,431	10371,431	13027,917	11128,737	1	1	1	0,4	1

Table D.5. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for original(exisiting) condition of buildings.

01-01-1-Z3-2	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	93,75	0,00	2,20	1,10	93,75	2,46
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	93,75	0,00	2,20	1,10	93,75	2,46
02-01-1-Z3-2	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0	86,04	0	1,37	0,685	86,04	1,67
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0	86,04	0	1,37	0,685	86,04	1,67
03-01-1-Z2-2	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,56	0	144,96	0,386313	2,275	1,1375	144,96	1,65
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,04	0	144,96	0,717439	2,275	1,1375	144,96	1,65
04-01-1-Z2-2	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,56	0,00	144,96	0,39	2,28	1,14	144,96	1,65
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,04	0,00	144,96	0,72	2,28	1,14	144,96	1,65
05-02-1-Z3-4	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	516,54	0,00	10,18	5,09	516,54	2,07
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,49	0,00	516,54	0,09	10,18	5,09	516,54	2,07
06-03-1-Z3-5	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,33	0	349,73	0,094359	7,546	3,773	349,73	2,27
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,33	0	349,73	0,094359	7,546	3,773	349,73	2,27
07-03-1-Z3-5	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,88	0,00	223,17	0,84	3,76	1,88	223,17	1,77
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,55	0,00	223,17	2,49	3,76	1,88	223,17	1,77
08-03-1-Z2-4	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,22	0,00	345,68	0,64	8,20	4,10	345,68	2,49
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,11	0,00	345,68	0,32	8,20	4,10	345,68	2,49
09-03-1-Z3-2	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	145,09	0,00	2,84	1,42	145,09	2,05
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	145,09	0,00	2,84	1,42	145,09	2,05
10-03-1-Z3-3	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	101,44	0,00	2,83	1,41	101,44	2,92
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	101,44	0,00	2,83	1,41	101,44	2,92
11-03-1-Z2-4	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	227,68	0,00	2,86	1,43	227,68	1,32
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,80	0,00	227,68	1,23	2,86	1,43	227,68	1,32
12-04-1-Z3-4	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	401,30	0,00	9,88	4,94	401,30	2,59
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	401,30	0,00	9,88	4,94	401,30	2,59
13-04-2-Z3-5	<i>x - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,91	0,00	178,85	1,07	3,64	1,82	178,85	2,14
	<i>y - direction</i>							
	<i>A_{cv}</i>	<i>A_{mv}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,60	0,00	178,85	0,34	3,64	1,82	178,85	2,14

Table D.5. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for original(exisiting) condition of buildings. (Cont.).

14-05-1-Z2-3	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	118,78	0,00	2,51	1,26	118,78	2,22
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,75	0,00	118,78	0,63	2,51	1,26	118,78	2,22
15-05-1-Z3-3	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	182,36	0,00	2,87	1,44	182,36	1,65
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	182,36	0,00	2,87	1,44	182,36	1,65
16-06-2-Z3-7	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0	115,62	0	2,435	1,2175	115,62	2,21
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0	115,62	0	2,435	1,2175	115,62	2,21
17-06-2-Z3-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	132,47	0,00	1,97	0,98	132,47	1,56
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	132,47	0,00	1,97	0,98	132,47	1,56
18-06-2-Z3-6	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,11	0	226,53	0,487794	5,73	2,865	226,53	2,66
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,13	0	226,53	0,496623	5,73	2,865	226,53	2,66
19-06-2-Z3-6	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	98,44	0,00	3,09	1,55	98,44	3,30
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	98,44	0,00	3,09	1,55	98,44	3,30
20-06-2-Z3-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	187,29	0,00	5,16	2,58	187,29	2,89
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	187,29	0,00	5,16	2,58	187,29	2,89
21-06-2-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	104,46	0,00	2,47	1,23	104,46	2,48
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	104,46	0,00	2,47	1,23	104,46	2,48
22-06-2-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,19	0,00	266,53	0,44	8,10	4,05	266,53	3,19
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,92	0,00	266,53	0,72	8,10	4,05	266,53	3,19
23-06-2-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	59,41	0,00	1,76	0,88	59,41	3,10
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	59,41	0,00	1,76	0,88	59,41	3,10
24-06-2-Z3-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	96,12	0,00	2,34	1,17	96,12	2,56
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	96,12	0,00	2,34	1,17	96,12	2,56

Table D.5. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for original(exisiting) condition of buildings. (Cont.).

25-07-2-Z3-7	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,32	0	178,32	0,181696	2,4025	1,20125	178,32	1,41
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,68	0	178,32	0,380215	2,4025	1,20125	178,32	1,41
26-07-2-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,25	0,00	266,00	0,85	5,57	2,78	266,00	2,20
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,50	0,00	266,00	1,69	5,57	2,78	266,00	2,20
27-08-1-Z2-6	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,69	0,00	262,64	0,26	5,89	2,95	262,64	2,35
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,62	0,00	262,64	1,38	5,89	2,95	262,64	2,35
28-08-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,70	0,00	213,56	0,79	6,92	3,46	213,56	3,40
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	213,56	0,00	6,92	3,46	213,56	3,40
29-08-1-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,85	0,00	245,83	0,35	3,97	1,98	245,83	1,69
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,44	0,00	245,83	0,18	3,97	1,98	245,83	1,69
30-08-1-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	125,30	0,00	2,29	1,15	125,30	1,92
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,83	0,00	125,30	0,66	2,29	1,15	125,30	1,92
31-08-1-Z3-2	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	163,16	0,00	3,28	1,64	163,16	2,11
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	163,16	0,00	3,28	1,64	163,16	2,11
32-08-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,76	0,00	378,00	0,73	7,46	3,73	378,00	2,07
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,68	0,00	378,00	1,24	7,46	3,73	378,00	2,07
33-08-1-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	74,04	0,00	1,85	0,92	74,04	2,62
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	74,04	0,00	1,85	0,92	74,04	2,62
34-10-1-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	118,13	0,00	3,47	1,74	118,13	3,09
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	118,13	0,00	3,47	1,74	118,13	3,09
35-09-1-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	272,54	0,00	8,69	4,34	272,54	3,35
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	272,54	0,00	8,69	4,34	272,54	3,35

Table D.5. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for original(exisiting) condition of buildings (Cont.).

36-09-1-Z3-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,33	0,00	121,36	1,10	2,75	1,38	121,36	2,38
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
37-12-2-Z4-4	0,00	0,00	121,36	0,00	2,75	1,38	121,36	2,38
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	414,35	0,00	7,32	3,66	414,35	1,85
	<i>y - direction</i>							
38-13-2-Z3-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	232,26	0,00	5,22	2,61	232,26	2,36
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	232,26	0,00	5,22	2,61	232,26	2,36
39-14-1-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,65	0,00	408,40	0,16	7,59	3,80	408,40	1,95
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
40-14-1-Z2-2	1,58	0,00	408,40	0,39	7,59	3,80	408,40	1,95
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	107,99	0,00	3,14	1,57	107,99	3,06
	<i>y - direction</i>							
41-15-1-Z2-4	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,38	0,00	107,99	0,35	3,14	1,57	107,99	3,06
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,00	0,00	565,94	1,06	7,83	3,92	565,94	1,45
42-15-1-Z2-5	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,57	0,00	565,94	1,16	7,83	3,92	565,94	1,45
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
43-15-1-Z2-5	0,86	0,00	125,73	0,68	1,17	0,59	125,73	0,98
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	125,73	0,00	1,17	0,59	125,73	0,98
	<i>x - direction</i>							
44-15-1-Z2-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,86	0,00	125,73	0,68	1,17	0,59	125,73	0,98
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	125,73	0,00	1,17	0,59	125,73	0,98
45-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,86	0,00	125,50	0,68	1,17	0,59	125,50	0,98
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
46-15-1-Z2-5	0,00	0,00	125,50	0,00	1,17	0,59	125,50	0,98
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,86	0,00	125,73	0,68	1,17	0,59	125,73	0,98
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	125,73	0,00	1,17	0,59	125,73	0,98

Table D.5. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for original(exisiting) condition of buildings (Cont.).

47-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,86	0	125,73	0,680029	1,17	0,585	125,73	0,98
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0	125,73	0	1,17	0,585	125,73	0,98
48-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,86	0,00	125,73	0,68	1,17	0,59	125,73	0,98
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,00	0,00	125,73	0,00	1,17	0,59	125,73	0,98

Table D.6. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for retrofitted condition of buildings.

01-01-1-Z3-2	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,80	0,00	93,75	3,52	3,52	1,76	93,75	3,94
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
02-01-1-Z3-2	0,80	0,00	93,75	0,85	3,52	1,76	93,75	3,94
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,00	0	86,04	2,32	2,32	1,16	86,04	2,83
	<i>y - direction</i>							
03-01-1-Z2-2	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,21	0	86,04	1,409228	2,32	1,16	86,04	2,83
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,08	0	144,96	3,3025	3,3025	1,65125	144,96	2,39
04-01-1-Z2-2	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,21	0	144,96	1,524558	3,3025	1,65125	144,96	2,39
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
05-02-1-Z3-4	0,80	0	93,75	3,515	3,515	1,7575	93,75	3,94
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	0,80	0	93,75	0,853333	3,515	1,7575	93,75	3,94
	<i>x - direction</i>							
06-03-1-Z3-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,01	0,00	516,54	21,44	21,44	10,72	516,54	4,36
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,73	0,00	516,54	1,30	21,44	10,72	516,54	4,36
07-03-1-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,36	0	349,73	13,7335	13,7335	6,86675	349,73	4,12
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
08-03-1-Z2-4	4,84	0	349,73	1,382781	13,7335	6,86675	349,73	4,12
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,52	0,00	223,17	7,77	7,77	3,89	223,17	3,66
	<i>y - direction</i>							
09-03-1-Z3-2	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,37	0,00	223,17	2,85	7,77	3,89	223,17	3,66
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,95	0,00	345,68	15,98	15,98	7,99	345,68	4,85
10-03-1-Z3-3	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,26	0,00	345,68	0,94	15,98	7,99	345,68	4,85
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
11-03-1-Z2-4	1,63	0,00	145,09	4,97	4,97	2,48	145,09	3,59
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,88	0,00	145,09	1,29	4,97	2,48	145,09	3,59
	<i>x - direction</i>							
12-03-1-Z3-3	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,48	0,00	101,44	3,97	3,97	1,98	101,44	4,10
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,98	0,00	101,44	1,95	3,97	1,98	101,44	4,10
13-03-1-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,34	0,00	227,68	6,13	6,13	3,06	227,68	2,82
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
14-03-1-Z2-4	6,06	0,00	227,68	2,66	6,13	3,06	227,68	2,82

Table D.6. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for retrofitted condition of buildings (Cont.).

12-04-1-Z3-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,28	0	401,3	13,96	13,96	6,98	401,3	3,65
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
13-04-2-Z3-5	6,81	0	401,3	1,696985	13,96	6,98	401,3	3,65
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,12	0,00	178,85	10,05	10,05	5,02	178,85	5,90
	<i>y - direction</i>							
14-05-1-Z2-3	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,22	0,00	118,78	5,62	5,62	2,81	118,78	4,97
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,27	0,00	118,78	3,59	5,62	2,81	118,78	4,97
15-05-1-Z3-3	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,76	0,00	182,36	4,99	4,99	2,49	182,36	2,87
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
16-06-2-Z3-7	1,95	0,00	182,36	1,07	4,99	2,49	182,36	2,87
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,26	0,00	115,62	5,46	5,46	2,73	115,62	4,96
	<i>y - direction</i>							
17-06-2-Z3-4	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,37	0,00	132,47	4,04	4,04	2,02	132,47	3,20
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,94	0,00	132,47	2,22	4,04	2,02	132,47	3,20
18-06-2-Z3-6	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,11	0	226,53	10,455	10,455	5,2275	226,53	4,85
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
19-06-2-Z3-6	4,13	0	226,53	1,8236	10,455	5,2275	226,53	4,85
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,44	0,00	98,44	6,35	6,35	3,18	98,44	6,78
	<i>y - direction</i>							
20-06-2-Z3-4	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,58	0,00	98,44	3,63	6,35	3,18	98,44	6,78
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,35	0,00	187,29	7,12	7,12	3,56	187,29	3,99
21-06-2-Z2-4	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,59	0,00	187,29	1,92	7,12	3,56	187,29	3,99
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
22-06-2-Z3-5	2,06	0,00	104,46	3,63	3,63	1,82	104,46	3,65
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,07	0,00	104,46	1,98	3,63	1,82	104,46	3,65
	<i>x - direction</i>							
22-06-2-Z3-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,42	0,00	266,53	10,46	10,46	5,23	266,53	4,12
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,40	0,00	266,53	1,65	10,46	5,23	266,53	4,12

Table D.6. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for retrofitted condition of buildings (Cont.).

23-06-2-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,39	0,00	59,41	3,34	3,34	1,67	59,41	5,90
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
24-06-2-Z3-4	1,24	0,00	59,41	2,09	3,34	1,67	59,41	5,90
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,80	0,00	96,12	4,46	4,46	2,23	96,12	4,87
	<i>y - direction</i>							
25-07-2-Z3-7	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,72	0	178,32	6,49	6,49	3,245	178,32	3,82
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,16	0	178,32	1,212988	6,49	3,245	178,32	3,82
26-07-2-Z3-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,32	0,00	266,00	11,56	11,56	5,78	266,00	4,56
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
27-08-1-Z2-6	7,98	0,00	266,00	3,00	11,56	5,78	266,00	4,56
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,84	0,00	262,64	9,91	9,91	4,96	262,64	3,96
	<i>y - direction</i>							
28-08-1-Z2-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,85	0,00	262,64	2,23	9,91	4,96	262,64	3,96
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,64	0,00	213,56	13,64	13,64	6,82	213,56	6,70
29-08-1-Z2-4	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,20	0,00	213,56	1,50	13,64	6,82	213,56	6,70
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
30-08-1-Z3-5	4,18	0,00	245,83	9,41	9,41	4,71	245,83	4,02
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,89	0,00	245,83	1,58	9,41	4,71	245,83	4,02
	<i>x - direction</i>							
31-08-1-Z3-2	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,14	0,00	125,30	5,13	5,13	2,56	125,30	4,29
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,96	0,00	125,30	3,16	5,13	2,56	125,30	4,29
32-08-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,58	0,00	163,16	5,19	5,19	2,60	163,16	3,34
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
33-08-1-Z2-4	2,05	0,00	163,16	1,25	5,19	2,60	163,16	3,34
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	6,75	0,00	378,00	15,51	15,51	7,76	378,00	4,31
	<i>y - direction</i>							
33-08-1-Z2-4	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	7,38	0,00	378,00	1,95	15,51	7,76	378,00	4,31
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,83	0,00	74,04	5,43	5,43	2,72	74,04	7,70
33-08-1-Z2-4	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,09	0,00	74,04	1,47	5,43	2,72	74,04	7,70
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>

Table D.6. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for retrofitted condition of buildings (Cont.).

34-10-1-Z2-4	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,82	0,00	118,13	5,96	5,96	2,98	118,13	5,30
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
35-09-1-Z3-5	3,04	0,00	118,13	2,58	5,96	2,98	118,13	5,30
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,37	0,00	272,54	12,79	12,79	6,39	272,54	4,93
	<i>y - direction</i>							
36-09-1-Z3-4	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,37	0,00	272,54	1,97	12,79	6,39	272,54	4,93
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,81	0,00	121,36	6,23	6,23	3,11	121,36	5,39
37-12-2-Z4-4	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,07	0,00	121,36	1,71	6,23	3,11	121,36	5,39
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
38-13-2-Z3-5	4,94	0,00	414,35	9,74	9,74	4,87	414,35	2,47
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	8,91	0,00	414,35	2,15	9,74	4,87	414,35	2,47
	<i>x - direction</i>							
39-14-1-Z2-4	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,30	0,00	232,26	9,99	9,99	5,00	232,26	4,52
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	2,39	0,00	232,26	1,03	9,99	5,00	232,26	4,52
40-14-1-Z2-2	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	5,92	0,00	408,40	9,95	9,95	4,97	408,40	2,56
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
41-15-1-Z2-4	6,35	0,00	408,40	1,55	9,95	4,97	408,40	2,56
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,10	0,00	107,99	4,46	4,46	2,23	107,99	4,33
	<i>y - direction</i>							
42-15-1-Z2-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	1,28	0,00	107,99	1,18	4,46	2,23	107,99	4,33
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	9,60	0,00	565,94	14,91	14,91	7,46	565,94	2,77
43-15-1-Z2-5	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	9,99	0,00	565,94	1,77	14,91	7,46	565,94	2,77
	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
44-15-1-Z2-5	4,77	0,00	125,73	3,42	3,42	1,71	125,73	2,86
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,10	0,00	125,73	2,47	3,42	1,71	125,73	2,86
	<i>x - direction</i>							
45-15-1-Z2-5	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,77	0,00	125,73	3,42	3,42	1,71	125,73	2,86
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>W_I</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,10	0,00	125,73	2,47	3,42	1,71	125,73	2,86

Table D.6. Parameters and results of preliminary seismic assessment method proposed by Hassan and Sözen (1997) for retrofitted condition of buildings (Cont.).

45-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,77	0,00	125,50	3,42	3,42	1,71	125,50	2,86
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,10	0,00	125,50	2,47	3,42	1,71	125,50	2,86
46-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,77	0,00	125,73	3,42	3,42	1,71	125,73	2,86
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,10	0,00	125,73	2,47	3,42	1,71	125,73	2,86
47-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,77	0	125,73	3,42	3,42	1,71	125,73	2,86
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,10	0	125,73	2,465601	3,42	1,71	125,73	2,86
48-15-1-Z2-5	<i>x - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	4,77	0,00	125,73	3,42	3,42	1,71	125,73	2,86
	<i>y - direction</i>							
	<i>A_{cw}</i>	<i>A_{mw}</i>	<i>A_{ft}</i>	<i>WI</i>	<i>A_{col}</i>	<i>A_{ce}</i>	<i>A_{ft}</i>	<i>CI</i>
	3,10	0,00	125,73	2,47	3,42	1,71	125,73	2,86

Table D.7. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for original (existing) condition of buildings.

01-01-1-Z3-2	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	93,7500	0,4400	97,1140	0,7230	0,1350	0,0520	0,0550	0,0350	0,8781
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	56,28	57,31	56,28	57,31	22,06	22,04	2,55	2,60	1,62	1,65
02-01-1-Z3-2	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	86,04	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	40,68	42,45	40,68	42,45	26,01	13,19	1,56	3,22	1,08	2,23
03-01-1-Z2-2	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	144,96	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	56,28	57,31	56,28	57,31	22,06	22,04	2,55	2,60	1,62	1,65
04-01-1-Z2-2	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	144,96	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	95,17	139,97	95,17	139,97	35,47	34,93	2,68	4,01	1,86	2,78
05-02-1-Z3-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	516,54	0,44	132,98	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	235,92	352,50	235,92	352,50	300,40	306,99	0,79	1,15	0,54	0,80
06-03-1-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	349,73	0,44	123,80	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	179,51	192,54	179,51	192,54	183,94	182,16	0,98	1,06	0,68	0,73
07-03-1-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	223,17	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	162,85	303,93	162,85	303,93	182,49	185,39	0,89	1,64	0,62	1,14
08-03-1-Z2-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	345,68	0,44	118,94	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	309,36	259,51	309,36	259,51	213,91	215,33	1,45	1,21	1,00	0,84
09-03-1-Z3-2	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	145,09	0,44	137,34	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	105,38	102,09	105,38	102,09	59,66	59,70	1,77	1,71	1,23	1,19
10-03-1-Z3-3	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	101,44	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	72,38	78,90	72,38	78,90	61,59	59,83	1,18	1,32	0,82	0,91
11-03-1-Z2-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	227,68	0,44	103,01	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	61,80	180,25	61,80	180,25	136,15	186,13	0,45	0,97	0,31	0,67

Table D.7. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for original (existing) condition of buildings (Cont.).

12-04-1-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	401,30	0,44	132,98	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	246,13	299,11	246,13	299,11	205,49	191,76	1,20	1,56	0,83	1,08
13-04-2-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	178,85	0,44	118,94	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	173,95	93,94	173,95	93,94	161,15	156,35	1,08	0,60	0,75	0,42
14-05-1-Z2-3	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	118,78	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	59,36	103,21	59,36	103,21	58,41	55,66	1,02	1,85	0,70	1,29
15-05-1-Z3-3	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	182,36	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	78,61	75,05	78,61	75,05	100,81	102,74	0,78	0,73	0,54	0,51
16-06-2-Z3-7	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	115,62	0,44	132,98	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	37,64	54,71	37,64	54,71	67,90	76,89	0,55	0,71	0,38	0,49
17-06-2-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	132,47	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	42,06	50,80	42,06	50,80	44,93	44,72	0,94	1,14	0,65	0,79
18-06-2-Z3-6	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	226,53	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	151,297641	141,6671	151,29764	141,6671	141,37059	141,96912	1,0702201	0,9978727	0,74	0,69
19-06-2-Z3-6	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	98,44	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	52,08	61,65	52,08	61,65	63,91	64,12	0,81	0,96	0,57	0,67
20-06-2-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	187,29	0,44	103,01	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	113,19	107,25	113,19	107,25	86,10	85,42	1,31	1,26	0,91	0,87
21-06-2-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	104,46	0,44	123,80	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	45,34	81,43	45,34	81,43	38,69	44,94	1,17	1,81	0,81	1,26
22-06-2-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	266,53	0,44	123,80	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	256,92	261,98	256,92	261,98	145,02	151,19	1,77	1,73	1,23	1,20

Table D.7. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for original (existing) condition of buildings (Cont.).

23-06-2-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	59,41	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	31,81	37,97	31,81	37,97	32,82	33,32	0,97	1,14	0,67	0,79
24-06-2-Z3-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	96,12	0,44	118,94	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	43,44	72,06	43,44	72,06	43,93	42,28	0,99	1,70	0,69	1,18
25-07-2-Z3-7	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	178,32	0,44	128,47	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	58,47	66,28	58,47	66,28	97,27	95,17	0,60	0,70	0,42	0,48
26-07-2-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	266,00	0,44	118,94	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	231,52	304,92	231,52	304,92	233,52	227,64	0,99	1,34	0,69	0,93
27-08-1-Z2-6	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	262,64	0,44	123,80	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	150,97	257,14	150,97	257,14	221,78	302,96	0,68	0,85	0,47	0,59
28-08-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	213,56	0,44	137,34	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	237,70	195,74	237,70	195,74	230,23	232,50	1,03	0,84	0,72	0,58
29-08-1-Z2-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	245,83	0,44	128,47	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	180,56	99,61	180,56	99,61	183,49	167,59	0,98	0,59	0,68	0,41
30-08-1-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,30	0,44	90,84	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	40,20	63,43	40,20	63,43	81,12	76,63	0,50	0,83	0,34	0,57
31-08-1-Z3-2	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	163,16	0,44	123,80	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	101,26	115,11	101,26	115,11	52,93	52,86	1,91	2,18	1,33	1,51
32-08-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	378,00	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	263,04	329,25	263,04	329,25	307,68	303,24	0,85	1,09	0,59	0,75
33-08-1-Z2-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	74,04	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	37,85	45,28	37,85	45,28	61,98	63,46	0,61	0,71	0,42	0,49

Table D.7. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for original (existing) condition of buildings (Cont.).

34-10-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	118,13	0,44	97,11	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	61,46	78,49	61,46	78,49	56,03	71,33	1,10	1,10	0,76	0,76
35-09-1-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	272,54	0,44	123,80	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	201,00	192,76	201,00	192,76	240,48	247,26	0,84	0,78	0,58	0,54
36-09-1-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	121,36	0,44	103,01	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	112,32	62,20	112,32	62,20	121,11	125,59	0,93	0,50	0,64	0,34
37-12-2-Z4-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	414,35	0,44	97,11	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	117,61	270,09	117,61	270,09	145,55	139,53	0,81	1,94	0,56	1,34
38-13-2-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	232,26	0,44	118,94	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	102,73	124,44	102,73	124,44	154,92	155,45	0,66	0,80	0,46	0,56
39-14-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	408,40	0,44	137,34	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	266,57	292,90	266,57	292,90	236,64	235,02	1,13	1,25	0,78	0,86
40-14-1-Z2-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	107,99	0,44	118,94	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	74,61	122,15	74,61	122,15	35,28	35,51	2,12	3,44	1,47	2,39
41-15-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	565,94	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	425,28	493,92	425,28	493,92	369,67	382,99	1,15	1,29	0,80	0,89
42-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	57,26	23,26	57,26	23,26	76,43	57,21	0,75	0,41	0,52	0,28
43-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	109,66	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	57,83	23,49	57,83	23,49	76,43	57,21	0,76	0,41	0,52	0,28
44-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	113,88	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	60,06	24,40	60,06	24,40	76,99	57,63	0,78	0,42	0,54	0,29
45-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,50	0,44	110,19	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	58,11	23,61	58,11	23,61	76,43	57,21	0,76	0,41	0,53	0,29
46-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	110,73	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	58,39	23,72	58,39	23,72	76,43	57,21	0,76	0,41	0,53	0,29

Table D.7. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for original (existing) condition of buildings (Cont.).

47-15-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	57,26	23,26	57,26	23,26	76,43	57,21	0,75	0,41	0,52	0,28
48-15-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	108,58	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	57,26	23,26	57,26	23,26	76,43	57,21	0,75	0,41	0,52	0,28

Table D.8. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for retrofitted condition of buildings.

01-01-1-Z3-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	93,75	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	193,79	216,17	193,79	216,17	19,71	18,35	9,83	11,78	9,83	11,78
02-01-1-Z3-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	86,04	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	191,85	235,36	191,85	235,36	19,00	15,95	10,10	14,75	10,10	14,75
03-01-1-Z2-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	144,96	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	304,33	323,97	304,33	323,97	34,33	38,62	8,87	8,39	8,87	8,39
04-01-1-Z2-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	144,96	0,44	113,88	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	307,81	329,30	307,81	329,30	34,33	38,62	8,97	8,53	8,97	8,53
05-02-1-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	516,54	0,44	132,98	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	1101,06	1391,09	1101,06	1391,09	409,83	410,53	2,69	3,39	2,69	3,39
06-03-1-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	349,73	0,44	123,80	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	668,13	750,91	668,13	750,91	234,79	236,16	2,85	3,18	2,85	3,18
07-03-1-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	223,17	0,44	113,88	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	487,02	520,75	487,02	520,75	212,13	212,83	2,30	2,45	2,30	2,45
08-03-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	345,68	0,44	118,94	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	1042,16	792,54	1042,16	792,54	218,43	219,82	4,77	3,61	4,77	3,61
09-03-1-Z3-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	145,09	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	375,31	432,53	375,31	432,53	68,33	68,32	5,49	6,33	5,49	6,33
10-03-1-Z3-3	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	101,44	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	274,52	316,96	274,52	316,96	73,84	71,86	3,72	4,41	3,72	4,41
11-03-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	227,68	0,44	103,01	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	649,24	600,25	649,24	600,25	228,75	228,33	2,84	2,63	2,84	2,63
12-04-1-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	401,30	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	852,96	1025,50	852,96	1025,50	217,73	218,71	3,92	4,69	3,92	4,69
13-04-2-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	178,85	0,44	118,94	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	697,44	561,40	697,44	561,40	195,91	205,04	3,56	2,74	3,56	2,74
14-05-1-Z2-3	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	118,78	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	400,33	580,36	400,33	580,36	76,41	76,06	5,24	7,63	5,24	7,63

Table D.8. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for retrofitted condition of buildings (Cont.).

	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
15-05-1-Z3-3	0,65	182,36	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,79	363,60	443,79	363,60	119,39	120,49	3,72	3,02	3,72	3,02
16-06-2-Z3-7	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	115,62	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	240,81	376,84	240,81	376,84	121,13	120,31	1,99	3,13	1,99	3,13
17-06-2-Z3-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	132,47	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	314,44	402,30	314,44	402,30	57,75	55,68	5,45	7,22	5,45	7,22
18-06-2-Z3-6	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	226,53	0,44	113,88	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	533,720114	497,9828608	533,72011	497,9829	173,52353	172,68382	3,0757795	2,8837841	3,0757795	2,8837841
19-06-2-Z3-6	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	98,44	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	267,13	410,19	267,13	410,19	93,90	93,19	2,84	4,40	2,84	4,40
20-06-2-Z3-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	187,29	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	405,21	470,59	405,21	470,59	101,04	101,45	4,01	4,64	4,01	4,64
21-06-2-Z2-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	104,46	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	245,05	321,41	245,05	321,41	54,86	55,60	4,47	5,78	4,47	5,78
22-06-2-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	266,53	0,44	123,80	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	519,37	536,49	519,37	536,49	160,27	161,71	3,24	3,32	3,24	3,32
23-06-2-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	59,41	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	202,91	192,65	202,91	192,65	43,33	44,63	4,68	4,32	4,68	4,32
24-06-2-Z3-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	96,12	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	300,02	319,20	300,02	319,20	59,76	59,42	5,02	5,37	5,02	5,37
25-07-2-Z3-7	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	178,32	0,44	128,47	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	321,56	271,49	321,56	271,49	153,59	151,88	2,09	1,79	2,09	1,79
26-07-2-Z3-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	266,00	0,44	118,94	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	711,86	800,62	711,86	800,62	262,07	258,07	2,72	3,10	2,72	3,10
27-08-1-Z2-6	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	262,64	0,44	123,80	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	450,98	565,23	450,98	565,23	306,75	335,33	1,47	1,69	1,47	1,69
28-08-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	213,56	0,44	137,34	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	710,26	696,24	710,26	696,24	283,75	287,42	2,50	2,42	2,50	2,42
29-08-1-Z2-4	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	245,83	0,44	128,47	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	682,55	624,15	682,55	624,15	235,27	235,64	2,90	2,65	2,90	2,65

Table D.8. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for retrofitted condition of buildings (Cont.).

30-08-1-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,30	0,44	90,84	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	405,36	407,11	405,36	407,11	111,55	111,66	3,63	3,65	3,63	3,65
31-08-1-Z3-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	163,16	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	366,93	456,92	366,93	456,92	56,21	44,36	6,53	10,30	6,53	10,30
32-08-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	378,00	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	906,73	838,64	906,73	838,64	367,16	369,19	2,47	2,27	2,47	2,27
33-08-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	74,04	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	420,34	309,21	420,34	309,21	103,87	107,29	4,05	2,88	4,05	2,88
34-10-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	118,13	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	296,93	480,89	296,93	480,89	85,62	85,61	3,47	5,62	3,47	5,62
35-09-1-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	272,54	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	629,75	740,83	629,75	740,83	278,12	271,66	2,26	2,73	2,26	2,73
36-09-1-Z3-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	121,36	0,44	103,01	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	399,24	407,47	399,24	407,47	138,42	138,62	2,88	2,94	2,88	2,94
37-12-2-Z4-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	414,35	0,44	97,11	0,723	0,135	0,052	0,055	0,035	0,9593733
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	611,50	962,45	611,50	962,45	148,25	135,45	4,12	7,11	2,86	4,93
38-13-2-Z3-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	232,26	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	475,85	496,13	475,85	496,13	175,78	174,53	2,71	2,84	2,71	2,84
39-14-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	408,40	0,44	137,34	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	808,67	762,67	808,67	762,67	259,59	259,66	3,12	2,94	3,12	2,94
40-14-1-Z2-2	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	107,99	0,44	188,06	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	233,13	277,10	233,13	277,10	40,68	41,04	5,73	6,75	5,73	6,75
41-15-1-Z2-4	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	565,94	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	971,18	1135,68	971,18	1135,68	401,86	416,66	2,42	2,73	2,42	2,73
42-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,11	309,59	443,11	309,59	109,99	114,08	4,03	2,71	4,03	2,71
43-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	109,66	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,45	309,59	443,45	309,59	109,99	114,08	4,03	2,71	4,03	2,71
44-15-1-Z2-5	α	Atf	$Qr\ Ratios$	$fctk$	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	113,88	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V\ code(x)$	$V\ code(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	444,77	309,59	444,77	309,59	110,02	114,09	4,04	2,71	4,04	2,71

Table D.8. Parameters and results of preliminary seismic assessment method proposed by Yakut (2004) for retrofitted condition of buildings (Cont.).

45-15-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,50	0,44	110,19	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V_{code}(x)$	$V_{code}(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,61	309,59	443,61	309,59	109,99	114,08	4,03	2,71	4,03	2,71
46-15-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	110,73	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V_{code}(x)$	$V_{code}(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,78	309,59	443,78	309,59	109,99	114,08	4,03	2,71	4,03	2,71
47-15-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V_{code}(x)$	$V_{code}(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,11	309,59	443,11	309,59	109,99	114,08	4,03	2,71	4,03	2,71
48-15-1-Z2-5	α	Atf	$Qr\ Ratios$	f_{ctk}	CA	CAS	$CASC$	CAP	CAF	CM
	0,65	125,73	0,44	108,58	1	-	-	-	-	1
	$V_y(x)$	$V_y(y)$	$V_{yw}(x)$	$V_{yw}(y)$	$V_{code}(x)$	$V_{code}(y)$	$BCPI(x)$	$BCPI(y)$	$CPI(x)$	$CPI(y)$
	443,11	309,59	443,11	309,59	109,99	114,08	4,03	2,71	4,03	2,71

APPENDIX E

DETAILS OF TOTAL RETROFITTING COST CALCULATIONS FOR BUILDINGS

Details of total retrofitting cost calculations of buildings are summarized in Table E.1.

Table E-1. Details of total retrofitting cost calculations for buildings.

Building ID	Total Retrofitting Cost (Civil + Electrical + Mechanical Works) (TL)	RC Retrofitting Cost (TL)	Civil and Architectural Works Retrofitting Cost (TL)	Foundation Retrofitting Cost (TL)
01-01-1-Z3-2	57111,62	32927,02	51919,66	0,00
02-01-1-Z3-2	70234,68	41288,63	61932,69	0,00
03-01-1-Z2-2	85528,26	50812,85	76865,29	0,00
04-01-1-Z2-2	85238,22	50812,85	76594,21	0,00
05-02-1-Z3-4	1102466,00	757588,84	999370,62	0,00
06-03-1-Z3-5	669674,83	459001,02	601047,15	50370,99
07-03-1-Z3-5	405303,78	245691,51	367408,58	42772,67
08-03-1-Z2-4	571076,25	410296,34	512092,04	52304,54
09-03-1-Z3-2	170565,21	107098,66	152352,23	23510,23
10-03-1-Z3-3	157462,08	108407,97	140992,93	0,00
11-03-1-Z2-4	509101,36	323804,47	442739,10	48638,10
12-04-1-Z3-4	423436,84	250542,69	384020,13	0,00
13-04-2-Z3-5	616060,80	409179,75	549591,33	39921,43
14-05-1-Z2-3	226259,94	149321,29	199416,88	0,00
15-05-1-Z3-3	298769,66	197919,75	268403,66	0,00
16-06-2-Z3-7	472683,22	367008,80	427766,32	21836,40
17-06-2-Z3-4	280692,86	182814,47	249548,91	0,00
18-06-2-Z3-6	598256,85	419416,20	535672,10	51787,29
19-06-2-Z3-6	464915,29	297155,66	413306,66	17932,88
20-06-2-Z3-4	298530,71	212024,83	269115,70	32816,51
21-06-2-Z2-4	185781,25	138782,22	167601,50	0,00
22-06-2-Z3-5	361136,74	256212,48	323121,77	0,00
23-06-2-Z3-5	195040,60	134492,13	175379,32	10619,75
24-06-2-Z3-4	288705,27	196803,46	258299,84	0,00
25-07-2-Z3-7	353875,61	233824,06	321453,62	52248,52
26-07-2-Z3-5	579578,07	326565,95	504985,50	56396,28
27-08-1-Z2-6	432365,59	245507,44	392222,67	0,00
28-08-1-Z2-5	609329,98	434693,30	539261,54	36901,41
29-08-1-Z2-4	590020,14	372631,55	528749,47	0,00
30-08-1-Z3-5	380515,12	282365,58	338999,15	21850,50
31-08-1-Z3-2	131632,30	83485,65	118470,94	0,00
32-08-1-Z2-5	621787,91	409000,96	547321,30	35776,80
33-08-1-Z2-4	254977,69	168162,65	221998,46	9602,83
34-10-1-Z2-4	334869,65	207188,75	301095,96	20750,44
35-09-1-Z3-5	777075,13	551151,13	691929,30	34450,93
36-09-1-Z3-4	293376,31	209341,28	266705,73	20933,37
37-12-2-Z4-4	357614,80	232321,43	325104,37	0,00
38-13-2-Z3-5	486422,08	329928,67	442201,90	44274,60
39-14-1-Z2-4	402711,28	254896,02	366101,16	0,00
40-14-1-Z2-2	96588,12	67245,33	87807,38	0,00
41-15-1-Z2-4	733167,74	465140,23	666516,13	72952,72
42-15-1-Z2-5	298497,85	170520,41	252833,58	19142,96
43-15-1-Z2-5	298601,58	170614,71	252927,88	19142,96
44-15-1-Z2-5	298668,84	170675,85	252989,03	19374,73
45-15-1-Z2-5	298711,07	170714,24	253027,41	19413,11
46-15-1-Z2-5	300382,75	172233,94	254547,12	20856,50
47-15-1-Z2-5	300508,57	172348,33	254661,51	20970,89
48-15-1-Z2-5	298867,65	170856,58	253169,76	19479,14

APPENDIX F

SUMMARY OF RESULTS FOR THE MINIMUM, RECOMMENDED AND CONSERVATIVE ESTIMATES FOR THE INCREASES IN CAIR% USING THE METHODS DEVELOPED IN THIS STUDY (SECTION 6.6)

Results of minimum, recommended and conservative estimates for the increases in CAIR % using the methods described in Section 6.6 for buildings are summarized in Tables F.1-1 to F.1-7, for all of the preliminary seismic assessment methods. Also in this appendix the corresponding cost estimates are presented in Tables F2.1 to F.2.7.

Table F.1-1. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Özcebe *et al.* (2003), DI-LS score.

Building ID	The Preliminary Assessment Method Proposed by Özcebe et al. (DI-LS Score)									
	A	B	C	D	E	F	G	H	I	J
	DI-LS Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-Z3-2	-1,83	2,34	5,46	5,08	7,83	10,57	3,11	2,74	5,48	8,23
02-01-1-Z3-2	-2,91	1,59	5,26	4,46	7,33	10,20	3,67	2,87	5,74	8,61
03-01-1-Z2-2	-3,12	2,67	5,24	4,43	6,19	7,95	2,56	1,76	3,52	5,28
04-01-1-Z2-2	-3,12	2,67	5,24	4,43	6,19	7,95	2,56	1,76	3,52	5,28
05-02-1-Z3-4	-0,56	2,06	6,42	5,73	9,39	13,06	4,36	3,66	7,33	10,99
06-03-1-Z3-5	-0,11	2,35	6,27	5,99	9,63	13,27	3,92	3,64	7,28	10,92
07-03-1-Z3-5	0,11	5,02	8,36	6,30	7,59	8,87	3,35	1,29	2,57	3,86
08-03-1-Z2-4	-1,45	3,33	7,57	5,35	7,38	9,40	4,24	2,02	4,04	6,06
09-03-1-Z3-2	-2,04	1,95	5,83	4,95	7,94	10,93	3,88	2,99	5,99	8,98
10-03-1-Z3-3	-0,64	2,78	7,32	5,74	8,70	11,66	4,53	2,96	5,92	8,87
11-03-1-Z2-4	1,01	2,49	7,70	6,58	10,68	14,78	5,21	4,10	8,19	12,29
12-04-1-Z3-4	-1,74	2,46	6,49	5,14	7,82	10,50	4,03	2,68	5,36	8,04
13-04-2-Z3-5	0,35	3,44	10,74	6,31	9,18	12,05	7,30	2,87	5,74	8,62
14-05-1-Z2-3	-2,52	2,75	10,20	4,75	6,76	8,76	7,45	2,01	4,01	6,02
15-05-1-Z3-3	-1,87	1,57	5,32	5,01	8,44	11,87	3,74	3,43	6,86	10,30
16-06-2-Z3-7	0,52	2,11	10,08	6,30	10,49	14,68	7,98	4,19	8,38	12,57
17-06-2-Z3-4	-1,64	1,48	7,06	5,12	8,75	12,39	5,57	3,64	7,27	10,91
18-06-2-Z3-6	-0,49	3,51	7,95	5,87	8,23	10,59	4,44	2,36	4,72	7,08
19-06-2-Z3-6	-0,16	3,14	11,55	6,02	8,90	11,78	8,41	2,88	5,76	8,64
20-06-2-Z3-4	-1,55	2,75	6,97	5,26	7,77	10,27	4,22	2,51	5,01	7,52
21-06-2-Z2-4	-0,76	2,36	7,42	5,64	8,93	12,21	5,06	3,28	6,56	9,85
22-06-2-Z3-5	-0,34	4,20	6,86	6,00	7,80	9,60	2,66	1,80	3,60	5,39
23-06-2-Z3-5	0,66	2,95	10,05	6,43	9,91	13,39	7,10	3,48	6,96	10,44
24-06-2-Z3-4	-0,98	2,43	9,96	5,53	8,63	11,73	7,53	3,10	6,20	9,30
25-07-2-Z3-7	0,93	1,91	6,38	6,50	11,09	15,67	4,47	4,59	9,18	13,76
26-07-2-Z3-5	0,77	4,63	10,09	6,62	8,60	10,59	5,46	1,99	3,97	5,96
27-08-1-Z2-6	-0,09	3,88	7,46	6,11	8,34	10,57	3,58	2,23	4,46	6,68
28-08-1-Z2-5	0,06	4,04	10,05	6,20	8,37	10,53	6,02	2,16	4,33	6,49
29-08-1-Z2-4	-0,76	2,14	7,11	5,63	9,12	12,61	4,97	3,49	6,98	10,47
30-08-1-Z3-5	0,45	2,49	9,75	6,29	10,09	13,89	7,27	3,80	7,60	11,40
31-08-1-Z3-2	-2,74	2,01	5,40	4,58	7,16	9,73	3,39	2,57	5,14	7,72
32-08-1-Z2-5	-0,84	3,94	7,84	5,72	7,50	9,28	3,90	1,78	3,56	5,34
33-08-1-Z2-4	-0,20	2,49	12,63	5,95	9,41	12,86	10,13	3,46	6,92	10,37
34-10-1-Z2-4	-1,11	2,94	9,17	5,50	8,07	10,63	6,23	2,56	5,13	7,69
35-09-1-Z3-5	0,30	3,19	7,90	6,27	9,34	12,42	4,71	3,08	6,16	9,24
36-09-1-Z3-4	1,07	3,36	9,15	6,68	10,00	13,32	5,78	3,32	6,63	9,95
37-12-2-Z4-4	-0,44	2,32	5,69	5,81	9,30	12,79	3,37	3,49	6,98	10,47
38-13-2-Z3-5	-0,45	2,25	6,32	5,80	9,36	12,92	4,07	3,56	7,12	10,67
39-14-1-Z2-4	-1,03	2,40	5,44	5,51	8,61	11,72	3,04	3,10	6,21	9,31
40-14-1-Z2-2	-2,33	3,26	6,32	4,89	6,53	8,16	3,06	1,63	3,27	4,90
41-15-1-Z2-4	-1,35	3,60	6,10	5,43	7,25	9,08	2,49	1,82	3,65	5,47
42-15-1-Z2-5	-0,81	1,61	8,98	5,57	9,52	13,48	7,37	3,96	7,91	11,87
43-15-1-Z2-5	-0,78	1,61	8,96	5,58	9,55	13,52	7,35	3,97	7,94	11,91
44-15-1-Z2-5	-0,81	1,61	8,98	5,57	9,52	13,48	7,37	3,96	7,91	11,87
45-15-1-Z2-5	-0,81	1,61	9,00	5,57	9,52	13,47	7,38	3,95	7,90	11,86
46-15-1-Z2-5	-0,81	1,61	8,98	5,57	9,52	13,48	7,37	3,96	7,91	11,87
47-15-1-Z2-5	-0,81	1,61	8,98	5,57	9,52	13,48	7,37	3,96	7,91	11,87
48-15-1-Z2-5	-0,81	1,61	8,98	5,57	9,52	13,48	7,37	3,96	7,91	11,87

Table F.1-2. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Özcebe *et al.* (2003), DI-IO score.

Building ID	The Preliminary Assessment Method Proposed by Özcebe et al. (2003) (DI-IO Score)									
	A	B	C	D	E	F	G	H	I	J
	DI-IO Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-Z3-2	-1,64	2,34	5,46	4,11	5,88	7,64	3,11	1,77	3,53	5,30
02-01-1-Z3-2	-2,77	1,59	5,26	3,61	5,62	7,64	3,67	2,02	4,03	6,05
03-01-1-Z2-2	-3,42	2,67	5,24	3,39	4,10	4,82	2,56	0,72	1,43	2,15
04-01-1-Z2-2	-3,42	2,67	5,24	3,39	4,10	4,82	2,56	0,72	1,43	2,15
05-02-1-Z3-4	-0,23	2,06	6,42	4,68	7,30	9,91	4,36	2,62	5,23	7,85
06-03-1-Z3-5	0,43	2,35	6,27	4,96	7,58	10,20	3,92	2,62	5,24	7,85
07-03-1-Z3-5	0,55	5,02	8,36	5,09	5,16	5,24	3,35	0,07	0,15	0,22
08-03-1-Z2-4	-1,20	3,33	7,57	4,34	5,34	6,34	4,24	1,00	2,00	3,01
09-03-1-Z3-2	-1,56	1,95	5,83	4,13	6,30	8,47	3,88	2,17	4,34	6,52
10-03-1-Z3-3	-0,26	2,78	7,32	4,70	6,61	8,53	4,53	1,91	3,83	5,74
11-03-1-Z2-4	1,60	2,49	7,70	5,45	8,42	11,39	5,21	2,97	5,93	8,90
12-04-1-Z3-4	-1,53	2,46	6,49	4,16	5,86	7,56	4,03	1,70	3,40	5,09
13-04-2-Z3-5	0,70	3,44	10,74	5,12	6,81	8,49	7,30	1,68	3,37	5,05
14-05-1-Z2-3	-2,41	2,75	10,20	3,81	4,87	5,93	7,45	1,06	2,13	3,19
15-05-1-Z3-3	-1,64	1,57	5,32	4,08	6,58	9,08	3,74	2,50	5,00	7,50
16-06-2-Z3-7	2,76	2,11	10,08	5,30	8,49	11,68	7,98	3,19	6,38	9,57
17-06-2-Z3-4	-1,42	1,48	7,06	4,16	6,84	9,51	5,57	2,68	5,35	8,03
18-06-2-Z3-6	0,06	3,39	7,95	4,73	6,08	7,42	4,57	1,35	2,69	4,04
19-06-2-Z3-6	0,35	3,14	11,55	4,97	6,79	8,62	8,41	1,83	3,65	5,48
20-06-2-Z3-4	-1,64	2,75	6,97	4,13	5,50	6,88	4,22	1,38	2,75	4,13
21-06-2-Z2-4	-0,48	2,36	7,42	4,59	6,82	9,04	5,06	2,23	4,45	6,68
22-06-2-Z3-5	-0,07	4,20	6,86	4,84	5,47	6,11	2,66	0,64	1,27	1,91
23-06-2-Z3-5	0,96	2,95	10,05	4,64	6,33	8,02	7,10	1,69	3,38	5,07
24-06-2-Z3-4	-0,77	2,43	9,96	4,47	6,51	8,55	7,53	2,04	4,08	6,12
25-07-2-Z3-7	2,65	1,91	6,38	5,43	8,96	12,48	4,47	3,52	7,05	10,57
26-07-2-Z3-5	1,96	4,81	10,09	5,51	6,20	6,90	5,29	0,70	1,40	2,10
27-08-1-Z2-6	0,65	3,88	7,46	5,12	6,36	7,60	3,58	1,24	2,48	3,72
28-08-1-Z2-5	0,31	4,04	10,05	4,99	5,95	6,90	6,02	0,96	1,91	2,87
29-08-1-Z2-4	-0,32	2,14	7,11	4,64	7,15	9,66	4,97	2,51	5,01	7,52
30-08-1-Z3-5	0,83	2,49	9,75	5,13	7,78	10,43	7,27	2,65	5,30	7,94
31-08-1-Z3-2	-2,51	2,01	5,40	3,74	5,46	7,19	3,39	1,73	3,45	5,18
32-08-1-Z2-5	-0,76	3,94	7,84	4,54	5,15	5,75	3,90	0,60	1,21	1,81
33-08-1-Z2-4	0,62	2,49	12,63	5,05	7,60	10,16	10,13	2,56	5,11	7,67
34-10-1-Z2-4	-0,87	2,94	9,17	4,45	5,97	7,48	6,23	1,51	3,03	4,54
35-09-1-Z3-5	0,80	3,19	7,90	5,15	7,12	9,08	4,71	1,97	3,93	5,90
36-09-1-Z3-4	1,84	3,36	9,15	5,59	7,82	10,04	5,78	2,23	4,45	6,68
37-12-2-Z4-4	-0,67	2,32	5,69	4,51	6,70	8,89	3,37	2,19	4,38	6,57
38-13-2-Z3-5	0,03	2,25	6,32	4,80	7,35	9,90	4,07	2,55	5,10	7,65
39-14-1-Z2-4	-0,76	2,40	5,44	4,48	6,55	8,62	3,04	2,07	4,14	6,22
40-14-1-Z2-2	-1,93	3,26	6,32	4,03	4,80	5,58	3,06	0,77	1,55	2,32
41-15-1-Z2-4	-0,79	3,60	6,10	4,52	5,43	6,34	2,49	0,91	1,82	2,73
42-15-1-Z2-5	-0,09	1,61	8,98	4,55	7,49	10,43	7,37	2,94	5,88	8,82
43-15-1-Z2-5	-0,09	1,61	8,96	4,56	7,50	10,45	7,35	2,95	5,90	8,85
44-15-1-Z2-5	-0,09	1,61	8,98	4,55	7,49	10,43	7,37	2,94	5,88	8,82
45-15-1-Z2-5	-0,09	1,61	9,00	4,55	7,49	10,43	7,38	2,94	5,88	8,81
46-15-1-Z2-5	-0,10	1,61	8,98	4,55	7,49	10,43	7,37	2,94	5,88	8,82
47-15-1-Z2-5	-0,09	1,61	8,98	4,55	7,49	10,43	7,37	2,94	5,88	8,82
48-15-1-Z2-5	-0,09	1,61	8,98	4,55	7,49	10,43	7,37	2,94	5,88	8,82

Table F.1-3. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Gülay *et al.* (2008), P0 score.

Building ID	The Preliminary Assessment Method Proposed by Gülay et al. (2008) (P0 Score)									
	A	B	C	D	E	F	G	H	I	J
	P0 Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-Z3-2	154,62	2,34	5,46	3,11	3,88	4,64	3,11	0,77	1,54	2,30
02-01-1-Z3-2	121,16	1,59	5,26	2,70	3,80	4,91	3,67	1,11	2,21	3,32
03-01-1-Z2-2	288,24	2,67	5,24	2,77	2,87	2,97	2,56	0,10	0,20	0,30
04-01-1-Z2-2	288,24	2,67	5,24	2,77	2,87	2,97	2,56	0,10	0,20	0,30
05-02-1-Z3-4	57,86	2,06	6,42	3,33	4,59	5,85	4,36	1,26	2,52	3,78
06-03-1-Z3-5	60,84	2,35	6,27	3,52	4,70	5,87	3,92	1,18	2,35	3,53
07-03-1-Z3-5	117,52	5,02	8,36	5,26	5,50	5,74	3,35	0,24	0,49	0,73
08-03-1-Z2-4	115,68	3,33	7,57	4,02	4,70	5,38	4,24	0,68	1,37	2,05
09-03-1-Z3-2	129,22	1,95	5,83	2,93	3,91	4,89	3,88	0,98	1,96	2,93
10-03-1-Z3-3	119,13	2,78	7,32	3,59	4,40	5,21	4,53	0,81	1,62	2,43
11-03-1-Z2-4	103,65	2,49	7,70	3,44	4,39	5,35	5,21	0,95	1,91	2,86
12-04-1-Z3-4	52,76	2,46	6,49	3,64	4,83	6,01	4,03	1,18	2,36	3,54
13-04-2-Z3-5	82,47	3,44	10,74	4,24	5,04	5,84	7,30	0,80	1,60	2,40
14-05-1-Z2-3	118,48	2,75	10,20	3,57	4,39	5,21	7,45	0,82	1,64	2,47
15-05-1-Z3-3	108,05	1,57	5,32	2,74	3,91	5,08	3,74	1,17	2,34	3,50
16-06-2-Z3-7	47,34	2,11	10,08	3,40	4,70	6,00	7,98	1,30	2,59	3,89
17-06-2-Z3-4	70,08	1,48	7,06	2,84	4,20	5,56	5,57	1,36	2,71	4,07
18-06-2-Z3-6	85,48	3,39	7,95	4,15	4,92	5,69	4,57	0,77	1,54	2,31
19-06-2-Z3-6	73,84	3,14	11,55	4,05	4,97	5,89	8,41	0,92	1,83	2,75
20-06-2-Z3-4	96,69	2,75	6,97	3,67	4,58	5,50	4,22	0,91	1,83	2,74
21-06-2-Z2-4	84,46	2,36	7,42	3,43	4,50	5,57	5,06	1,07	2,14	3,21
22-06-2-Z3-5	112,62	4,20	6,86	4,68	5,15	5,62	2,66	0,47	0,95	1,42
23-06-2-Z3-5	87,54	2,95	10,05	3,86	4,76	5,66	7,10	0,90	1,81	2,71
24-06-2-Z3-4	85,05	2,43	9,96	3,48	4,53	5,58	7,53	1,05	2,10	3,14
25-07-2-Z3-7	59,96	1,91	6,38	3,18	4,44	5,71	4,47	1,27	2,54	3,80
26-07-2-Z3-5	122,70	4,81	10,09	5,13	5,45	5,76	5,29	0,32	0,64	0,96
27-08-1-Z2-6	117,49	3,88	7,46	4,42	4,95	5,48	3,58	0,53	1,07	1,60
28-08-1-Z2-5	85,67	4,04	10,05	4,67	5,30	5,94	6,02	0,63	1,27	1,90
29-08-1-Z2-4	95,79	2,14	7,11	3,21	4,29	5,37	4,97	1,08	2,15	3,23
30-08-1-Z3-5	81,58	2,49	9,75	3,54	4,59	5,63	7,27	1,05	2,10	3,15
31-08-1-Z3-2	123,04	2,01	5,40	3,00	3,99	4,98	3,39	0,99	1,98	2,97
32-08-1-Z2-5	122,87	3,94	7,84	4,44	4,93	5,43	3,90	0,50	0,99	1,49
33-08-1-Z2-4	67,73	2,49	12,63	3,60	4,71	5,82	10,13	1,11	2,22	3,33
34-10-1-Z2-4	74,47	2,94	9,17	3,90	4,87	5,83	6,23	0,96	1,93	2,89
35-09-1-Z3-5	79,42	3,19	7,90	4,07	4,94	5,82	4,71	0,88	1,76	2,64
36-09-1-Z3-4	98,88	3,36	9,15	4,11	4,86	5,61	5,78	0,75	1,50	2,25
37-12-2-Z4-4	70,61	2,32	5,69	3,46	4,60	5,74	3,37	1,14	2,28	3,42
38-13-2-Z3-5	68,30	2,25	6,32	3,41	4,58	5,75	4,07	1,17	2,34	3,51
39-14-1-Z2-4	103,34	2,40	5,44	3,38	4,35	5,33	3,04	0,98	1,95	2,93
40-14-1-Z2-2	217,14	3,26	6,32	3,52	3,78	4,04	3,06	0,26	0,52	0,78
41-15-1-Z2-4	110,41	3,60	6,10	4,24	4,88	5,51	2,49	0,64	1,27	1,91
42-15-1-Z2-5	74,06	1,61	8,98	2,92	4,23	5,53	7,37	1,31	2,61	3,92
43-15-1-Z2-5	74,06	1,61	8,96	2,91	4,22	5,53	7,35	1,31	2,61	3,92
44-15-1-Z2-5	74,06	1,61	8,98	2,92	4,23	5,53	7,37	1,31	2,61	3,92
45-15-1-Z2-5	74,06	1,61	9,00	2,92	4,23	5,53	7,38	1,31	2,61	3,92
46-15-1-Z2-5	74,06	1,61	8,98	2,92	4,23	5,53	7,37	1,31	2,61	3,92
47-15-1-Z2-5	74,06	1,61	8,98	2,92	4,23	5,53	7,37	1,31	2,61	3,92
48-15-1-Z2-5	74,06	1,61	8,98	2,92	4,23	5,53	7,37	1,31	2,61	3,92

Table F.1-4. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Gülay *et al.* (2008), P1 score.

Building ID	The Preliminary Assessment Method Proposed by Gülay et al. (2008) (P1 Score)									
	A	B	C	D	E	F	G	H	I	J
	P1 Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-Z3-2	54,01	2,34	5,46	2,58	2,82	3,05	3,11	0,24	0,48	0,71
02-01-1-Z3-2	37,46	1,59	5,26	1,92	2,24	2,56	3,67	0,32	0,65	0,97
03-01-1-Z2-2	103,05	2,67	5,24	2,77	2,87	2,97	2,56	0,10	0,20	0,30
04-01-1-Z2-2	108,08	2,67	5,24	2,76	2,85	2,94	2,56	0,09	0,18	0,26
05-02-1-Z3-4	20,11	2,06	6,42	2,40	2,74	3,07	4,36	0,34	0,67	1,01
06-03-1-Z3-5	24,45	2,35	6,27	2,65	2,96	3,27	3,92	0,31	0,62	0,92
07-03-1-Z3-5	36,82	5,02	8,36	5,13	5,24	5,36	3,35	0,11	0,23	0,34
08-03-1-Z2-4	39,58	3,33	7,57	3,55	3,76	3,97	4,24	0,21	0,42	0,63
09-03-1-Z3-2	45,91	1,95	5,83	2,23	2,52	2,80	3,88	0,28	0,56	0,84
10-03-1-Z3-3	38,55	2,78	7,32	3,03	3,28	3,53	4,53	0,25	0,49	0,74
11-03-1-Z2-4	32,83	2,49	7,70	2,77	3,05	3,33	5,21	0,28	0,56	0,84
12-04-1-Z3-4	14,99	2,46	6,49	2,79	3,11	3,43	4,03	0,32	0,65	0,97
13-04-2-Z3-5	31,46	3,44	10,74	3,66	3,89	4,11	7,30	0,22	0,45	0,67
14-05-1-Z2-3	25,25	2,75	10,20	3,03	3,31	3,59	7,45	0,28	0,56	0,85
15-05-1-Z3-3	34,02	1,57	5,32	1,91	2,24	2,57	3,74	0,33	0,67	1,00
16-06-2-Z3-7	17,09	2,11	10,08	2,45	2,79	3,13	7,98	0,34	0,68	1,02
17-06-2-Z3-4	21,26	1,48	7,06	1,85	2,22	2,59	5,57	0,37	0,74	1,11
18-06-2-Z3-6	24,29	3,39	7,95	3,62	3,86	4,10	4,57	0,24	0,47	0,71
19-06-2-Z3-6	30,24	3,14	11,55	3,38	3,63	3,88	8,41	0,25	0,49	0,74
20-06-2-Z3-4	25,54	2,75	6,97	3,03	3,31	3,60	4,22	0,28	0,56	0,84
21-06-2-Z2-4	25,89	2,36	7,42	2,67	2,97	3,27	5,06	0,30	0,61	0,91
22-06-2-Z3-5	38,36	4,20	6,86	4,36	4,53	4,69	2,66	0,16	0,32	0,48
23-06-2-Z3-5	28,82	2,95	10,05	3,21	3,47	3,74	7,10	0,26	0,52	0,78
24-06-2-Z3-4	29,19	2,43	9,96	2,73	3,02	3,31	7,53	0,29	0,58	0,87
25-07-2-Z3-7	15,26	1,91	6,38	2,26	2,62	2,97	4,47	0,35	0,71	1,06
26-07-2-Z3-5	40,39	4,81	10,09	4,94	5,07	5,20	5,29	0,13	0,26	0,39
27-08-1-Z2-6	55,07	3,88	7,46	4,02	4,16	4,31	3,58	0,14	0,28	0,42
28-08-1-Z2-5	32,38	4,04	10,05	4,22	4,41	4,59	6,02	0,19	0,37	0,56
29-08-1-Z2-4	34,14	2,14	7,11	2,44	2,73	3,03	4,97	0,30	0,60	0,89
30-08-1-Z3-5	19,06	2,49	9,75	2,80	3,11	3,42	7,27	0,31	0,63	0,94
31-08-1-Z3-2	41,00	2,01	5,40	2,30	2,59	2,88	3,39	0,29	0,58	0,87
32-08-1-Z2-5	50,51	3,94	7,84	4,09	4,24	4,38	3,90	0,15	0,30	0,44
33-08-1-Z2-4	20,18	2,49	12,63	2,80	3,11	3,42	10,13	0,31	0,62	0,93
34-10-1-Z2-4	17,54	2,94	9,17	3,23	3,52	3,80	6,23	0,29	0,58	0,87
35-09-1-Z3-5	15,66	3,19	7,90	3,46	3,74	4,02	4,71	0,28	0,56	0,83
36-09-1-Z3-4	24,81	3,36	9,15	3,61	3,85	4,10	5,78	0,24	0,49	0,73
37-12-2-Z4-4	20,91	2,32	5,69	2,64	2,96	3,28	3,37	0,32	0,64	0,95
38-13-2-Z3-5	26,74	2,25	6,32	2,55	2,86	3,17	4,07	0,31	0,62	0,93
39-14-1-Z2-4	50,42	2,40	5,44	2,65	2,89	3,13	3,04	0,24	0,48	0,73
40-14-1-Z2-2	78,22	3,26	6,32	3,38	3,50	3,63	3,06	0,12	0,25	0,37
41-15-1-Z2-4	29,30	3,60	6,10	3,82	4,04	4,26	2,49	0,22	0,44	0,66
42-15-1-Z2-5	23,40	1,61	8,98	1,97	2,32	2,68	7,37	0,36	0,71	1,07
43-15-1-Z2-5	23,63	1,61	8,96	1,96	2,32	2,67	7,35	0,36	0,71	1,07
44-15-1-Z2-5	24,54	1,61	8,98	1,96	2,32	2,67	7,37	0,35	0,71	1,06
45-15-1-Z2-5	23,75	1,61	9,00	1,97	2,32	2,68	7,38	0,35	0,71	1,06
46-15-1-Z2-5	23,86	1,61	8,98	1,97	2,32	2,67	7,37	0,35	0,71	1,06
47-15-1-Z2-5	23,40	1,61	8,98	1,97	2,32	2,68	7,37	0,36	0,71	1,07
48-15-1-Z2-5	23,40	1,61	8,98	1,97	2,32	2,68	7,37	0,36	0,71	1,07

Table F.1-5. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Gülay *et al.* (2008), Pw score.

Building ID	The Preliminary Assessment Method Proposed by Gülay et al. (2008) (Pw Score)									
	A	B	C	D	E	F	G	H	I	J
	Pw Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-Z3-2	47,95	2,34	5,46	2,44	2,53	2,63	3,11	0,10	0,19	0,29
02-01-1-Z3-2	49,20	1,59	5,26	1,70	1,82	1,93	3,67	0,11	0,22	0,33
03-01-1-Z2-2	87,78	2,67	5,24	2,70	2,73	2,76	2,56	0,03	0,06	0,09
04-01-1-Z2-2	88,96	2,67	5,24	2,70	2,73	2,76	2,56	0,03	0,06	0,08
05-02-1-Z3-4	47,67	2,06	6,42	2,17	2,27	2,37	4,36	0,10	0,21	0,31
06-03-1-Z3-5	57,68	2,35	6,27	2,43	2,51	2,59	3,92	0,08	0,16	0,25
07-03-1-Z3-5	55,38	5,02	8,36	5,04	5,07	5,09	3,35	0,03	0,05	0,08
08-03-1-Z2-4	77,39	3,33	7,57	3,36	3,40	3,43	4,24	0,03	0,06	0,09
09-03-1-Z3-2	58,81	1,95	5,83	2,04	2,13	2,22	3,88	0,09	0,18	0,27
10-03-1-Z3-3	50,48	2,78	7,32	2,87	2,95	3,03	4,53	0,08	0,17	0,25
11-03-1-Z2-4	69,15	2,49	7,70	2,55	2,61	2,67	5,21	0,06	0,12	0,19
12-04-1-Z3-4	59,06	2,46	6,49	2,54	2,62	2,69	4,03	0,08	0,15	0,23
13-04-2-Z3-5	48,29	3,44	10,74	3,51	3,58	3,65	7,30	0,07	0,14	0,21
14-05-1-Z2-3	57,68	2,75	10,20	2,82	2,89	2,96	7,45	0,07	0,15	0,22
15-05-1-Z3-3	48,48	1,57	5,32	1,69	1,80	1,91	3,74	0,11	0,23	0,34
16-06-2-Z3-7	45,12	2,11	10,08	2,21	2,32	2,42	7,98	0,11	0,21	0,32
17-06-2-Z3-4	55,00	1,48	7,06	1,59	1,69	1,80	5,57	0,11	0,21	0,32
18-06-2-Z3-6	53,62	3,39	7,95	3,45	3,51	3,57	4,57	0,06	0,12	0,19
19-06-2-Z3-6	53,28	3,14	11,55	3,21	3,28	3,35	8,41	0,07	0,14	0,21
20-06-2-Z3-4	44,85	2,75	6,97	2,85	2,94	3,03	4,22	0,09	0,18	0,28
21-06-2-Z2-4	65,54	2,36	7,42	2,43	2,50	2,57	5,06	0,07	0,14	0,21
22-06-2-Z3-5	55,84	4,20	6,86	4,25	4,29	4,33	2,66	0,04	0,09	0,13
23-06-2-Z3-5	41,93	2,95	10,05	3,05	3,14	3,23	7,10	0,09	0,18	0,28
24-06-2-Z3-4	48,72	2,43	9,96	2,53	2,62	2,71	7,53	0,09	0,19	0,28
25-07-2-Z3-7	44,13	1,91	6,38	2,02	2,13	2,24	4,47	0,11	0,22	0,33
26-07-2-Z3-5	53,38	4,81	10,09	4,84	4,88	4,92	5,29	0,04	0,07	0,11
27-08-1-Z2-6	65,01	3,88	7,46	3,92	3,96	3,99	3,58	0,04	0,07	0,11
28-08-1-Z2-5	64,16	4,04	10,05	4,07	4,10	4,14	6,02	0,03	0,07	0,10
29-08-1-Z2-4	69,47	2,14	7,11	2,21	2,28	2,35	4,97	0,07	0,14	0,21
30-08-1-Z3-5	52,27	2,49	9,75	2,57	2,66	2,75	7,27	0,09	0,17	0,26
31-08-1-Z3-2	61,06	2,01	5,40	2,09	2,18	2,26	3,39	0,08	0,17	0,25
32-08-1-Z2-5	69,92	3,94	7,84	3,97	4,00	4,02	3,90	0,03	0,06	0,08
33-08-1-Z2-4	65,98	2,49	12,63	2,56	2,62	2,69	10,13	0,07	0,13	0,20
34-10-1-Z2-4	65,43	2,94	9,17	3,00	3,05	3,11	6,23	0,06	0,11	0,17
35-09-1-Z3-5	56,98	3,19	7,90	3,25	3,32	3,38	4,71	0,06	0,13	0,19
36-09-1-Z3-4	55,52	3,36	9,15	3,43	3,49	3,55	5,78	0,06	0,12	0,19
37-12-2-Z4-4	45,46	2,32	5,69	2,42	2,52	2,62	3,37	0,10	0,20	0,30
38-13-2-Z3-5	52,89	2,25	6,32	2,34	2,43	2,52	4,07	0,09	0,18	0,27
39-14-1-Z2-4	73,04	2,40	5,44	2,46	2,52	2,58	3,04	0,06	0,12	0,17
40-14-1-Z2-2	67,93	3,26	6,32	3,30	3,35	3,40	3,06	0,05	0,09	0,14
41-15-1-Z2-4	66,39	3,60	6,10	3,65	3,69	3,73	2,49	0,04	0,08	0,12
42-15-1-Z2-5	66,47	1,61	8,98	1,70	1,78	1,87	7,37	0,09	0,17	0,26
43-15-1-Z2-5	66,53	1,61	8,96	1,69	1,78	1,86	7,35	0,09	0,17	0,26
44-15-1-Z2-5	66,76	1,61	8,98	1,70	1,78	1,87	7,37	0,09	0,17	0,26
45-15-1-Z2-5	66,56	1,61	9,00	1,70	1,78	1,87	7,38	0,09	0,17	0,26
46-15-1-Z2-5	66,59	1,61	8,98	1,70	1,78	1,87	7,37	0,09	0,17	0,26
47-15-1-Z2-5	66,47	1,61	8,98	1,70	1,78	1,87	7,37	0,09	0,17	0,26
48-15-1-Z2-5	66,47	1,61	8,98	1,70	1,78	1,87	7,37	0,09	0,17	0,26

Table F.1-6. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Yakut (2004), CPI(x) and CPI(y) scores.

Building ID	The Preliminary Assessment Method Proposed by Yakut (2004) (CPI(x) + CPI(y) Score)									
	A	B	C	D	E	F	G	H	I	J
	CPI(x) + CPI(y) Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-23-2	3,27	2,34	5,46	5,43	8,51	11,60	3,11	3,09	6,17	9,26
02-01-1-23-2	3,32	1,59	5,26	5,32	9,77	12,78	3,67	3,73	7,46	11,19
03-01-1-22-2	4,43	2,67	5,24	5,09	8,47	9,92	2,56	2,42	4,83	7,25
04-01-1-22-2	4,64	2,67	5,24	5,02	8,32	9,72	2,56	2,35	4,70	7,05
05-02-1-23-4	1,58	2,06	6,42	6,02	10,85	13,94	4,36	3,96	7,92	11,87
06-03-1-23-5	1,66	2,35	6,27	6,03	10,93	13,41	3,92	3,69	7,37	11,06
07-03-1-23-5	2,07	5,02	8,36	6,24	9,43	8,70	3,35	1,23	2,45	3,68
08-03-1-22-4	2,16	3,33	7,57	6,01	10,66	11,37	4,24	2,68	5,36	8,04
09-03-1-23-2	2,41	1,95	5,83	5,66	10,32	13,07	3,88	3,71	7,41	11,12
10-03-1-23-3	2,04	2,78	7,32	5,98	10,61	12,38	4,53	3,20	6,39	9,59
11-03-1-23-4	1,16	2,49	7,70	6,19	10,57	13,59	5,21	3,70	7,40	11,10
12-04-1-22-4	2,25	2,46	6,49	5,88	10,47	12,73	4,03	3,42	6,84	10,27
13-04-2-23-5	1,37	3,44	10,74	6,24	11,56	11,86	7,30	2,81	5,61	8,42
14-05-1-22-3	2,34	2,75	10,20	5,89	10,09	12,19	7,45	3,15	6,29	9,44
15-05-1-23-3	1,23	1,57	5,32	6,06	11,39	15,03	3,74	4,48	8,97	13,45
16-06-2-23-7	1,03	2,11	10,08	6,18	11,19	14,32	7,98	4,07	8,14	12,21
17-06-2-23-4	1,69	1,48	7,06	5,92	11,03	14,80	5,57	4,44	8,87	13,31
18-06-2-23-6	1,69	3,39	7,95	6,17	10,89	11,73	4,57	2,78	5,56	8,34
19-06-2-23-6	1,45	3,14	11,55	6,19	10,83	12,28	8,41	3,05	6,10	9,14
20-06-2-23-4	2,10	2,75	6,97	5,96	10,68	12,38	4,22	3,21	6,42	9,62
21-06-2-22-4	2,43	2,36	7,42	5,82	10,13	12,74	5,06	3,46	6,92	10,38
22-06-2-23-5	2,86	4,20	6,86	5,93	9,87	9,37	2,66	1,72	3,44	5,16
23-06-2-23-5	1,72	2,95	10,05	6,09	10,69	12,36	7,10	3,14	6,27	9,41
24-06-2-23-4	2,20	2,43	9,96	5,90	10,31	12,82	7,53	3,46	6,92	10,38
25-07-2-23-7	1,06	1,91	6,38	6,15	11,36	14,62	4,47	4,24	8,48	12,71
26-07-2-23-5	1,90	4,81	10,09	6,24	9,99	9,11	5,29	1,43	2,87	4,30
27-08-1-22-6	1,25	3,88	7,46	6,33	10,39	11,23	3,58	2,45	4,90	7,35
28-08-1-22-5	1,53	4,04	10,05	6,27	11,00	10,75	6,02	2,24	4,47	6,71
29-08-1-22-4	1,29	2,14	7,11	6,11	11,59	14,06	4,97	3,97	7,95	11,92
30-08-1-23-5	1,08	2,49	9,75	6,21	11,00	13,66	7,27	3,72	7,45	11,17
31-08-1-23-2	2,84	2,01	5,40	5,53	9,92	12,56	3,39	3,52	7,04	10,55
32-08-1-22-5	1,58	3,94	7,84	6,25	10,51	10,86	3,90	2,31	4,61	6,92
33-08-1-22-4	1,08	2,49	12,63	6,21	11,19	13,65	10,13	3,72	7,44	11,16
34-10-1-22-4	1,79	2,94	9,17	6,07	10,58	12,32	6,23	3,13	6,26	9,38
35-09-1-23-5	1,32	3,19	7,90	6,23	11,09	12,31	4,71	3,04	6,08	9,13
36-09-1-23-4	1,16	3,36	9,15	6,29	11,67	12,15	5,78	2,93	5,86	8,79
37-12-2-24-4	2,24	2,32	5,69	5,87	10,14	12,97	3,37	3,55	7,10	10,65
38-13-2-23-5	1,19	2,25	6,32	6,15	11,16	13,96	4,07	3,90	7,81	11,71
39-14-1-22-4	1,94	2,40	5,44	5,96	10,73	13,08	3,04	3,56	7,12	10,68
40-14-1-22-2	3,85	3,26	6,32	5,35	8,64	9,53	3,06	2,09	4,18	6,27
41-15-1-22-4	1,99	3,60	6,10	6,09	10,41	11,07	2,49	2,49	4,98	7,47
42-15-1-22-5	0,94	1,61	8,98	6,14	11,93	15,21	7,37	4,53	9,06	13,60
43-15-1-22-5	0,95	1,61	8,96	6,14	11,92	15,21	7,35	4,53	9,07	13,60
44-15-1-22-5	0,98	1,61	8,98	6,13	11,90	15,18	7,37	4,52	9,04	13,56
45-15-1-22-5	0,96	1,61	9,00	6,14	11,92	15,19	7,38	4,53	9,05	13,58
46-15-1-22-5	0,96	1,61	8,98	6,14	11,92	15,19	7,37	4,53	9,05	13,58
47-15-1-22-5	0,94	1,61	8,98	6,14	11,93	15,21	7,37	4,53	9,06	13,60
48-15-1-22-5	0,94	1,61	8,98	6,14	11,93	15,21	7,37	4,53	9,06	13,60

Table F.1-7. Results of minimum, recommended and conservative increases in CAIR % using the method proposed by Hassan and Sözen (1997), PI(x) and PI(y) scores.

Building ID	The Preliminary Assessment Method Proposed by Hassan and Sözen (1997) (PI(x) + PI(y) Score)									
	A	B	C	D	E	F	G	H	I	J
	PI(x) + PI(y) Score of Existing (Original) Buildings	CAIR %	CAIR (%)	Calculated CAIR % of Buildings According to Minimum Estimation Approach	Calculated CAIR % of Buildings According to Recommended Estimation Approach	Calculated CAIR % of Buildings According to Conservative Estimation Approach	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach
		(Before Retrofitting)	(After Retrofitting)				(C-B)	(D-B)	(E-B)	(F-B)
01-01-1-Z3-2	3,27	2,34	5,46	4,46	6,58	8,71	3,11	2,12	4,24	6,37
02-01-1-Z3-2	3,32	1,59	5,26	4,54	7,48	10,43	3,67	2,94	5,89	8,83
03-01-1-Z2-2	4,43	2,67	5,24	4,94	7,20	9,46	2,56	2,26	4,53	6,79
04-01-1-Z2-2	4,64	2,67	5,24	4,94	7,20	9,46	2,56	2,26	4,53	6,79
05-02-1-Z3-4	1,58	2,06	6,42	4,53	7,00	9,47	4,36	2,47	4,94	7,41
06-03-1-Z3-5	1,66	2,35	6,27	4,55	6,75	8,95	3,92	2,20	4,41	6,61
07-03-1-Z3-5	2,07	5,02	8,36	5,73	6,44	7,15	3,35	0,71	1,42	2,13
08-03-1-Z2-4	2,16	3,33	7,57	4,81	6,28	7,75	4,24	1,47	2,95	4,42
09-03-1-Z3-2	2,41	1,95	5,83	4,50	7,05	9,60	3,88	2,55	5,09	7,64
10-03-1-Z3-3	2,04	2,78	7,32	4,42	6,05	7,69	4,53	1,63	3,27	4,90
11-03-1-Z2-4	1,16	2,49	7,70	5,01	7,54	10,06	5,21	2,53	5,05	7,58
12-04-1-Z3-4	2,25	2,46	6,49	4,45	6,44	8,43	4,03	1,99	3,98	5,97
13-04-2-Z3-5	1,37	3,44	10,74	5,00	6,56	8,12	7,30	1,56	3,12	4,68
14-05-1-Z2-3	2,34	2,75	10,20	4,71	6,68	8,65	7,45	1,97	3,93	5,90
15-05-1-Z3-3	1,23	1,57	5,32	4,54	7,50	10,47	3,74	2,96	5,93	8,89
16-06-2-Z3-7	1,03	2,11	10,08	4,49	6,87	9,25	7,98	2,38	4,76	7,14
17-06-2-Z3-4	1,69	1,48	7,06	4,55	7,61	10,68	5,57	3,06	6,13	9,19
18-06-2-Z3-6	1,69	3,39	7,95	4,80	6,21	7,63	4,57	1,41	2,83	4,24
19-06-2-Z3-6	1,45	3,14	11,55	4,38	5,63	6,88	8,41	1,25	2,49	3,74
20-06-2-Z3-4	2,10	2,75	6,97	4,42	6,09	7,76	4,22	1,67	3,34	5,01
21-06-2-Z2-4	2,43	2,36	7,42	4,46	6,56	8,66	5,06	2,10	4,20	6,30
22-06-2-Z3-5	2,86	4,20	6,86	4,81	5,42	6,03	2,66	0,61	1,22	1,83
23-06-2-Z3-5	1,72	2,95	10,05	4,40	5,85	7,30	7,10	1,45	2,90	4,35
24-06-2-Z3-4	2,20	2,43	9,96	4,45	6,47	8,49	7,53	2,02	4,04	6,06
25-07-2-Z3-7	1,06	1,91	6,38	4,76	7,62	10,47	4,47	2,85	5,71	8,56
26-07-2-Z3-5	1,90	4,81	10,09	5,40	5,99	6,59	5,29	0,59	1,19	1,78
27-08-1-Z2-6	1,25	3,88	7,46	5,06	6,24	7,42	3,58	1,18	2,36	3,54
28-08-1-Z2-5	1,53	4,04	10,05	4,66	5,29	5,91	6,02	0,63	1,25	1,88
29-08-1-Z2-4	1,29	2,14	7,11	4,72	7,31	9,90	4,97	2,59	5,17	7,76
30-08-1-Z3-5	1,08	2,49	9,75	4,75	7,02	9,28	7,27	2,26	4,53	6,79
31-08-1-Z3-2	2,84	2,01	5,40	4,50	6,98	9,47	3,39	2,49	4,97	7,46
32-08-1-Z2-5	1,58	3,94	7,84	5,21	6,48	7,74	3,90	1,27	2,53	3,80
33-08-1-Z2-4	1,08	2,49	12,63	4,45	6,40	8,36	10,13	1,96	3,91	5,87
34-10-1-Z2-4	1,79	2,94	9,17	4,40	5,87	7,33	6,23	1,46	2,93	4,39
35-09-1-Z3-5	1,32	3,19	7,90	4,38	5,57	6,77	4,71	1,19	2,39	3,58
36-09-1-Z3-4	1,16	3,36	9,15	4,86	6,37	7,87	5,78	1,50	3,00	4,50
37-12-2-Z4-4	2,24	2,32	5,69	4,72	7,12	9,52	3,37	2,40	4,80	7,19
38-13-2-Z3-5	1,19	2,25	6,32	4,47	6,70	8,93	4,07	2,23	4,45	6,68
39-14-1-Z2-4	1,94	2,40	5,44	4,71	7,01	9,31	3,04	2,30	4,61	6,91
40-14-1-Z2-2	3,85	3,26	6,32	4,53	5,81	7,08	3,06	1,27	2,55	3,82
41-15-1-Z2-4	1,99	3,60	6,10	5,36	7,11	8,86	2,49	1,75	3,50	5,26
42-15-1-Z2-5	0,94	1,61	8,98	4,85	8,08	11,32	7,37	3,24	6,47	9,71
43-15-1-Z2-5	0,95	1,61	8,96	4,85	8,09	11,33	7,35	3,24	6,48	9,72
44-15-1-Z2-5	0,98	1,61	8,98	4,85	8,08	11,32	7,37	3,24	6,47	9,71
45-15-1-Z2-5	0,96	1,61	9,00	4,85	8,08	11,31	7,38	3,23	6,47	9,70
46-15-1-Z2-5	0,96	1,61	8,98	4,85	8,08	11,32	7,37	3,24	6,47	9,71
47-15-1-Z2-5	0,94	1,61	8,98	4,85	8,08	11,32	7,37	3,24	6,47	9,71
48-15-1-Z2-5	0,94	1,61	8,98	4,85	8,08	11,32	7,37	3,24	6,47	9,71

Table F.2-1. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Özcebe *et al.*(2003), DI-LS score.

Building ID	The Preliminary Assessment Method Proposed by Özcebe et al. (DI-LS Score)							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	2,74	5,48	8,23	57111,62	60527,81	121055,62	181583,42
02-01-1-Z3-2	3,67	2,87	5,74	8,61	70234,68	59079,07	118158,14	177237,21
03-01-1-Z2-2	2,56	1,76	3,52	5,28	85528,26	78458,70	156917,40	235376,09
04-01-1-Z2-2	2,56	1,76	3,52	5,28	85238,22	78458,70	156917,40	235376,09
05-02-1-Z3-4	4,36	3,66	7,33	10,99	1102466,00	834059,08	1668118,17	2502177,25
06-03-1-Z3-5	3,92	3,64	7,28	10,92	669674,83	640704,27	1281408,54	1922112,81
07-03-1-Z3-5	3,35	1,29	2,57	3,86	405303,78	207650,94	415301,89	622952,83
08-03-1-Z2-4	4,24	2,02	4,04	6,06	571076,25	347681,92	695363,84	1043045,77
09-03-1-Z3-2	3,88	2,99	5,99	8,98	170565,21	150328,44	300656,88	450985,32
10-03-1-Z3-3	4,53	2,96	5,92	8,87	157462,08	109470,36	218940,73	328411,09
11-03-1-Z2-4	5,21	4,10	8,19	12,29	509101,36	425942,93	851885,85	1277828,78
12-04-1-Z3-4	4,03	2,68	5,36	8,04	423436,84	407393,46	814786,92	1222180,38
13-04-2-Z3-5	7,30	2,87	5,74	8,62	616060,80	300679,93	601359,87	902039,80
14-05-1-Z2-3	7,45	2,01	4,01	6,02	226259,94	91851,38	183702,77	275554,15
15-05-1-Z3-3	3,74	3,43	6,86	10,30	298769,66	247146,18	494292,37	741438,55
16-06-2-Z3-7	7,98	4,19	8,38	12,57	472683,22	331557,11	663114,23	994671,34
17-06-2-Z3-4	5,57	3,64	7,27	10,91	280692,86	195655,05	391310,11	586965,16
18-06-2-Z3-6	4,44	2,36	4,72	7,08	598256,85	364747,69	729495,38	1094243,08
19-06-2-Z3-6	8,41	2,88	5,76	8,64	464915,29	191056,95	382113,89	573170,84
20-06-2-Z3-4	4,22	2,51	5,01	7,52	298530,71	238171,33	476342,66	714513,99
21-06-2-Z2-4	5,06	3,28	6,56	9,85	185781,25	146160,87	292321,75	438482,62
22-06-2-Z3-5	2,66	1,80	3,60	5,39	361136,74	229001,85	458003,70	687005,54
23-06-2-Z3-5	7,10	3,48	6,96	10,44	195040,60	127466,18	254932,36	382398,55
24-06-2-Z3-4	7,53	3,10	6,20	9,30	288705,27	130145,96	260291,92	390437,88
25-07-2-Z3-7	4,47	4,59	9,18	13,76	353875,61	565415,89	1130831,78	1696247,67
26-07-2-Z3-5	5,46	1,99	3,97	5,96	579578,07	330576,67	661153,35	991730,02
27-08-1-Z2-6	3,58	2,23	4,46	6,68	432365,59	316040,28	632080,56	948120,85
28-08-1-Z2-5	6,02	2,16	4,33	6,49	609329,98	274428,13	548856,26	823284,39
29-08-1-Z2-4	4,97	3,49	6,98	10,47	590020,14	391168,13	782336,26	1173504,38
30-08-1-Z3-5	7,27	3,80	7,60	11,40	380515,12	258937,69	517875,37	776813,06
31-08-1-Z3-2	3,39	2,57	5,14	7,72	131632,30	113681,55	227363,11	341044,66
32-08-1-Z2-5	3,90	1,78	3,56	5,34	621787,91	362882,18	725764,36	1088646,54
33-08-1-Z2-4	10,13	3,46	6,92	10,37	254977,69	128872,36	257744,71	386617,07
34-10-1-Z2-4	6,23	2,56	5,13	7,69	334869,65	139908,97	279817,94	419726,91
35-09-1-Z3-5	4,71	3,08	6,16	9,24	777075,13	492091,70	984183,40	1476275,10
36-09-1-Z3-4	5,78	3,32	6,63	9,95	293376,31	197333,97	394667,94	592001,92
37-12-2-Z4-4	3,37	3,49	6,98	10,47	357614,80	436468,56	872937,12	1309405,68
38-13-2-Z3-5	4,07	3,56	7,12	10,67	486422,08	440761,47	881522,94	1322284,41
39-14-1-Z2-4	3,04	3,10	6,21	9,31	402711,28	476078,94	952157,89	1428236,83
40-14-1-Z2-2	3,06	1,63	3,27	4,90	96588,12	74193,75	148387,50	222581,25
41-15-1-Z2-4	2,49	1,82	3,65	5,47	733167,74	496394,38	992788,75	1489183,13
42-15-1-Z2-5	7,37	3,96	7,91	11,87	298497,85	264043,04	528086,08	792129,12
43-15-1-Z2-5	7,35	3,97	7,94	11,91	298601,58	264867,15	529734,30	794601,46
44-15-1-Z2-5	7,37	3,96	7,91	11,87	298668,84	264373,76	528747,52	793121,29
45-15-1-Z2-5	7,38	3,95	7,90	11,86	298711,07	263883,23	527766,46	791649,70
46-15-1-Z2-5	7,37	3,96	7,91	11,87	300382,75	266488,26	532976,52	799464,77
47-15-1-Z2-5	7,37	3,96	7,91	11,87	300508,57	266651,49	533302,98	799954,47
48-15-1-Z2-5	7,37	3,96	7,91	11,87	298867,65	264522,76	529045,53	793568,29

Table F.2-2. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Özcebe *et al.*(2003), DI-IO score.

Building ID	The Preliminary Assessment Method Proposed by Özcebe et al. (DI-IO Score)							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	1,77	3,53	5,30	57111,62	47483,95	94967,89	142451,84
02-01-1-Z3-2	3,67	2,02	4,03	6,05	70234,68	48595,71	97191,41	145787,12
03-01-1-Z2-2	2,56	0,72	1,43	2,15	85528,26	46034,43	92068,86	138103,29
04-01-1-Z2-2	2,56	0,72	1,43	2,15	85238,22	46034,43	92068,86	138103,29
05-02-1-Z3-4	4,36	2,62	5,23	7,85	1102466,00	602343,81	1204687,62	1807031,43
06-03-1-Z3-5	3,92	2,62	5,24	7,85	669674,83	487639,65	975279,30	1462918,95
07-03-1-Z3-5	3,35	0,07	0,15	0,22	405303,78	91985,39	183970,78	275956,17
08-03-1-Z2-4	4,24	1,00	2,00	3,01	571076,25	222083,15	444166,29	666249,44
09-03-1-Z3-2	3,88	2,17	4,34	6,52	170565,21	124851,67	249703,34	374555,01
10-03-1-Z3-3	4,53	1,91	3,83	5,74	157462,08	79243,83	158487,67	237731,50
11-03-1-Z2-4	5,21	2,97	5,93	8,90	509101,36	334187,10	668374,21	1002561,31
12-04-1-Z3-4	4,03	1,70	3,40	5,09	423436,84	266943,43	533886,86	800830,29
13-04-2-Z3-5	7,30	1,68	3,37	5,05	616060,80	209731,47	419462,93	629194,40
14-05-1-Z2-3	7,45	1,06	2,13	3,19	226259,94	59883,30	119766,59	179649,89
15-05-1-Z3-3	3,74	2,50	5,00	7,50	298769,66	186531,10	373062,19	559593,29
16-06-2-Z3-7	7,98	3,19	6,38	9,57	472683,22	265602,79	531205,57	796808,36
17-06-2-Z3-4	5,57	2,68	5,35	8,03	280692,86	150339,25	300678,50	451017,76
18-06-2-Z3-6	4,57	1,35	2,69	4,04	598256,85	249965,77	499931,54	749897,31
19-06-2-Z3-6	8,41	1,83	3,65	5,48	464915,29	139260,99	278521,99	417782,98
20-06-2-Z3-4	4,22	1,38	2,75	4,13	298530,71	162575,99	325151,98	487727,97
21-06-2-Z2-4	5,06	2,23	4,45	6,68	185781,25	106820,17	213640,33	320460,50
22-06-2-Z3-5	2,66	0,64	1,27	1,91	361136,74	96309,89	192619,78	288929,67
23-06-2-Z3-5	7,10	1,69	3,38	5,07	195040,60	81941,36	163882,71	245824,07
24-06-2-Z3-4	7,53	2,04	4,08	6,12	288705,27	93781,16	187562,32	281343,47
25-07-2-Z3-7	4,47	3,52	7,05	10,57	353875,61	457179,10	914358,20	1371537,30
26-07-2-Z3-5	5,29	0,70	1,40	2,10	579578,07	183916,75	367833,49	551750,24
27-08-1-Z2-6	3,58	1,24	2,48	3,72	432365,59	186319,97	372639,94	558959,92
28-08-1-Z2-5	6,02	0,96	1,91	2,87	609329,98	163843,63	327687,27	491530,90
29-08-1-Z2-4	4,97	2,51	5,01	7,52	590020,14	287687,73	575375,47	863063,20
30-08-1-Z3-5	7,27	2,65	5,30	7,94	380515,12	197078,70	394157,39	591236,09
31-08-1-Z3-2	3,39	1,73	3,45	5,18	131632,30	84127,39	168254,77	252382,16
32-08-1-Z2-5	3,90	0,60	1,21	1,81	621787,91	172561,19	345122,38	517683,57
33-08-1-Z2-4	10,13	2,56	5,11	7,67	254977,69	105069,31	210138,62	315207,93
34-10-1-Z2-4	6,23	1,51	3,03	4,54	334869,65	104465,34	208930,68	313396,02
35-09-1-Z3-5	4,71	1,97	3,93	5,90	777075,13	340569,17	681138,34	1021707,51
36-09-1-Z3-4	5,78	2,23	4,45	6,68	293376,31	150119,98	300239,97	450359,95
37-12-2-Z4-4	3,37	2,19	4,38	6,57	357614,80	282677,11	565354,23	848031,34
38-13-2-Z3-5	4,07	2,55	5,10	7,65	486422,08	340611,30	681222,61	1021833,91
39-14-1-Z2-4	3,04	2,07	4,14	6,22	402711,28	325733,87	651467,75	977201,62
40-14-1-Z2-2	3,06	0,77	1,55	2,32	96588,12	47655,82	95311,65	142967,47
41-15-1-Z2-4	2,49	0,91	1,82	2,73	733167,74	311945,18	623890,35	935835,53
42-15-1-Z2-5	7,37	2,94	5,88	8,82	298497,85	209461,92	418923,84	628385,76
43-15-1-Z2-5	7,35	2,95	5,90	8,85	298601,58	209860,47	419720,95	629581,42
44-15-1-Z2-5	7,37	2,94	5,88	8,82	298668,84	209792,64	419585,29	629377,93
45-15-1-Z2-5	7,38	2,94	5,88	8,81	298711,07	209401,94	418803,88	628205,83
46-15-1-Z2-5	7,37	2,94	5,88	8,82	300382,75	211907,14	423814,28	635721,42
47-15-1-Z2-5	7,37	2,94	5,88	8,82	300508,57	212070,37	424140,75	636211,12
48-15-1-Z2-5	7,37	2,94	5,88	8,82	298867,65	209941,65	419883,29	629824,94

Table F.2-3. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Gülay *et al.*(2008) P0 score.

Building ID	The Preliminary Assessment Method Proposed by Gülay et al. (2008) (P0 Score)							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	0,77	1,54	2,30	57111,62	34109,42	68218,84	102328,26
02-01-1-Z3-2	3,67	1,11	2,21	3,32	70234,68	37422,01	74844,02	112266,02
03-01-1-Z2-2	2,56	0,10	0,20	0,30	85528,26	26900,28	53800,56	80700,85
04-01-1-Z2-2	2,56	0,10	0,20	0,30	85238,22	26900,28	53800,56	80700,85
05-02-1-Z3-4	4,36	1,26	2,52	3,78	1102466,00	302797,06	605594,12	908391,18
06-03-1-Z3-5	3,92	1,18	2,35	3,53	669674,83	271791,13	543582,26	815373,40
07-03-1-Z3-5	3,35	0,24	0,49	0,73	405303,78	108083,71	216167,42	324251,12
08-03-1-Z2-4	4,24	0,68	1,37	2,05	571076,25	182679,13	365358,26	548037,39
09-03-1-Z3-2	3,88	0,98	1,96	2,93	170565,21	87764,95	175529,90	263294,84
10-03-1-Z3-3	4,53	0,81	1,62	2,43	157462,08	47254,00	94508,00	141762,00
11-03-1-Z2-4	5,21	0,95	1,91	2,86	509101,36	170641,52	341283,04	511924,56
12-04-1-Z3-4	4,03	1,18	2,36	3,54	423436,84	193009,94	386019,89	579029,83
13-04-2-Z3-5	7,30	0,80	1,60	2,40	616060,80	142137,66	284275,32	426412,99
14-05-1-Z2-3	7,45	0,82	1,64	2,47	226259,94	51696,68	103393,36	155090,04
15-05-1-Z3-3	3,74	1,17	2,34	3,50	298769,66	99826,41	199652,82	299479,23
16-06-2-Z3-7	7,98	1,30	2,59	3,89	472683,22	140580,44	281160,87	421741,31
17-06-2-Z3-4	5,57	1,36	2,71	4,07	280692,86	87985,26	175970,53	263955,79
18-06-2-Z3-6	4,57	0,77	1,54	2,31	598256,85	184690,50	369381,00	554071,49
19-06-2-Z3-6	8,41	0,92	1,83	2,75	464915,29	94449,88	188899,75	283349,63
20-06-2-Z3-4	4,22	0,91	1,83	2,74	298530,71	131793,96	263587,93	395381,89
21-06-2-Z2-4	5,06	1,07	2,14	3,21	185781,25	63670,06	127340,12	191010,18
22-06-2-Z3-5	2,66	0,47	0,95	1,42	361136,74	77770,93	155541,86	233312,79
23-06-2-Z3-5	7,10	0,90	1,81	2,71	195040,60	61969,08	123938,16	185907,24
24-06-2-Z3-4	7,53	1,05	2,10	3,14	288705,27	59764,88	119529,77	179294,65
25-07-2-Z3-7	4,47	1,27	2,54	3,80	353875,61	227439,46	454878,92	682318,38
26-07-2-Z3-5	5,29	0,32	0,64	0,96	579578,07	140677,09	281354,19	422031,28
27-08-1-Z2-6	3,58	0,53	1,07	1,60	432365,59	93848,98	187697,96	281546,95
28-08-1-Z2-5	6,02	0,63	1,27	1,90	609329,98	134441,02	268882,05	403323,07
29-08-1-Z2-4	4,97	1,08	2,15	3,23	590020,14	137179,25	274358,51	411537,76
30-08-1-Z3-5	7,27	1,05	2,10	3,15	380515,12	111318,93	222637,86	333956,79
31-08-1-Z3-2	3,39	0,99	1,98	2,97	131632,30	58436,96	116873,92	175310,89
32-08-1-Z2-5	3,90	0,50	0,99	1,49	621787,91	155092,79	310185,59	465278,38
33-08-1-Z2-4	10,13	1,11	2,22	3,33	254977,69	66824,72	133649,44	200474,16
34-10-1-Z2-4	6,23	0,96	1,93	2,89	334869,65	85955,89	171911,78	257867,67
35-09-1-Z3-5	4,71	0,88	1,76	2,64	777075,13	192654,72	385309,45	577964,17
36-09-1-Z3-4	5,78	0,75	1,50	2,25	293376,31	86117,25	172234,50	258351,75
37-12-2-Z4-4	3,37	1,14	2,28	3,42	357614,80	158613,17	317226,33	475839,50
38-13-2-Z3-5	4,07	1,17	2,34	3,51	486422,08	203294,91	406589,82	609884,73
39-14-1-Z2-4	3,04	0,98	1,95	2,93	402711,28	165989,73	331979,47	497969,20
40-14-1-Z2-2	3,06	0,26	0,52	0,78	96588,12	31826,31	63652,63	95478,94
41-15-1-Z2-4	2,49	0,64	1,27	1,91	733167,74	256409,41	512818,81	769228,22
42-15-1-Z2-5	7,37	1,31	2,61	3,92	298497,85	121519,41	243038,82	364558,22
43-15-1-Z2-5	7,35	1,31	2,61	3,92	298601,58	121519,41	243038,82	364558,22
44-15-1-Z2-5	7,37	1,31	2,61	3,92	298668,84	121850,13	243700,26	365550,39
45-15-1-Z2-5	7,38	1,31	2,61	3,92	298711,07	121735,46	243470,92	365206,38
46-15-1-Z2-5	7,37	1,31	2,61	3,92	300382,75	123964,63	247929,25	371893,88
47-15-1-Z2-5	7,37	1,31	2,61	3,92	300508,57	124127,86	248255,72	372383,58
48-15-1-Z2-5	7,37	1,31	2,61	3,92	298867,65	121999,13	243998,26	365997,40

Table F.2-4. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Gülay *et al.*(2008), P1 score.

Building ID	The Preliminary Assessment Method Proposed by Gülay et al. (2008) (P1 Score)							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	0,24	0,48	0,71	57111,62	27018,83	54037,67	81056,50
02-01-1-Z3-2	3,67	0,32	0,65	0,97	70234,68	27808,63	55617,26	83425,89
03-01-1-Z2-2	2,56	0,10	0,20	0,30	85528,26	26930,70	53861,41	80792,11
04-01-1-Z2-2	2,56	0,09	0,18	0,26	85238,22	26556,32	53112,63	79668,95
05-02-1-Z3-4	4,36	0,34	0,67	1,01	1102466,00	98114,00	196228,00	294342,00
06-03-1-Z3-5	3,92	0,31	0,62	0,92	669674,83	141860,14	283720,27	425580,41
07-03-1-Z3-5	3,35	0,11	0,23	0,34	405303,78	95852,40	191704,80	287557,20
08-03-1-Z2-4	4,24	0,21	0,42	0,63	571076,25	124542,30	249084,61	373626,91
09-03-1-Z3-2	3,88	0,28	0,56	0,84	170565,21	66108,99	132217,97	198326,96
10-03-1-Z3-3	4,53	0,25	0,49	0,74	157462,08	31005,19	62010,39	93015,58
11-03-1-Z2-4	5,21	0,28	0,56	0,84	509101,36	115944,71	231889,43	347834,14
12-04-1-Z3-4	4,03	0,32	0,65	0,97	423436,84	70195,18	140390,36	210585,54
13-04-2-Z3-5	7,30	0,22	0,45	0,67	616060,80	97990,33	195980,66	293971,00
14-05-1-Z2-3	7,45	0,28	0,56	0,85	226259,94	33393,73	66787,45	100181,18
15-05-1-Z3-3	3,74	0,33	0,67	1,00	298769,66	45474,36	90948,72	136423,07
16-06-2-Z3-7	7,98	0,34	0,68	1,02	472683,22	77477,97	154955,94	232433,90
17-06-2-Z3-4	5,57	0,37	0,74	1,11	280692,86	41266,24	82532,48	123798,71
18-06-2-Z3-6	4,57	0,24	0,47	0,71	598256,85	124554,20	249108,39	373662,59
19-06-2-Z3-6	8,41	0,25	0,49	0,74	464915,29	61510,26	123020,53	184530,79
20-06-2-Z3-4	4,22	0,28	0,56	0,84	298530,71	89418,62	178837,25	268255,87
21-06-2-Z2-4	5,06	0,30	0,61	0,91	185781,25	35160,17	70320,34	105480,51
22-06-2-Z3-5	2,66	0,16	0,32	0,48	361136,74	42201,27	84402,53	126603,80
23-06-2-Z3-5	7,10	0,26	0,52	0,78	195040,60	45618,92	91237,84	136856,77
24-06-2-Z3-4	7,53	0,29	0,58	0,87	288705,27	33833,51	67667,02	101500,53
25-07-2-Z3-7	4,47	0,35	0,71	1,06	353875,61	134392,15	268784,29	403176,44
26-07-2-Z3-5	5,29	0,13	0,26	0,39	579578,07	119116,15	238232,30	357348,45
27-08-1-Z2-6	3,58	0,14	0,28	0,42	432365,59	42269,11	84538,21	126807,32
28-08-1-Z2-5	6,02	0,19	0,37	0,56	609329,98	93470,20	186940,39	280410,59
29-08-1-Z2-4	4,97	0,30	0,60	0,89	590020,14	55174,39	110348,79	165523,18
30-08-1-Z3-5	7,27	0,31	0,63	0,94	380515,12	71786,01	143572,02	215358,03
31-08-1-Z3-2	3,39	0,29	0,58	0,87	131632,30	33936,31	67872,62	101808,93
32-08-1-Z2-5	3,90	0,15	0,30	0,44	621787,91	98833,81	197667,61	296501,42
33-08-1-Z2-4	10,13	0,31	0,62	0,93	254977,69	45719,10	91438,20	137157,30
34-10-1-Z2-4	6,23	0,29	0,58	0,87	334869,65	63174,40	126348,80	189523,19
35-09-1-Z3-5	4,71	0,28	0,56	0,83	777075,13	110809,55	221619,09	332428,64
36-09-1-Z3-4	5,78	0,24	0,49	0,73	293376,31	64316,60	128633,20	192949,79
37-12-2-Z4-4	3,37	0,32	0,64	0,95	357614,80	61468,47	122936,94	184405,41
38-13-2-Z3-5	4,07	0,31	0,62	0,93	486422,08	117732,41	235464,82	353197,23
39-14-1-Z2-4	3,04	0,24	0,48	0,73	402711,28	59154,48	118308,96	177463,44
40-14-1-Z2-2	3,06	0,12	0,25	0,37	96588,12	27640,91	55281,82	82922,73
41-15-1-Z2-4	2,49	0,22	0,44	0,66	733167,74	172244,39	344488,78	516733,17
42-15-1-Z2-5	7,37	0,36	0,71	1,07	298497,85	70308,81	140617,62	210926,43
43-15-1-Z2-5	7,35	0,36	0,71	1,07	298601,58	70278,74	140557,49	210836,23
44-15-1-Z2-5	7,37	0,35	0,71	1,06	298668,84	70492,06	140984,12	211476,18
45-15-1-Z2-5	7,38	0,35	0,71	1,06	298711,07	70604,65	141209,29	211813,94
46-15-1-Z2-5	7,37	0,35	0,71	1,06	300382,75	72694,19	145388,38	218082,57
47-15-1-Z2-5	7,37	0,36	0,71	1,07	300508,57	72917,26	145834,52	218751,78
48-15-1-Z2-5	7,37	0,36	0,71	1,07	298867,65	70788,53	141577,07	212365,60

Table F.2-5. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Gülay *et al.*(2008), Pw score.

Building ID	The Preliminary Assessment Method Proposed by Gülay et al. (2008) (Pw Score)							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	0,10	0,19	0,29	57111,62	25132,99	50265,97	75398,96
02-01-1-Z3-2	3,67	0,11	0,22	0,33	70234,68	25210,99	50421,97	75632,96
03-01-1-Z2-2	2,56	0,03	0,06	0,09	85528,26	24772,81	49545,62	74318,43
04-01-1-Z2-2	2,56	0,03	0,06	0,08	85238,22	24718,33	49436,65	74154,98
05-02-1-Z3-4	4,36	0,10	0,21	0,31	1102466,00	46675,01	93350,01	140025,02
06-03-1-Z3-5	3,92	0,08	0,16	0,25	669674,83	108007,13	216014,25	324021,38
07-03-1-Z3-5	3,35	0,03	0,05	0,08	405303,78	87300,09	174600,18	261900,27
08-03-1-Z2-4	4,24	0,03	0,06	0,09	571076,25	102248,68	204497,36	306746,04
09-03-1-Z3-2	3,88	0,09	0,18	0,27	170565,21	60160,38	120320,77	180481,15
10-03-1-Z3-3	4,53	0,08	0,17	0,25	157462,08	26239,44	52478,88	78718,33
11-03-1-Z2-4	5,21	0,06	0,12	0,19	509101,36	98273,31	196546,61	294819,92
12-04-1-Z3-4	4,03	0,08	0,15	0,23	423436,84	34922,83	69845,66	104768,49
13-04-2-Z3-5	7,30	0,07	0,14	0,21	616060,80	86275,05	172550,10	258825,14
14-05-1-Z2-3	7,45	0,07	0,15	0,22	226259,94	26317,58	52635,16	78952,73
15-05-1-Z3-3	3,74	0,11	0,23	0,34	298769,66	31198,17	62396,34	93594,51
16-06-2-Z3-7	7,98	0,11	0,21	0,32	472683,22	62003,53	124007,06	186010,58
17-06-2-Z3-4	5,57	0,11	0,21	0,32	280692,86	28824,83	57649,65	86474,48
18-06-2-Z3-6	4,57	0,06	0,12	0,19	598256,85	104731,47	209462,94	314194,41
19-06-2-Z3-6	8,41	0,07	0,14	0,21	464915,29	52908,52	105817,04	158725,55
20-06-2-Z3-4	4,22	0,09	0,18	0,28	298530,71	76812,42	153624,84	230437,26
21-06-2-Z2-4	5,06	0,07	0,14	0,21	185781,25	26451,00	52902,01	79353,01
22-06-2-Z3-5	2,66	0,04	0,09	0,13	361136,74	28741,87	57483,74	86225,61
23-06-2-Z3-5	7,10	0,09	0,18	0,28	195040,60	41328,25	82656,50	123984,76
24-06-2-Z3-4	7,53	0,09	0,19	0,28	288705,27	27042,12	54084,24	81126,36
25-07-2-Z3-7	4,47	0,11	0,22	0,33	353875,61	109746,96	219493,91	329240,87
26-07-2-Z3-5	5,29	0,04	0,07	0,11	579578,07	108533,32	217066,65	325599,97
27-08-1-Z2-6	3,58	0,04	0,07	0,11	432365,59	28635,97	57271,95	85907,92
28-08-1-Z2-5	6,02	0,03	0,07	0,10	609329,98	79645,59	159291,18	238936,78
29-08-1-Z2-4	4,97	0,07	0,14	0,21	590020,14	31130,08	62260,16	93390,24
30-08-1-Z3-5	7,27	0,09	0,17	0,26	380515,12	59685,18	119370,36	179055,54
31-08-1-Z3-2	3,39	0,08	0,17	0,25	131632,30	26795,84	53591,68	80387,52
32-08-1-Z2-5	3,90	0,03	0,06	0,08	621787,91	79423,65	158847,30	238270,96
33-08-1-Z2-4	10,13	0,07	0,13	0,20	254977,69	39299,37	78598,74	117898,10
34-10-1-Z2-4	6,23	0,06	0,11	0,17	334869,65	55379,96	110759,93	166139,89
35-09-1-Z3-5	4,71	0,06	0,13	0,19	777075,13	81737,98	163475,95	245213,93
36-09-1-Z3-4	5,78	0,06	0,12	0,19	293376,31	56412,10	112824,19	169236,29
37-12-2-Z4-4	3,37	0,10	0,20	0,30	357614,80	35753,91	71507,81	107261,72
38-13-2-Z3-5	4,07	0,09	0,18	0,27	486422,08	96113,16	192226,32	288339,48
39-14-1-Z2-4	3,04	0,06	0,12	0,17	402711,28	32288,68	64577,35	96866,03
40-14-1-Z2-2	3,06	0,05	0,09	0,14	96588,12	25268,27	50536,54	75804,80
41-15-1-Z2-4	2,49	0,04	0,08	0,12	733167,74	136182,68	272365,37	408548,05
42-15-1-Z2-5	7,37	0,09	0,17	0,26	298497,85	55764,01	111528,02	167292,03
43-15-1-Z2-5	7,35	0,09	0,17	0,26	298601,58	55759,36	111518,72	167278,08
44-15-1-Z2-5	7,37	0,09	0,17	0,26	298668,84	56071,93	112143,86	168215,79
45-15-1-Z2-5	7,38	0,09	0,17	0,26	298711,07	56130,57	112261,13	168391,70
46-15-1-Z2-5	7,37	0,09	0,17	0,26	300382,75	58199,98	116399,95	174599,93
47-15-1-Z2-5	7,37	0,09	0,17	0,26	300508,57	58372,46	116744,92	175117,39
48-15-1-Z2-5	7,37	0,09	0,17	0,26	298867,65	56243,73	112487,47	168731,20

Table F.2-6. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Yakut (2004) CPI(x) and CPI(y) scores.

Building ID	The Preliminary Assessment Method Proposed by Yakut (2004) (CPI(x) + CPI(y) Score)							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	3,09	6,17	9,26	57111,62	65124,52	130249,03	195373,55
02-01-1-Z3-2	3,67	3,73	7,46	11,19	70234,68	69635,03	139270,05	208905,08
03-01-1-Z2-2	2,56	2,42	4,83	7,25	85528,26	98788,10	197576,20	296364,30
04-01-1-Z2-2	2,56	2,35	4,70	7,05	85238,22	96707,80	193415,60	290123,40
05-02-1-Z3-4	4,36	3,96	7,92	11,87	1102466,00	899016,99	1798033,98	2697050,98
06-03-1-Z3-5	3,92	3,69	7,37	11,06	669674,83	647753,72	1295507,44	1943261,16
07-03-1-Z3-5	3,35	1,23	2,45	3,68	405303,78	202104,90	404209,79	606314,69
08-03-1-Z2-4	4,24	2,68	5,36	8,04	571076,25	428829,96	857659,92	1286489,89
09-03-1-Z3-2	3,88	3,71	7,41	11,12	170565,21	172498,09	344996,19	517494,28
10-03-1-Z3-3	4,53	3,20	6,39	9,59	157462,08	116406,91	232813,82	349220,73
11-03-1-Z2-4	5,21	3,70	7,40	11,10	509101,36	393878,12	787756,23	1181634,35
12-04-1-Z3-4	4,03	3,42	6,84	10,27	423436,84	513726,34	1027452,69	1541179,03
13-04-2-Z3-5	7,30	2,81	5,61	8,42	616060,80	295651,35	591302,69	886954,04
14-05-1-Z2-3	7,45	3,15	6,29	9,44	226259,94	130528,19	261056,39	391584,58
15-05-1-Z3-3	3,74	4,48	8,97	13,45	298769,66	315550,05	631100,10	946650,16
16-06-2-Z3-7	7,98	4,07	8,14	12,21	472683,22	323713,90	647427,80	971141,70
17-06-2-Z3-4	5,57	4,44	8,87	13,31	280692,86	233544,60	467089,21	700633,81
18-06-2-Z3-6	4,57	2,78	5,56	8,34	598256,85	412311,18	824622,37	1236933,55
19-06-2-Z3-6	8,41	3,05	6,10	9,14	464915,29	199283,33	398566,65	597849,98
20-06-2-Z3-4	4,22	3,21	6,42	9,62	298530,71	284997,15	569994,30	854991,45
21-06-2-Z2-4	5,06	3,46	6,92	10,38	185781,25	152730,10	305460,19	458190,29
22-06-2-Z3-5	2,66	1,72	3,44	5,16	361136,74	220209,74	440419,49	660629,23
23-06-2-Z3-5	7,10	3,14	6,27	9,41	195040,60	118740,05	237480,10	356220,14
24-06-2-Z3-4	7,53	3,46	6,92	10,38	288705,27	142507,20	285014,40	427521,60
25-07-2-Z3-7	4,47	4,24	8,48	12,71	353875,61	529728,11	1059456,22	1589184,33
26-07-2-Z3-5	5,29	1,43	2,87	4,30	579578,07	267637,64	535275,27	802912,91
27-08-1-Z2-6	3,58	2,45	4,90	7,35	432365,59	345038,75	690077,50	1035116,25
28-08-1-Z2-5	6,02	2,24	4,47	6,71	609329,98	281060,01	562120,02	843180,03
29-08-1-Z2-4	4,97	3,97	7,95	11,92	590020,14	441992,48	883984,96	1325977,44
30-08-1-Z3-5	7,27	3,72	7,45	11,17	380515,12	254804,93	509609,87	764414,80
31-08-1-Z3-2	3,39	3,52	7,04	10,55	131632,30	146710,98	293421,96	440132,94
32-08-1-Z2-5	3,90	2,31	4,61	6,92	621787,91	448022,05	896044,11	1344066,16
33-08-1-Z2-4	10,13	3,72	7,44	11,16	254977,69	135779,09	271558,17	407337,26
34-10-1-Z2-4	6,23	3,13	6,26	9,38	334869,65	158919,49	317838,97	476758,46
35-09-1-Z3-5	4,71	3,04	6,08	9,13	777075,13	487112,75	974225,50	1461338,24
36-09-1-Z3-4	5,78	2,93	5,86	8,79	293376,31	180560,14	361120,29	541680,43
37-12-2-Z4-4	3,37	3,55	7,10	10,65	357614,80	443451,63	886903,27	1330354,90
38-13-2-Z3-5	4,07	3,90	7,81	11,71	486422,08	475249,90	950499,80	1425749,70
39-14-1-Z2-4	3,04	3,56	7,12	10,68	402711,28	542542,24	1085084,48	1627626,72
40-14-1-Z2-2	3,06	2,09	4,18	6,27	96588,12	88267,35	176534,69	264802,04
41-15-1-Z2-4	2,49	2,49	4,98	7,47	733167,74	630366,11	1260732,22	1891098,33
42-15-1-Z2-5	7,37	4,53	9,06	13,60	298497,85	295108,56	590217,11	885325,67
43-15-1-Z2-5	7,35	4,53	9,07	13,60	298601,58	295154,58	590309,15	885463,73
44-15-1-Z2-5	7,37	4,52	9,04	13,56	298668,84	294861,17	589722,33	884583,50
45-15-1-Z2-5	7,38	4,53	9,05	13,58	298711,07	294699,58	589399,17	884098,75
46-15-1-Z2-5	7,37	4,53	9,05	13,58	300382,75	297275,65	594551,30	891826,96
47-15-1-Z2-5	7,37	4,53	9,06	13,60	300508,57	297717,01	595434,01	893151,02
48-15-1-Z2-5	7,37	4,53	9,06	13,60	298867,65	295588,28	591176,56	886764,84

Table F.2-7. Results of minimum, recommended and conservative retrofitting cost calculations using the method proposed by Hassan and Sözen (1997) PI(x) and PI(y) scores.

Building ID	The Preliminary Assessment Method Proposed by Hassan and Sözen (PI(x) and PI(y))							
	A	B	C	D	E	F	G	H
	Increase of CAIR %	Increase of CAIR % According to Minimum Estimation Approach	Increase of CAIR % According to Recommended Estimation Approach	Increase of CAIR % According to Conservative Estimation Approach	Actual Total Retrofitting Cost	Calculated Retrofitting Cost According to Minimum Estimation Approach	Calculated Retrofitting Cost According to Recommended Estimation Approach	Calculated Retrofitting Cost According to Conservative Estimation Approach
					(TL)	(TL)	(TL)	(TL)
01-01-1-Z3-2	3,11	2,12	4,24	6,37	57111,62	52225,50	104451,00	156676,50
02-01-1-Z3-2	3,67	2,94	5,89	8,83	70234,68	59992,06	119984,12	179976,18
03-01-1-Z2-2	2,56	2,26	4,53	6,79	85528,26	94061,30	188122,60	282183,90
04-01-1-Z2-2	2,56	2,26	4,53	6,79	85238,22	94061,30	188122,60	282183,90
05-02-1-Z3-4	4,36	2,47	4,94	7,41	1102466,00	569891,45	1139782,91	1709674,36
06-03-1-Z3-5	3,92	2,20	4,41	6,61	669674,83	353624,63	707249,25	1060873,88
07-03-1-Z3-5	3,35	0,71	1,42	2,13	405303,78	91788,35	183576,69	275365,04
08-03-1-Z2-4	4,24	1,47	2,95	4,42	571076,25	205478,04	410956,07	616434,11
09-03-1-Z3-2	3,88	2,55	5,09	7,64	170565,21	102947,82	205895,64	308843,46
10-03-1-Z3-3	4,53	1,63	3,27	4,90	157462,08	71163,04	142326,08	213489,12
11-03-1-Z2-4	5,21	2,53	5,05	7,58	509101,36	228954,03	457908,06	686862,08
12-04-1-Z3-4	4,03	1,99	3,98	5,97	423436,84	308624,66	617249,32	925873,99
13-04-2-Z3-5	7,30	1,56	3,12	4,68	616060,80	143257,43	286514,87	429772,30
14-05-1-Z2-3	7,45	1,97	3,93	5,90	226259,94	90534,24	181068,48	271602,71
15-05-1-Z3-3	3,74	2,96	5,93	8,89	298769,66	216657,89	433315,77	649973,66
16-06-2-Z3-7	7,98	2,38	4,76	7,14	472683,22	180922,40	361844,79	542767,19
17-06-2-Z3-4	5,57	3,06	6,13	9,19	280692,86	168644,72	337289,44	505934,16
18-06-2-Z3-6	4,57	1,41	2,83	4,24	598256,85	183720,43	367440,87	551161,30
19-06-2-Z3-6	8,41	1,25	2,49	3,74	464915,29	85086,14	170172,29	255258,43
20-06-2-Z3-4	4,22	1,67	3,34	5,01	298530,71	135361,06	270722,12	406083,18
21-06-2-Z2-4	5,06	2,10	4,20	6,30	185781,25	102057,82	204115,63	306173,45
22-06-2-Z3-5	2,66	0,61	1,22	1,83	361136,74	93415,20	186830,40	280245,60
23-06-2-Z3-5	7,10	1,45	2,90	4,35	195040,60	60688,30	121376,60	182064,89
24-06-2-Z3-4	7,53	2,02	4,04	6,06	288705,27	93089,71	186179,43	279269,14
25-07-2-Z3-7	4,47	2,85	5,71	8,56	353875,61	314319,54	628639,08	942958,62
26-07-2-Z3-5	5,29	0,59	1,19	1,78	579578,07	91476,91	182953,82	274430,72
27-08-1-Z2-6	3,58	1,18	2,36	3,54	432365,59	178600,86	357201,72	535802,58
28-08-1-Z2-5	6,02	0,63	1,25	1,88	609329,98	80989,30	161978,59	242967,89
29-08-1-Z2-4	4,97	2,59	5,17	7,76	590020,14	295981,49	591962,98	887944,47
30-08-1-Z3-5	7,27	2,26	4,53	6,79	380515,12	145312,35	290624,71	435937,06
31-08-1-Z3-2	3,39	2,49	4,97	7,46	131632,30	110639,14	221278,28	331917,42
32-08-1-Z2-5	3,90	1,27	2,53	3,80	621787,91	228920,98	457841,97	686762,95
33-08-1-Z2-4	10,13	1,96	3,91	5,87	254977,69	75515,93	151031,85	226547,78
34-10-1-Z2-4	6,23	1,46	2,93	4,39	334869,65	73222,14	146444,29	219666,43
35-09-1-Z3-5	4,71	1,19	2,39	3,58	777075,13	186270,28	372540,57	558810,85
36-09-1-Z3-4	5,78	1,50	3,00	4,50	293376,31	88816,92	177633,84	266450,76
37-12-2-Z4-4	3,37	2,40	4,80	7,19	357614,80	307442,97	614885,93	922328,90
38-13-2-Z3-5	4,07	2,23	4,45	6,68	486422,08	245291,23	490582,46	735873,69
39-14-1-Z2-4	3,04	2,30	4,61	6,91	402711,28	359361,11	718722,22	1078083,33
40-14-1-Z2-2	3,06	1,27	2,55	3,82	96588,12	63118,13	126236,26	189354,39
41-15-1-Z2-4	2,49	1,75	3,50	5,26	733167,74	377578,37	755156,74	1132735,11
42-15-1-Z2-5	7,37	3,24	6,47	9,71	298497,85	198015,32	396030,65	594045,97
43-15-1-Z2-5	7,35	3,24	6,48	9,72	298601,58	198201,09	396402,18	594603,26
44-15-1-Z2-5	7,37	3,24	6,47	9,71	298668,84	198015,32	396030,65	594045,97
45-15-1-Z2-5	7,38	3,23	6,47	9,70	298711,07	197553,21	395106,42	592659,63
46-15-1-Z2-5	7,37	3,24	6,47	9,71	300382,75	198015,32	396030,65	594045,97
47-15-1-Z2-5	7,37	3,24	6,47	9,71	300508,57	198015,32	396030,65	594045,97
48-15-1-Z2-5	7,37	3,24	6,47	9,71	298867,65	198015,32	396030,65	594045,97