MINISTRY OF HOUSING, CONSTRUCTION AND SANITATION

NATIONAL BUILDING CODE

TECHNICAL STANDARD OF BUILDINGS E.030

“EARTHQUAKE-RESISTANT DESIGN”

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TECHNICAL BUILDING STANDARD E.030

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CHAPTER 1 GENERAL

1.1 Nomenclature

For the purposes of this technical standard, the following nomenclatures are considered:

C Seismic amplification coefficient.
C_T Coefficient to estimate the fundamental period of a building.
D_i Lateral displacement of the center of mass of level i in the pure translation (restricting the turns in plant) due to the forces f_i.
e_i Accidental eccentricity at level i.
F_i Horizontal seismic force at level i.
g Gravity acceleration.
h_i Height of story i with respect to ground level.
h_{ei} Height of interstory i.
h_n Total height of building in meters.
M_{ti} Accidental torsional moment in story i.
m Number of modes used in modal combination.
n Number of stories in the building.
P Total weight of the building.
P_i Weight of story i.
R Reduction coefficient of seismic forces.
r Maximum expected elastic structural response.
r_i Maximum elastic responses corresponding to mode i.
S Soil amplification factor.
S_a Spectrum of pseudo accelerations.
T Fundamental period of the structure for static analysis or period of a mode in dynamic analysis.
T_P Period that defines the spectral platform for seismic amplification coefficient.
T_L Period that defines the beginning of seismic amplification coefficient zone with constant displacement.
U Use or importance factor.
V Seismic base shear of the structure.
Z Zone factor.
R_0 Basic coefficient of reduction of seismic forces.
I_a Factor of irregularity in elevation.
I_p Factor of irregularity in plan.
f_i Lateral force at level i.
$\bar{V}_s$ Average velocity of propagation of shear waves.
$\bar{N}_{60}$ Weighted average of the standard penetration tests.
$\bar{S}_u$ Weighted average of shear strength in undrained condition.

1.2 Scope

This code establishes the minimum conditions for designed buildings to have a seismic behavior in accordance with the principles stated in item 1.3.

It applies to the design of all new buildings, to the reinforcement of existing ones and to the repair of those that are damaged by the action of earthquakes.

The use of structural systems other than those indicated in item 3.2 must be approved by the Ministry of Housing, Construction and Sanitation and demonstrate that the proposed alternative produces adequate results of rigidity, seismic resistance and ductility.

For structures, such as reservoirs, tanks, silos, bridges, transmission towers, springs, hydraulic structures and all those whose seismic behavior differs from that of buildings, this Standard may be used as applicable.

Besides what is indicated in the present code, disaster prevention measures against disasters that may occur as a consequence of the seismic movement such as tsunamis, fires, leakage of hazardous materials, landslides or other events should be taken.

1.3 Philosophy and Principles of Earthquake-Resistant Design

The philosophy of earthquake-resistant design consists in:

a) Avoid human losses.
b) Ensure the continuity of the basic services.
c) Minimize property damages.

It is well known that to give complete protection against every earthquake is not technically or economically feasible for most buildings. In accordance with such philosophy, the following design principles have been established in this standard:

a) The structure must not collapse or cause serious damage to people, although could have important damages, due to severe seismic movements that may occur in site.
b) The structure should endure ground movements qualified as moderate for the project site, the structure could experience repairable damages within the acceptable limits.
c) Essential buildings, defined in Table N° 5, will have special considerations oriented to achieve that the building remains operational after a severe earthquake.

1.4 Earthquake-resistant Structural Concepts

The importance of the following aspects must be taken into account:

- Symmetry, both in the distribution of masses and rigidities.
- Minimum weight, especially in top floors.
- Proper use and selection of construction materials.
- Adequate resistance against lateral loads.
- Structural continuity, both in plant and elevation.
- Ductility, understood as the structure deformation capacity beyond the elastic range.
- Limited lateral deformation.
- Inclusion of resistance successive lines (structural redundancy)

- Consideration of local conditions.
- Good constructive practice and rigorous structural supervision.

1.5 General Considerations

Every building and each of its parts shall be designed and built to resist the required seismic demands prescribed in this standard, following the specifications of the related codes to the materials used.

Is not necessary to consider simultaneously wind and earthquake effects.
The possible effect of partition walls, parapets and other attached elements must be considered in the structure seismic response. Analysis, reinforcement details and anchorage must be done according to this consideration.

In accordance with the earthquake-resistant design principles of the item 1.3, it is accepted that the buildings may have inelastic incursions against severe seismic demands. Thus, the design seismic forces are a fraction of the elastic maximum seismic demand.

1.6 Project Presentation

Blueprints, description memory and technical specifications of the structural project, must be signed by the registered (at the Peruvian Board of Engineers) civil engineer responsible of the design, who will be the only one authorized to approve any modification.

Blueprints of the structural project must include the following information.

a) Earthquake-resistant structural system.
b) Fundamental period of vibration in both principal directions.
c) Parameters to define the seismic force or the design spectrum.
d) Shear force in the base used for the design, in both directions.
e) Maximum displacement of the last floor and the maximum relative interstory displacement.
f) The location of the accelerometric stations, if needed according the Chapter 9.

CHAPTER 2 SEISMIC HAZARD

2.1 Seismic Zonation

The country is divided in four zones, as shown in Figure N°1. The zonation is based on the spatial distribution of observed seismology, the general characteristics of the seismic movements and their attenuation with epicentral distance, as well as the neotectonic information. Appendix N°01 contains a list of provinces and districts and their corresponding seismic zones.

SEISMIC ZONES

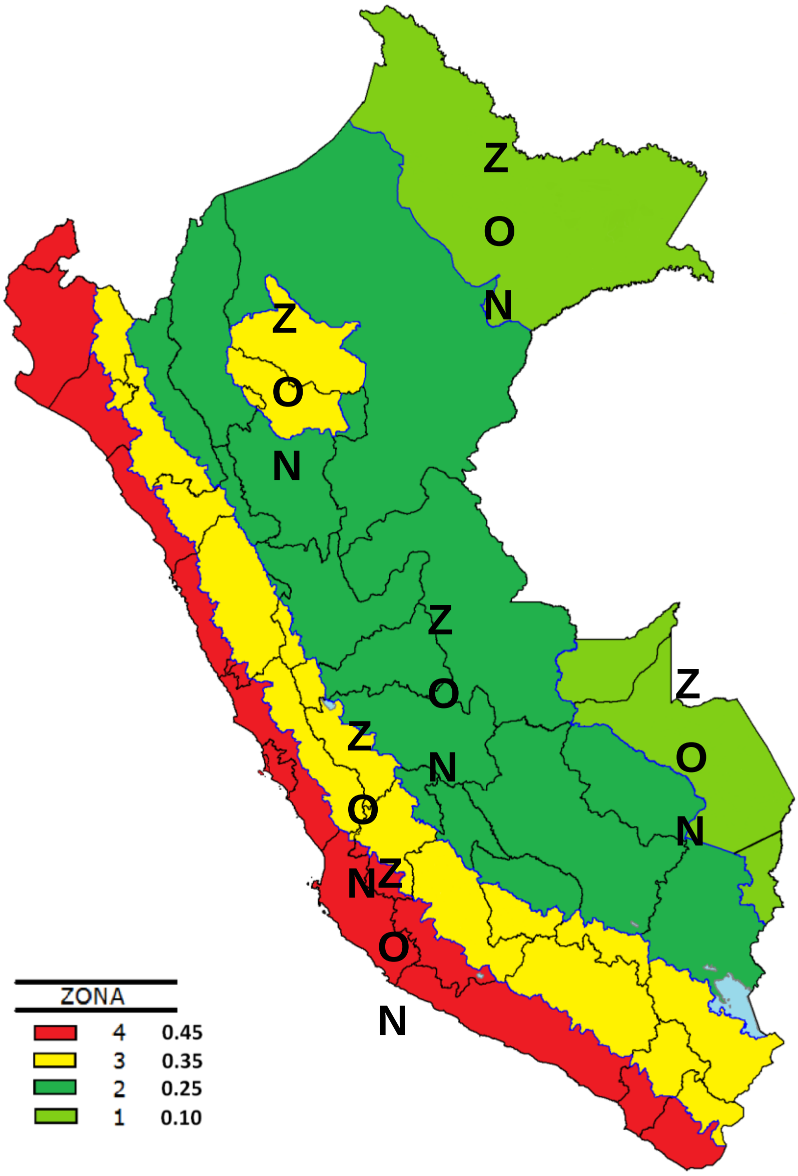

FIGURE N° 1

Every zone is assigned a zone factor Z as shown in Table N°1. This factor is interpreted as the peak ground acceleration (PGA) for rigid soil with a probability of exceedance of 10 percent in 50 years. Factor Z is expressed as a fraction of acceleration of gravity.

Table N° 1 ZONE FACTOR “Z”	
ZONE	Z
4	0,45
3	0,35
2	0,25
1	0,10

2.2 Seismic Microzonation and Site Studies

2.2.1 Seismic Microzonation

They are multidisciplinary studies which investigate the effects of seismic movements and associated phenomena such as soil liquefaction, landslides, tsunamis, etc., on the area of interest. The studies supply information on the possible modification of the seismic actions by local conditions and other natural phenomena, as well as the limitations and demands that, as a result of the studies, are taken into account for the design and construction of buildings and other works

The results obtained from microzonation studies could be considered in the following cases:

- Areas for urban expansion development.
- Reconstruction of urban areas destroyed by earthquakes and related phenomena.

2.2.2 Site Studies

These analyses are similar to the microzonation studies, but not necessarily in its whole extension. These studies are limited to the project site, and provide information about the variation of earthquake characteristics and other natural phenomena due to local conditions. The main objective is to determine the site seismic design parameters.

The site studies shall be conducted, among other cases, at heavy industrial sectors, explosives manufacturing, chemical, flammable and polluting materials.

The seismic design parameters must not be lower than those established In this standard

2.3 Geotechnical Conditions

2.3.1 Soil Profiles

For application of this standard, soil profiles are classified according to the average shear wave velocity ($\bar{V}_s$) .or alternatively, for granular soils, the weighted average of $\bar{N}_{60}$ obtained by a standard penetration test (SPT), or the weighted average of undrained shear strength ($\bar{S}_u$) for cohesive soils. These properties must be determined for the top 30 m of the subsurface profile extending from the base of the foundation, as indicated in the section 2.3.2.

For predominant granular soils, $\bar{N}_{60}$ is computed using only the soil layers of each of the granular strata. For predominant cohesive soils, the undrained shear strength $\bar{S}_u$ is computed using the weighted average result from cohesive soil strata.

The methodology explained above is also applicable for heterogeneous soils (granular and cohesive). In that case, if using $\bar{N}_{60}$ for granular soils and $\bar{S}_u$ for cohesive soils different profile classification are obtained, the site must be assigned to the category with the softer soil.

The site profiles types are five:

a. Soil Profile S_0: Hard Rock

This type corresponds to sound rock with shear wave velocity $\bar{V}_s$ greater than 1500 m/s. This category must be supported by shear wave velocity measurement either on site or on profiles of the same rock type in the same formation with an equal or greater degree of weathering and fracturing. Where hard rock conditions are known to be continuous to a depth of 30 m, superficial shear wave velocity measurements are permitted to be extrapolated to estimate $\bar{V}_s$.

b. Soil Profile S_1: Rock or Very Rigid Soils

This type corresponds to rocks with different degrees of fracturing, homogeneous rocks, very rigid soils with shear wave velocities $\bar{V}_s$ ranging from 500 to 1500 m/s, including when the foundation is constructed on:

- Fractured rock, with an unconfined compression strength qu greater or equal that 500 kPa (5 kg/cm^2).
- Very dense sand or dense sandy gravel, with $\bar{N}_{60}$ greater than 50.
- Very stiff clay (with a thickness larger than 20 m), with undrained shear strength $\bar{S}_u$ greater than 100 kPa (1 kg/cm^2) and its mechanical properties are increasing gradually with depth.

c. Soil Profile S_2: Intermediate Soils

This type corresponds to fairly rigid soils, with shear wave velocities $\bar{V}_s$ ranging from 180 to 500 m/s, including when the foundation is constructed on:

- Dense sand, medium to course, or sandy gravel, medium dense, with SPT values $\bar{N}_{60}$ between 15 and 50.
- Compact cohesive soil, with an undrained shear strength $\bar{S}_u$between 50 kPa (0,5 kg/cm^2) and 100 kPa (1 kg/cm^2), and its mechanical properties are increasing gradually with depth.

d. Soil Profile S_3: Soft Soils

This type corresponds to soft soils, with shear wave velocities $\bar{V}_s$ less than or equal to 180 m/s, including when the foundation is constructed on:

- Fine to medium sand, or sandy gravel, with SPT values $\bar{N}_{60}$ less than 15.

- Soft cohesive soil, with undrained shear strength $\bar{S}_u$between 25 kPa (0,25 kg/cm^2) and 50 kPa (0,5 kg/cm^2), and its mechanical properties are increasing gradually with depth.
- Any profile that does not correspond to S_4, with a total thickness greater than 3 m and having the following characteristics: plasticity index P_I greater than 20, moisture content ω greater than 40%, and undrained shear strength $\bar{S}_u$ less than 25 kPa.

e. Soil Profile S_4: Exceptional conditions

This type corresponds to exceptionally soft soils as well as sites where geologic and/or topographic conditions are particularly unfavorable, where a site response analysis is required to be performed. Soil Profile S_4 only will be considered when the geotechnical study of the site so indicates.

Table N°2 shows typical values for different of soil profiles types:

Table Nº 2
SOIL PROFILES CLASSIFICATION

Soil Profile	$\overline{V}_s$	$\overline{N}_{60}$	$\overline{s}_u$
S_0	> 1500 m/s	-	-
S_1	500 m/s a 1500 m/s	> 50	>100 kPa
S_2	180 m/s a 500 m/s	15 a 50	50 kPa a 100 kPa
S_3	< 180 m/s	< 15	25 kPa a 50 kPa
S_4	Classification depends on the geotechnical study		

2.3.2 Definitions of Soil Profile Parameters

The expressions presented in this section will be applied to the upper 30 m of the profile type, measured from the base of the foundation. The subindex i refers to n distinct layers in the top 30 m, where some of the n layers are cohesive and others are not, m is the number of granular layers and k is the number of cohesive layers.

a. Average Shear Wave Velocity, $\overline{V}_s$

The average shear wave velocity will be determined in accordance with the following formula:

$$\overline{V}_s = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \left(\frac{d_i}{V_{si}} \right)}$$

where d_i is the thickness of each one of the n layers and V_{si} is the shear wave velocity (m/s).

b. Weighted Average of the Standard Penetration Test, $\overline{N}_{60}$

$\overline{N}_{60}$ must be determined only for granular soil layers of the upper 30 m of the profile type, in accordance with the following formula:

$$\overline{N}_{60} = \frac{\sum_{i=1}^{m} d_i}{\sum_{i=1}^{m} \left(\frac{d_i}{N_{60i}} \right)}$$

where d_i is the thickness of the m granular soil layers, and N_{60i} is the corrected SPT value.

c. Weighted Average of Undrained Shear Strength, $\bar{S}_u$

$\bar{S}_u$ must only be determined for cohesive soil layers of the top 30 m of the profile type, in accordance with the following formula:

$$\bar{s}_u = \frac{\sum_{i=1}^{k} d_i}{\sum_{i=1}^{k} \left(\frac{d_i}{s_{u\,i}} \right)}$$

where d_i is the thickness of the k cohesive soil layers, and S_{ui} is the undrained shear strength (kPa).

Additional Considerations:

In case that geotechnical studies are not mandatory or soil properties are unknown for the upper 30 m, the responsible professional can assume appropriate soil profile parameters based on his experience and knowledge.

For deep foundation systems like piles, the profile type is the one corresponding to the 30 m below the top of the pile foundation.

2.4 Site Parameters (S, T_P y T_L)

The profile type that best describes the local type conditions will be considered, the soil amplification factor S and the period site coefficients T_P and T_L given in Tables N°3 and N°4, will be used.

Table N° 3
SOIL FACTOR “S”

ZONE \ SOIL	S_0	S_1	S_2	S_3
Z_4	0,80	1,00	1,05	1,10
Z_3	0,80	1,00	1,15	1,20
Z_2	0,80	1,00	1,20	1,40
Z_1	0,80	1,00	1,60	2,00

Table N° 4 PERÍODS “T_P” Y “T_L”				
	Soil Profile			
	S_0	S_1	S_2	S_3
T_P (s)	0,3	0,4	0,6	1,0
T_L (s)	3,0	2,5	2,0	1,6

2.5 Seismic Amplification Factor (C)

According to the local site conditions, the site amplification factor (C) is defined by the following equations:

$T < T_P$ $\qquad C = 2{,}5$

$T_P < T < T_L$ $\qquad C = 2{,}5 \cdot \left(\frac{T_P}{T}\right)$

$T > T_L$ $\qquad C = 2{,}5 \cdot \left(\frac{T_P \cdot T_L}{T^2}\right)$

T is the period according to items 4.5.4 and 4.6.1.

This coefficient is interpreted as the amplification factor of the structure acceleration with respect to the ground acceleration.

CHAPTER 3 CATEGORY, STRUCTURAL SYSTEM AND BUILDING REGULARITY

3.1 Building Category and Use or Importance Factor (*U*)

Each Structure shall be classified according to the category indicated in Table N° 5. The use or importance factor (*U*), defined in Table N° 5 will be used according to the classification done. For buildings with base isolation systems *U* = 1 can be considered.

Table N° 5
BUILDING CATEGORY AND FACTOR “U”

CATEGORY	DESCRIPTION	FACTOR *U*
A Essential buildings	A1: Health establishments from the Health Sector (public and private) of the second and third level, as regulated by the Ministry of Health.	See Note 1
	A2: Essential buildings whose function should not be interrupted immediately after a severe earthquake occurs, such as: - Health establishments not included in category A1. - Ports, airports, municipal facilities, communication exchanges. Fire stations, military and police headquarters. - Electricity generation and transformation plants, reservoirs and water treatment plants. All those buildings that could serve as shelter after a disaster, such as educational institutions, technological institutions and universities. Buildings whose collapse may represent an additional risk, such as blast furnace, factories and deposits of flammable or toxic materials, are included. Buildings that store archives and essential state information.	1,5
B Important buildings	Buildings where large numbers of people are assembled such as cinemas, theaters, stadiums, coliseums, shopping malls, passenger terminals, penitentiary establishments, or those where valuable patrimonies are stored like museums and libraries. Grain stores and other important warehouses for the supply are also considered.	1,3
C Common buildings	Common buildings such as housing units, business offices, hotels, restaurants, deposits and industrial facilities whose failure does not involve additional hazard of fires or toxic leaks.. Grain silos and other important warehouses for food supply are also considered.	1,0
D Temporary buildings	Provisional facilities for deposits, booths and others similar.	See note 2

Note 1: New buildings of category A1 will have base isolation systems when they are in seismic zones 4 and 3. In seismic zones 1 and 2, the responsible entity may decide whether or not to use base isolation systems. If base isolation system is not used in seismic zones 1 and 2, the value of U shall be at least 1.5.

Note 2: In these buildings adequate strength and stiffness for lateral actions must be provided, at the discretion of the designer.

3.2 Structural Systems

3.2.1 Reinforced Concrete Structures

All reinforced concrete elements that configure the earthquake resistant structural system shall satisfy the provisions of Chapter 21 "Special provisions for seismic design" of Technical Standard E.060 Reinforced Concrete of the RNE.

Moment Resistant Frames: At least 80% of the shear force at the base acts on the columns of the frames. In the case of structural walls, they shall be designed to withstand a fraction of the total seismic action in accordance with their stiffness.

Structural Walls: System in which seismic resistance is predominantly given by structural walls on which at least 70% of the shear force at the base acts.

Dual: Seismic actions are resisted by a combination of frames and structural walls. The shear force taken by the walls is between 20% and 70% of the base shear of the building. Frames shall be designed to withstand at least 30% of the shear force at the base.

Buildings of Limited Ductility Walls (EMDL): Buildings characterized by having a structural system where seismic and gravity load resistance is given by reinforced concrete walls of reduced thickness, in which end reinforcement is not confined and the vertical reinforcement is arranged in a single layer.

With this system, a maximum of eight floors can be built.

3.2.2 Steel Structures

The systems listed below are part of the Earthquake Resistant Structural System.

Special Moment Frames (SMF)
These frames must provide a significant inelastic deformation capacity through yielding by bending of beams and limited yielding in the panel zones of columns. Columns shall be designed to have a greater strength than beams when they reach the strain hardening zone.

Intermediate Moment Frames (IMF)
These frames must provide limited inelastic deformation capacity in their elements and connections.

Ordinary Moment Resistant Frames (OMF)
These frames must provide a minimum inelastic deformation capacity in their elements and connections.

Special Concentrically Braced Frames (SCBF)
These frames must provide a significant inelastic deformation capacity through the post-buckling strength in braces in compression and yielding in braces in tension.

Ordinary Concentrically Braced Frames (OCBF)

These frames must provide limited inelastic deformation capacity in their elements and connections.

Eccentrically Braced Frame (EBF)
These frames must provide a significant inelastic deformation capacity mainly due to the yielding by bending or shear in the zone between braces.

3.2.3 Masonry structures

Buildings whose earthquake resistant elements are walls based on masonry units of clay or concrete. For purposes of this Standard, no distinction is made between confined or reinforced masonry structures.

3.2.4 Timber structures

In this group are considered buildings whose resistant elements are mainly based on wood. Framed systems and braced structures type post and beam are included.

3.2.5 Earth structures

Buildings whose walls are made with units of earth masonry or in-situ rammed earth.

3.3 Category and structural systems

According to the category of a building and the zone where it is located, it must be projected using the structural system indicated in Table N ° 6 and following the irregularity restrictions of Table N ° 10.

Table N° 6
CATEGORY AND STRUCTURAL SYSTEM OF BUILDINGS

Building category	Zone	Structural System
A1	4 & 3	Base isolation systems with any structural system.
	2 & 1	Steel structures type SCBF, OCBF and EBF. Reinforced concrete structures: Dual Systems, Structural Walls. Confined or Reinforced masonry.
A2 (*)	4, 3 & 2	Steel structures type SCBF, OCBF and EBF. Reinforced Concrete Structures: Dual Systems, Structural Walls. Confined or Reinforced masonry.
	1	Any structural system.
B	4, 3 & 2	Steel structures type SMF, IMF, SCBF, OCBF and EBF. Reinforced Concrete Structures: Moment Frames, Dual Systems, Structural Walls. Confined or reinforced masonry. Timber structures.
	1	Any structural system.
C	4, 3, 2 & 1	Any structural system.

(*) For small rural constructions, such as schools and health center posts, traditional materials may be used following the recommendations of the standards for such materials.

3.4 Structural Systems and Basic Coefficient of Reduction of Seismic Forces (*R_0*)

Structural systems will be classified according to the materials used and seismic-resistant structural system in each direction of analysis, as indicated in Table No. 7.

When, in the direction of analysis, the building presents more than one structural system, the lowest coefficient R_0 will be taken.

Table N° 7
STRUCTURAL SYSTEMS

Structural System	Basic Coefficient of Reduction R_0 (*)
Steel:	
Special Moment Frames (SMF)	8
Intermediate Moment Frames (IMF)	7
Ordinary Moment Frames (OMF)	6
Special Concentrically Braced Frames (SCBF)	8
Ordinary Concentrically Braced Frames (OCBF)	6
Eccentrically Braced Frame (EBF)	8
Reinforced concrete:	
Frames	8
Dual	7
Structural walls	6
Limited Ductility Walls	4
Reinforced and confined concrete	3
Timber (Using allowable stresses)	7

(*) These coefficients will only apply to structures in which the vertical and horizontal elements allow dissipation of energy while maintaining the stability of the structure. They do not apply to inverted pendulum structures.

For earth constructions, refer to the RNE Standard E.080 "Adobe". This type of constructions is not recommended in S_3 soils, nor S_4 soils.

3.5 Structural Regularity

Structures should be classified as regular or irregular for the following purposes:

- Satisfy restrictions of Table No. 10.
- Establish procedures for analysis.
- Determine the R coefficient of reduction of seismic forces.

Regular Structures are those that in their resistant configuration to lateral loads, do not present the irregularities indicated in Tables N ° 8 and Nº 9.

In these cases, the factor I_a or I_p will be equal to 1,0.

Irregular Structures are those that present one or more of the irregularities indicated in Tables N ° 8 and N ° 9.

3.6 Irregularities Factors (I_a , I_p)

The factor I_a will be determined as the smallest of the values in Table Nº 8 corresponding to the structural irregularities, in height, in the two directions of analysis. The factor I_p will be determined as the lowest of the values in Table Nº 9 corresponding to the structural irregularities, in plant, in the two directions of analysis.

If, when Tables No. 8 and 9 are applied, different values of factors I_a o I_p were obtained for the two directions of analysis, the lowest value of each factor should be taken for the two directions of analysis.

Table N° 8 **STRUCTURAL IRREGULARITIES IN HEIGHT**	**Irregularity Factor I_a**
Stiffness Irregularity – Soft floor There is stiffness irregularity when, in any of the directions of analysis, the interstory distortion (drift) is greater than 1.4 times the corresponding value in the next upper story, or is greater than 1.25 times the average of the inter-story distortions in the three adjacent upper levels. The inter-story distortion shall be calculated as the average of the distortions at both ends of the story. **Resistance Irregularity – Weak floor** There is resistance irregularity when, in any of the directions of analysis, the inter-story resistance to shear forces is less than 80% of the resistance of the next upper inter-story.	**0,75**
Extreme Stiffness Irregularity (See Table Nº 10) There is stiffness-extreme irregularity when, in either direction of analysis, the interstory distortion (drift) is greater than 1.6 times the corresponding value of the next upper interstory, or is greater than 1.4 times the average of the interstory distortions in the three adjacent upper levels. The inter-story distortion shall be calculated as the average of the distortions at both ends of the story. **Extreme Resistance- Irregularity (See Table Nº 10)** There is extreme resistance irregularity when, in any of the directions of analysis, the inter-story resistance to shear forces is less than 65% of the resistance of the next upper inter-story.	**0,50**
Mass or Weight Irregularity There is mass (or weight) irregularity when the story weight, determined according to Item 4.3, is greater than 1.5 times the weight of an adjacent story. This criterion does not apply to roofs or basements.	**0,90**

Vertical Geometry Irregularity The configuration is irregular when, in any of the directions of analysis, the dimension in plan of the lateral force-resisting structure is greater than 1.3 times the corresponding dimension in an adjacent story. This criterion does not apply to roofs or basements.	**0,90**
Discontinuity in Resisting Systems The structure is characterized as irregular when in any element that withstands more than 10% of the shear force there is a vertical misalignment, either by a change in orientation or by an axis displacement of magnitude greater than 25% of the corresponding dimension of the element.	**0,80**
Extreme Discontinuity in Resisting Systems (See Table Nº 10) There is extreme discontinuity when the shear force that resists the discontinuous elements, as described in the previous item, exceeds 25% of the total shear force.	**0,60**

Table N° 9 **STRUCTURAL IRREGULARITIES IN PLAN**	**Irregularity Factor** I_p
Torsional Irregularity There is torsional irregularity when, in any of the directions of analysis, the maximum relative interstory displacement at the end of the building, calculated including accidental eccentricity ($\Delta_{máx}$), is greater than 1.2 times the relative displacement of the mass center of the same interstory for the same load condition (Δ_{CM}). This criterion applies only to buildings with rigid diaphragms and only if the maximum relative inter-story displacement is greater than 50% of the allowable displacement indicated in Table No. 11.	**0,75**
Extreme Torsional Irregularity (See Table Nº 10) There is torsional irregularity when, in any of the directions of analysis, the maximum relative interstory displacement at the end of the building, calculated including accidental eccentricity ($\Delta_{máx}$), is greater than 1.5 times the relative displacement of the mass center of the same inter-story for the same load condition (Δ_{CM}). This criterion applies only to buildings with rigid diaphragms and only if the maximum relative inter-story displacement is greater than 50% of the allowable displacement indicated in Table No. 11.	**0,60**
Reentrant Corner The structure is classified as irregular when it has reentrant corners whose dimensions in both directions are greater than 20% of the corresponding total dimension in plan.	**0,90**

Diaphragm Discontinuity The structure is classified as irregular when the diaphragms have abrupt discontinuities or significant variations in stiffness, including openings greater than 50% of the gross diaphragm area. There is also irregularity when, on any story and for any of the directions of analysis, there is some diaphragm cross-section with a net resistant area of less than 25% of the total cross-sectional area of the same direction computed with the total dimensions of the story.	**0,85**
Non-Parallel Systems There is irregularity when in any of the directions of analysis, the lateral force-resisting elements are not parallel. It does not apply if the axes of frames or walls form angles less than 30°, or when non-parallel elements resist less than 10% of the story shear force.	**0,90**

3.7 Restrictions to Irregularity

3.7.1 Building Category and Irregularity

According to the building category and the zone where it is located, it must be projected respecting the restrictions on irregularity of Table N° 10.

Table N° 10
CATEGORY AND REGULARITY OF BUILDINGS

Building Category	Zone	Restrictions
A1 y A2	4, 3 & 2	No irregularities allowed
	1	No extreme irregularities allowed
B	4, 3 & 2	No extreme irregularities allowed
	1	No restrictions
C	4 & 3	No extreme irregularities allowed
	2	No extreme irregularities allowed, except in buildings up to 2 floors or 8 m in total height
	1	No restrictions

3.7.2 Transfer Systems

The transfer systems are structures of slabs and beams that transmit forces and moments from discontinuous vertical elements to others of the lower story.

In seismic zones 4, 3 and 2 structures with transfer system in which more than 25% of gravity loads or seismic loads at any story are supported by vertical elements that are not continuous until the foundation are not allowed. This provision does not apply to the last story of buildings.

3.8 Coefficient of Reduction of Seismic Forces, R

The coefficient of reduction of seismic forces will be determined as the product of the coefficient R_0 determined from Table Nº 7 and the factors I_a, I_p obtained from Tables Nº 8 and Nº 9.

$$R = R_0 \cdot I_a \cdot I_p$$

3.9 Seismic Isolated Systems and Dissipation Energy Systems

Seismic isolation systems or energy dissipation systems are permitted in the building, as long as they comply with the provisions of this Standard (minimum base shear force, maximum permissible inter-story drift), and to the extent that the requirements of the following document are applicable:

“Minimum Design Loads for Building and Other Structures”, ASCE/SEI 7-10, Structural Engineering Institute of the American Society of Civil Engineers, Reston, Virginia, USA, 2010.

The installation of seismic isolation systems or energy dissipation systems shall be subject to specialized technical supervision by a civil engineer.

CHAPTER 4 STRUCTURAL ANALYSIS

4.1 General Considerations for Analysis

For regular structures, analysis can be made considering that the total of the seismic force is acting independently in two predominant orthogonal directions. For irregular structures should be assumed that the seismic force is acting in the most unfavorable direction for the design.

Vertical seismic forces are considered in the design of vertical elements, in very large horizontal elements, in post-tensioned and prestressed elements and cantilevers of a building. It is considered that the vertical seismic force is acting in the elements simultaneously with the horizontal seismic force, and the analysis is made in the most unfavorable direction.

4.2 Models for the Analysis

The model for the analysis will consider an adequate spatial distribution of masses and stiffnesses to calculate the most significant aspects of the dynamic behavior of the structure.

For purposes of this Standard, reinforced concrete and masonry structures might be analyzed considering the inertia moment of its cross-section area, ignoring cracking and reinforcement.

For buildings where can be reasonably assumed that floor systems work as rigid diaphragms, a lumped-mass model with three degrees of freedom, associated to two orthogonal components for horizontal translation and one component for rotation can be used. For that case the element deformations must be compatible with the rigid diaphragm condition, and plan distribution of the horizontal forces must be done as a function of the stiffness of the resisting elements.

It should be verified that the diaphragms have enough stiffness and resistance to assure the distributions mentioned above, on the contrary, their flexibility for the seismic force distribution should be taken into account.

The model should include the partition walls that are not properly isolated.

For stories that do not constitute rigid diaphragms, the resistant elements will be designed for the horizontal forces that directly correspond to them.

For the buildings in which its predominant structural elements are walls, a model that takes into consideration the interaction between walls in perpendicular directions should be considered (H walls, T walls and L walls).

4.3 Weight Estimation (P)

The weight (P), will be calculated by adding to the permanent and total load of the structure a percentage of the live load that will be determined as following:

a. For buildings included in categories A and B, 50% of the live load shall be taken.
b. For buildings included in category C, 25% of the live load shall be taken
c. For warehouses, 80% of the total weight can be taken stored.
d. For rooftops and roofs 25% of the live load can be taken.
e. For tank, silos and similar structures 100% of the load they can support shall be considered.

4.4 Seismic Analysis Procedures

It should be used one of the following procedures:

- Static analysis or equivalent static forces (item 4.5).
- Spectral modal dynamic analysis (item 4.6).

The analysis will be made considering a model with a linear-elastic behavior and with reduced seismic forces.

Time-history dynamic analysis procedure, described in item 4.7, can be used for verification purposes, but in no case it will be mandatory as a substitute of the procedures indicated in items 4.5 and 4.6.

4.5 Static Analysis or Equivalent Static Forces

4.5.1 Overview

This method represents the seismic forces through a set of horizontal forces acting at the center of mass of each story of the building.

This procedure can be used to analyzed all regular structures, or irregular structures, located in seismic zone 1, structures classified as regulars according to the item 3.5 with no more than 30 m of height and structures of reinforced concrete walls, reinforced masonry walls or confined masonry walls with no more than 15 m of height, even if they were irregulars.

4.5.2 Base Shear Force

The total shear force acting in the base of the structure, corresponding to the direction considered will be determined through the following expression:

$$V = \frac{Z \cdot U \cdot C \cdot S}{R} \cdot P$$

The minimum value for C/R should be considered:

$$\frac{C}{R} \geq 0{,}125$$

4.5.3 Seismic Force Distribution in Height

The horizontal seismic forces in any level i, corresponding to the direction considered, will be calculated through:

$$F_i = \alpha_i \cdot V$$

$$\alpha_i = \frac{P_i (h_i)^k}{\sum_{j=1}^{n} P_j (h_j)^k}$$

where n is the number of the stories of the building, k is an exponent related to the fundamental period of vibration of the structure (T), in the direction considered, which is calculated as follows:

a) For T less than or equal to 0,5 seconds: k = 1,0.
b) For T greater than 0,5 seconds: k = (0,75 + 0,5 T) ≤ 2,0.

4.5.4 Fundamental Period of Vibration

The fundamental period of vibration for each direction will be estimated with the following expression:

$$T = \frac{h_n}{C_T}$$

where:

C_T = 35 for buildings whose resistant elements in the direction considered are only:

a) Reinforced concrete frames without shear walls.
b) Ductile steel frames with moment-resistant connections, without bracing.

C_T = 45 for buildings whose resistant elements in the direction considered are:

a) Reinforced concrete frames with walls in the elevator shafts and stairs.
b) Braced steel frames.

C_T = 60 for masonry buildings and for all dual reinforced concrete buildings, with structural walls and low ductility walls.

Alternatively, the following expression can be used:

$$T = 2\pi \cdot \sqrt{\frac{\left(\sum_{i=1}^{n} P_i \cdot d_i^2\right)}{\left(g \cdot \sum_{i=1}^{n} f_i \cdot d_i\right)}}$$

where:

- f_i is the lateral force at level i corresponding to a distribution in height similar to the first mode in the direction of the analysis.
- d_i is the lateral displacement in the center of mass of level i in pure translation (restricting plan rotations) due to the forces f_i. The displacements will be calculated assuming a linear-elastic behavior of the structure, and for the case of reinforced concrete and masonry structures, considering cross-section areas without cracking.

When the analysis does not consider stiffness of the non-structural elements, the fundamental period T should be taken as 0,85 of the obtained value with the above formula.

4.5.5 Accidental Eccentricity

For structures with rigid diaphragm, the force acting in each level (F_i) will be assumed to be acting in the mass center of the corresponding level, and besides the eccentricity of the structure, the effect of the accidental eccentricity should be considered (for each direction of the analysis), as indicated as follows:

a) In the center of mass of each level, in addition to the acting static lateral force, an accidental moment (M_{ti}) will be applied which will be computed as:

$$M_{ti} = \pm F_i \cdot e_i$$

For each direction of analysis, the accidental eccentricity for each level (e_i) will be considered as 0,05 times the building dimension in the perpendicular direction of analysis.

b) It can be assumed that the most unfavorable conditions can be obtained considering the accidental eccentricities with the same sign for all stories. Only increments of the horizontal forces can be considered but not the reductions.

4.5.6 Vertical Seismic Forces

The vertical seismic force will be considered as a fraction of the weight equal to 2/3 $Z \cdot U \cdot S$.

In very long horizontal elements, including cantilevers, a dynamic analysis with spectra defined in item 4.6.2 will be required.

4.6 Spectral Modal Dynamic Analysis

Any structure can be designed using the dynamic analysis results by spectral modal combination as specified in this item.

4.6.1 Modes of Vibration

The modes of vibration can be determined by an analysis procedure that considers appropriately the stiffness characteristics and mass distribution of the structure.

In each direction, the modes of vibration considered are those where the sum of effective masses is at least 90 % of the total mass, but at least the first three predominant modes in the direction of the analysis should be taken into account.

4.6.2 Spectral Acceleration

For each horizontal direction analyzed an inelastic spectrum of pseudo-accelerations defined by the following expression will be used:

$$S_a = \frac{Z \cdot U \cdot C \cdot S}{R} \cdot g$$

For the analysis in the vertical direction a design spectrum with values equal to 2/3 of the design spectra used for the horizontal directions.

4.6.3 Combination Criteria

Through the combination criteria indicated, the expected maximum elastic response (r) can be determined for the internal forces in the elements of the structure as well as for the global parameters of the structure, such as base shear force, story shears, overturning moments, total and relative interstory displacements.

The expected maximum elastic response (r) corresponding to the total effect of different modes of vibration used (r_i) can be determined by using the complete quadratic combination of the calculated values for each mode.

$$r = \sqrt{\sum \sum r_i \, \rho_{ij} \, r_j}$$

Where r represents the modal responses, displacements or forces. The correlation coefficients are defined by:

$$\rho_{ij} = \frac{8\beta^2(1+\lambda)\lambda^{3/2}}{(1-\lambda^2)^2 + 4\beta^2\lambda(1+\lambda)^2} \qquad \lambda = \frac{\omega_j}{\omega_i}$$

β, fraction of the critical damping, that can be assumed as a constant and equal to 0,05 for each mode

ω_i , ω_j are angular frequencies corresponding to the modes i, j

Alternatively, the maximum response can be estimated through the following expression:

$$r = 0{,}25 \cdot \sum_{i=1}^{m} |r_i| + 0{,}75 \cdot \sqrt{\sum_{i=1}^{m} r_i^2}$$

4.6.4 Minimum Shear Force

For each direction considered in the analysis, the shear force at the base of the building cannot be less than 80 % of the calculated value according to item 4.5 for regular structures, nor less than 90 % for irregular structures.

If it is necessary to increase the shear force to fulfill the minimum requirements indicated, all other results should be scaled appropriately, except the displacements.

4.6.5 Accidental Eccentricity (Torsional Effects)

The uncertainty in the location of the mass centers for each level can be considered through the accidental eccentricity perpendicular to the earthquake direction equal to 0,05 times the dimension of the building in the perpendicular direction to the analysis direction. For each case the most unfavorable sign should be considered.

4.7 Time – History Dynamic Analysis

The time-history dynamic analysis can be used as a complementary procedure of the specified procedures in items 4.5 y 4.6.

In this analysis type, a mathematical model of the structure that considers the histeretical behavior of the elements should be used, determining the response against a set of ground accelerations through direct integration of the equilibrium equations.

4.7.1 Acceleration Records

A set of minimum three records of ground accelerations will be used for the analysis, each of them will include two components in orthogonal directions.

Each set of ground accelerations will contain a pair of components of horizontal accelerations, chosen and scaled from individual events. The accelerations records will be obtained from events whose magnitudes, distance to the fault and source mechanism are consistent with the maximum earthquake considered. When the required number of appropriate records are not available, synthetic records can be used to reach the required number.

For each pair of horizontal components of the ground motion, a pseudo-acceleration spectrum will be generated, using the square root of the sum of the squares (SRSS) of the calculated spectral values for each component separately, with 5% damping. Both components will be scaled by the same factor, so that in the range of periods between 0,2 T and 1.5 T (with T as the fundamental period), the average of the spectral values SRSS obtained for every set of records will not be less than the corresponding ordinate of the design spectrum, calculated according to item 4.6.2 with R = 1.

For the generation of the synthetic records, C values defined in the item 2.5 should be considered, but not for a zone with very short periods (T < 0,2 T_P), where the following expression will be considered:

$$T < 0{,}2\ T_P \qquad C = 1 + 7{,}5 \cdot \left(\frac{T}{T_P}\right)$$

4.7.2 Models for the Analysis

The mathematical model shall consider an adequate spatial distribution of masses of the structure.

The elements behavior will be modeled consistently with laboratory test results, and it has to be taken into account yield, strength degradation, stiffness degradation, pinching of the hysteretic loops and all the important aspects of the structural behavior shown by the tests.

The elements strength will be obtained based on the material strength expected values, hardening due to deformation and strength degradation due to the cyclic loading.

It is allowed to assume linear properties for those elements whose behavior remains in the elastic range as is shown by the analysis.

It is allowed to assume an equivalent viscous damping with a maximum value of 5 % of critical damping, besides the dissipation due to hysteretic behavior of the elements.

It can be assumed that the structure is perfectly fixed at the base, or alternatively, consider the flexibility of the foundations if applicable

4.7.3 Processing of the results

In case that at least seven set of ground motion records are used, the design forces, elements deformations and story drift, will be evaluated from the average of the corresponding maximum result obtained in the analysis. If the number of records used were less than seven, the design forces, the deformations and the story drift will be evaluated from the maximum values obtained in all analyses.

The maximum story drift should not exceed 1,25 times the values indicated in Table Nº 11.

Elements deformations will not exceed 2/3 times of those for which they would lose their bearing capacity under vertical loads or for those that will get a strength reduction of more than 30 %.

To verify element strength, the analysis result will be divided by R = 2, using the standards applicable for each material.

CHAPTER 5 STIFFNESS, STRENGTH AND DUCTILITY REQUIREMENTS

5.1 Determination of Lateral Displacements

For regular structures, the lateral displacements will be computed multiplying by 0,75 R the result obtained from the lineal and elastic analysis with the reduced seismic forces. For irregular structures, the lateral displacement will be calculated by multiplying by R the result obtained from the linear elastic analysis.

For the calculation of lateral displacement, the minimum C/R indicated in the item 4.5.2 and the minimum base shear specified in the item 4.6.4 will not be considered.

5.2 Allowable Lateral Displacements

The maximum relative interstory displacement, calculated according to item 5.1, should not exceed the fraction of the story height (drift) indicated in Table N° 11.

Table N° 11
LIMITIS FOR INTERSTORY DISTORTION

Predominant Material	(Δ_i / h_{ei})
Reinforced concrete	0,007
Steel	0,010
Masonry	0,005
Wood	0,010
Reinforced concrete building with law ductility wall	0,005

Note: The limits of distortion (drift) for structures of industrial use will be established by the designer, but in no case they will exceed twice the values of this Table.

5.3 Seismic Separation between Buildings (s)

Every structure should be separated from other adjacent structure, from the ground level, a minimum distance s to avoid impact during an earthquake

This distance will not be lower than 2/3 of the sum of maximum displacements of the adjacent building, nor lower than:

$$s = 0{,}006\ h \geq 0{,}03 \text{ m}$$

Where h is the height measure from ground level to the level considered to evaluate s.

The building will be separated from property boundaries from adjacent lots with or without buildings, distances not less than 2/3 the maximum displacement computed according to item 5.1, nor less than s/2 if the existing building has a regulatory seismic joint. In case there is no regulatory seismic joint, the building should be separated from the existing building the value of s/2 that corresponds plus the value s/2 of the neighboring structure

5.4 Redundancy

When there is an element in the structure, wall or frame, where the acting force is 30% or more of the total horizontal base shear in any interstory, the element shall be designed for 125% of that force.

5.5 Verification of the Ultimate Resistance

In case an analysis of the Ultimate Resistance is performed specifications of the ASCE/SEI 41 SEISMIC REHABILITATION OF EXISTING BUILDINGS can be used. This specification does not constitute a requirement of this Standard.

CHAPTER 6 NON-STRUCTURAL ELEMENTS, APENDIXES AND EQUIPMENT

6.1 Overview

Nonstructural elements are those that, whether connected or not to the system resistant to horizontal forces, contribute mass to the system but their contribution to the stiffness is not significant

For non-structural elements that are attached to the earthquake resistance structural system and should accompany the deformation of the structure, it must be ensured that in case of fault they should not cause damage

Within the nonstructural elements that must have adequate resistance and stiffness for seismic action are included:

- Fences (walls), partitions, parapets, prefabricated panels.
- Architectural and decorative elements among them ceilings, veneers.
- Glasses and curtain walls
- Hydraulic and sanitary installations
- Electrical installations
- Gas installations.
- Mechanical equipment
- Furniture whose instability means a risk

6.2 Professional Responsibility

The professionals who prepare the different projects will be responsible for providing the nonstructural elements with adequate resistance and stiffness for seismic actions

6.3 Design Forces

Nonstructural elements, their anchorage, and connections shall be designed to resist a seismic horizontal force in any direction (F) associated to its weight (P_e), whose resultant can be supposed to be applied at the center of mass of the element, such as indicated.

$$F = \frac{a_i}{g} \cdot C_1 \cdot P_e$$

Where a_i is the horizontal acceleration at the level where the nonstructural element is supported, or anchored, to the structural system of the building. This acceleration depends on the dynamic characteristic of the structural system of the building and must be evaluated by means of a dynamic analysis of the structure.

Alternatively the following equation can be used:

$$F = \frac{F_i}{P_i} \cdot C_1 \cdot P_e$$

Where F_i is the lateral force in the level where the nonstructural element is computed accordingly to the item 4.5 and P_i the weight of that level.

The values of C_1 will be taken from Table N° 12.

To compute the design forces in walls, partitions and nonstructural elements in general with distributed mas, the force F will be taken a distributed uniform load by unit area. For wall and partitions supported horizontally in two consecutive levels, the average of the acceleration of the two levels will be taken.

Table N° 12 VALUES OF C_1	
- Elements that if fail may fall outside the building and whose failure means danger for people or other structures.	3,0
- Walls and partitions inside of building	2,0
- Tanks on the rooftop, elevators machine room, pergolas, parapets in roof	3,0
- Rigid equipment connected rigidly to the floor	1,5

6.4 Mínimum Horizontal Force

At no level of the building the force F computed with item 6.3 will be less than $0,5\ Z \cdot U \cdot S \cdot P_e$.

6.5 Vertical Seismic Forces

The seismic vertical force will be considered to be 2/3 times the horizontal force.

For equipment supported by long spans elements, including cantilevers, a dynamic analysis shall be required with the spectrum defined in item 4.6.2.

6.6 Non Structural Elements Located at Base of the Structure, Under the Base and Fences (Walls)

Nonstructural elements located at or below the base of the structure (Basement) and fences shall be designed with horizontal force calculated with:

$$F = 0,5 \cdot Z \cdot U \cdot S \cdot P_e$$

6.7 Other Structures

For signs, chimneys, tower and communication antennas installed at any level of the building, the design force will be established considering the dynamic properties of the building and the structure it be installed. The design force should not be less than the correspondent to the calculated one with the methodology proposed in this chapter with a minimum value of C_1 of 3,0.

6.8 Design using the Method of Admissible Stresses

When a nonstructural element or the anchor are designed using the Method of Allowable Stresses, the seismic forces defined in this chapter shall be multiplying by 0,8.

CHAPTER 7 FOUNDATIONS

7.1 Overview

Assumptions made for the structure supports must be compatible with the foundation subsoil characteristics.

Computation of the applied pressures on the ground for verification with the Allowable Strength Design (ASD) must be determined using the forces obtained from the seismic analysis factored by 0.8.

7.2 Bearing Capacity

Every Geotechnical study must consider the effects of earthquake to obtain the bearing capacity of soil foundations. In case of soils where liquefaction is possible, the geotechnical prospection and geotechnical study must evaluate the liquefaction potential and proposed the proper solution.

7.3 Overturning Moment

Both the superstructure and foundation must be designed against seismic overturning moment following items 4.5 or 4.6. The safety factor computed with forces obtained applying this Standard must be greater than or equal to 1.2.

7.4 Foundations on soft or low bearing capacity soils

Isolated footings with or without piles on soils type S_3 y S_4 located in Zone 4 and 3 must have connection elements between them, which must bear in traction and compression, a minimum horizontal load equal to 10% the applied vertical load supported by the footing.

Beam connections in both directions must be provided in case of soils of bearing capacity less than 0,15 MPa,.

In case of piles and caissons beam connections must be used or, piles and isolated footings must be designed taken in account rotation and deformation caused by the horizontal force. Piles must have a tension steel reinforcement equal to at least 15% the bearing vertical load.

CHAPTER 8 EVALUATION, REHABILITATION AND RETROFITTING OF STRUCTURES

The structures damaged by earthquakes shall be evaluated, rehabilitated or retrofitted in such a way that corrects structural defects and recover the capacity to resist a new seismic event, following the seismic design philosophy specified in Chapter 1.

8.1 Evaluation of structures after an earthquake

After a seismic event, the structure shall be evaluated by a civil engineer, who should decide if the structure is in good condition or needs retrofitting, strengthening or demolition. The study shall consider geotechnical characteristics of the site.

8.2 Rehabilitation and retrofitting

The rehabilitation or retrofitting shall provide adequate combination of stiffness, resistance and ductility to the structure that guaranties adequate behavior in future events.

Rehabilitation or retrofitting project will include details, procedures and constructive procedures.

Seismic rehabilitation and retrofitting of structures follow guidelines of National Building Regulation (RNE). Only in exceptional cases may be used other criteria or procedures different to RNE, with due technical justification and approval of the owner and the competent authority.

Essential buildings may be intervened using the criteria of incremental seismic retrofit and to the extent applicable, using established criteria in the guideline “Engineering Guideline for Incremental Rehabilitation”, FEMA P-420, Risk Management Series, USA 2009.

CHAPTER 9 INSTRUMENTATION

9.1 Accelerometric Stations

Buildings with 10 000 m^2 area or more shall have one accelerometric station installed at ground level or at building base. That accelerometric station shall be provided by the building owner, technical specifications, connectivity system and data transmission shall be approved by the Geophysical Institute of Peru (IGP).

In buildings with more than 20 stories or in those with seismic dissipation devices or base isolation, of any height, an additional accelerometric station will be required, besides of one at the base, at the roof or one floor below to the roof.

9.2 Location requirements

The accelerometric station shall be installed at a suitable area, with easy access for maintenance and proper illumination, ventilation, stabilized power supply. The area shall be away from sources that generate any type of anthropic noise. The instrumentation plan shall be prepared by designers of each specialty and must be clearly indicated in the architectural, structures and facilities plan of the building.

9.3 Maintenance

The operational maintenance of parts, components, consumables, service of instruments, shall be provided by the buildings or apartment owners, under municipality control and shall be supervised by the Geophysical Institute of Peru (IGP). owner responsibility will be maintained for 10 years.

9.4 Data availability

Recorded information by the instruments will be integrated to the National Geophysical Data Center and will be available to the general public.

APPENDIX N° 1 SEISMIC ZONATION

The seismic zones, in which the Peruvian territory is divided, for the purpose of this standard, are shown in Figure 1

The provinces and districts of each area are specified as follows:

REGION (DEPT.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LORETO	MARISCAL RAMON CASTILLA	RAMON CASTILLA	1	ALL DISTRICTS
		PEBAS		
		SAN PABLO		
		YAVARI		
	MAYNAS	ALTO NANAY	1	ALL DISTRICTS
		BELÉN		
		FERNANDO LORES		
		INDIANA		
		IQUITOS		
		LAS AMAZONAS		
		MAZÁN		
		NAPO		
		PUNCHANA		
		PUTUMAYO		
		SAN JUAN BAUTISTA		
		TNTE. MANUEL CLAVERO		
		TORRES CAUSANA		
	REQUENA	SAQUENA	1	ONE DISTRICT
		REQUENA	2	TEN DISTRICTS
		CAPELO		
		SOPLÍN		
		TAPICHE		
		JENARO HERRERA		
		YAQUERANA		
		ALTO TAPICHE		
		EMILIO SAN MARTÍN		
		MAQUÍA		
		PUINAHUA		
	LORETO	NAUTA	2	ALL DISTRICTS
		PARINARI		
		TIGRE		
		TROMPETEROS		
		URARINAS		
	ALTO AMAZONAS	LAGUNAS	2	ONE DISTRICT
		YURIMAGUAS	3	FIVE DISTRICTS
		BALSAPUERTO		
		JEBEROS		
		SANTA CRUZ		
		TNTE. CÉSAR LOPEZ ROJAS		

REGION	PROVINCE	DISTRICT	SEISMIC	NUMBER OF

(DPTO.)			ZONE	DISTRICTS
LORETO	UCAYALI	CONTAMANA	2	ALL DISTRICTS
		INAHUAYA		
		PADRE MÁRQUEZ		
		PAMPA HERMOSA		
		SARAYACU		
		ALFREDO VARGAS GUERRA		
		YANAYACU		
	DATEM DEL MARAÑON	MANSERICHE	2	FOUR DISTRICTS
		MORONA		
		PASTAZA		
		ANDOAS		
		BARRANCA	3	TWO DISTRICTS
		CAHUAPANAS		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
UCAYALI	PURÚS	PURÚS	1	ONE DISTRICT
	ATALAYA	RAIMONDI	2	ALL DISTRICTS
		SEPAHUA		
		TAHUANÍA		
		YURÚA		
	PADRE ABAD	CURIMANÁ	2	ALL DISTRICTS
		IRAZOLA		
		PADRE ABAD		
	CORONEL PORTILLO	CALLERÍA	2	ALL DISTRICTS
		CAMPOVERDE		
		IPARÍA		
		MANANTAY		
		MASISEA		
		NUEVA REQUENA		
		YARINACOCHA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
MADRE DE DIOS	TAMBOPATA	INAMBARI	1	ALL DISTRICTS
		LABERINTO		
		LAS PIEDRAS		
		TAMBOPATA		
	TAHUAMANU	IBERIA	1	ALL DISTRICTS
		IÑAPARI		
		TAHUAMANU		
	MANU	FITZCARRALD	2	ALL DISTRICTS
		HUEPETUHE		
		MADRE DE DIOS		
		MANU		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
PUNO	SANDIA	ALTO INAMBARI	1	THREE DISTRICTS
		SAN JUAN DEL ORO		
		YANAHUAYA		
		CUYOCUYO	2	SEVEN DISTRICTS
		LIMBANI		
		PATAMBUCO		
		PHARA		
		QUIACA		
		SAN PEDRO DE PUTINA PUNCO		
		SANDIA		
	SAN ANTONIO DE PUTINA	ANANEA	2	ALL DISTRICTS
		QUILCAPUNCU		
		SINA		
		PEDRO VILCA APAZA		
		PUTINA		
	CARABAYA	AYAPATA	2	ALL DISTRICTS
		COASA		
		CRUCERO		
		ITUATA		
		SAN GABÁN		
		USICAYOS		
		AJOYANI		
		CORANI		
		MACUSANI		
		OLLACHEA		
	HUANCANÉ	COJATA	2	ALL DISTRICTS
		HUANCANÉ		
		HUATASANI		
		INCHUPALLA		
		PUSI		
		ROSASPATA		
		TARACO		
		VILQUE CHICO		
	MOHO	HUAYRAPATA	2	ALL DISTRICTS
		MOHO		
		CONIMA		
		TILALI		
	PUNO	COATA	2	THREE DISTRICTS
		CAPACHICA		
		AMANTANI		
		ACORA	3	TWELVE DISTRICTS
		ATUNCOLLA		
		CHUCUITO		
		HUATA		
		MAÑAZO		
		PAUCARCOLLA		
		PICHACANI		
		PLATERIA		
		PUNO		
		SAN ANTONIO		
		TIQUILLACA		
		VILQUE		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
PUNO	AZÁNGARO	AZÁNGARO	2	ALL DISTRICTS
		ACHAYA		
		ARAPA		
		ASILLO		
		CAMINACA		
		CHUPA		
		JOSÉ DOMINGO CHOQUEHUANCA		
		MUÑANI		
		POTONI		
		SAMAN		
		SAN ANTON		
		SAN JOSÉ		
		SAN JUAN DE SALINAS		
		SANTIAGO DE PUPUJA		
		TIRAPATA		
	CHUCUITO	DESAGUADERO	3	ALL DISTRICTS
		HUACULLANI		
		JULI		
		KELLUYO		
		PISACOMA		
		POMATA		
		ZEPITA		
	EL COLLAO	CAPAZO	3	ALL DISTRICTS
		CONDURIRI		
		ILAVE		
		PILCUYO		
		SANTA ROSA		
	LAMPA	CALAPUJA	2	THREE DISTRICTS
		NICASIO		
		PUCARÁ		
		CABANILLA	3	SEVEN DISTRICTS
		LAMPA		
		OCUVIRI		
		PALCA		
		PARATIA		
		SANTA LUCÍA		
		VILAVILA		
	MELGAR	ANTAUTA	2	ALL DISTRICTS
		AYAVIRI		
		CUPI		
		LLALLI		
		MACARI		
		NUÑOA		
		ORURILLO		
		SANTA ROSA		
		UMACHIRI		
	SAN ROMÁN	JULIACA	3	ALL DISTRICTS
		CABANA		
		CABANILLAS		
		CARACOTO		
	YUNGUYO	YUNGUYO	3	ALL DISTRICTS
		ANAPIA		
		COPANI		
		CUTURAPI		
		OLLARAYA		
		TINICACHI		
		UNICACHI		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AMAZONAS	CAHACHAPOYAS	ASUNCION	2	ALL DISTRICTS
		BALSAS		
		CHACHAPOYAS		
		CHETO		
		CHILIQUÍN		
		CHUQUIBAMBA		
		GRANADA		
		HUANCAS		
		LA JALCA		
		LEVANTO		
		LEYMEBAMBA		
		MAGDALENA		
		MARISCAL CASTILLA		
		MOLINOPAMPA		
		MONTEVIDEO		
		OLLEROS		
		QUINJALCA		
		SAN FRANCISCO DE DAGUAS		
		SAN ISIDRO DE MAINO		
		SOLOCO		
		SONCHE		
	BAGUA	ARAMANGO	2	ALL DISTRICTS
		BAGUA		
		COPALLIN		
		EL PARCO		
		IMAZA		
		LA PECA		
	BONGARÁ	CHISQUILLA	2	ALL DISTRICTS
		CHURUJA		
		COROSHA		
		CUISPES		
		FLORIDA		
		JAZAN		
		JUMBILLA		
		RECTA		
		SAN CARLOS		
		SHIPASBAMBA		
		VALERA		
		YAMBRASBAMBA		
	CONDORCANQUI	EL CENEPA	2	ALL DISTRICTS
		NIEVA		
		RÍO SANTIAGO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AMAZONAS	LUYA	CAMPORREDONDO	2	ALL DISTRICTS
		COCABAMBA		
		COLCAMAR		
		CONILA		
		INGUILPATA		
		LAMUD		
		LONGUITA		
		LONYA CHICO		
		LUYA		
		LUYA VIEJO		
		MARÍA		
		OCALLI		
		OCUMAL		
		PISUQUÍA		
		PROVIDENCIA		
		SAN CRISTOBAL		
		SAN FRANCISCO DEL YESO		
		SAN JERONIMO		
		SAN JUAN DE LOPECANCHA		
		SANTA CATALINA		
		SANTO TOMÁS		
		TINGO		
		TRITA		
	UTCUBAMBA	BAGUA GRANDE	2	ALL DISTRICTS
		CAJARURO		
		CUMBA		
		EL MILAGRO		
		JAMALCA		
		LONYA GRANDE		
		YAMON		
	RODRÍGUEZ DE MENDOZA	CHIRIMOTO	2	ELEVEN DISTRICTS
		COCHAMAL		
		HUAMBO		
		LIMABAMBA		
		LONGAR		
		MARISCAL BENAVIDES		
		MILPUC		
		OMIA		
		SAN NICOLÁS		
		SANTA ROSA		
		TOTORA		
		VISTA ALEGRE	3	ONE DISTRICT

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
SAN MARTÍN	BELLAVISTA	BELLAVISTA	2	ALL DISTRICTS
		ALTO BIAVO		
		BAJO BIAVO		
		HUALLAGA		
		SAN PABLO		
		SAN RAFAEL		
	HUALLAGA	SAPOSOA	2	ALL DISTRICTS
		EL ESLABON		
		PISCOYACU		
		SACANCHE		
		TINGO DE SAPOSOA		
		ALTO SAPOSOA		
	LAMAS	LAMAS	3	ALL DISTRICTS
		ALONSO DE ALVARADO		
		BARRANQUILLA		
		CAYNARACHI		
		CUÑUMBUQUI		
		PINTO RECODO		
		RUMISAPA		
		SAN ROQUE DE CUMBAZA		
		SHANAO		
		TABALOSOS		
		ZAPATEROS		
	MARISCAL CÁCERES	JUANJUÍ	2	ALL DISTRICTS
		CAMPANILLA		
		HUICUNGO		
		PACHIZA		
		PAJARILLO		
		JUANJUICILLO		
	PICOTA	PICOTA	2	ALL DISTRICTS
		BUENOS AIRES		
		CASPISAPA		
		PILLUANA		
		PUCACACA		
		SAN CRISTOBAL		
		SAN HILARION		
		SHAMBOYACU		
		TINGO DE PONAZA		
		TRES UNIDOS		
	MOYOBAMBA	MOYOBAMBA	3	ALL DISTRICTS
		CALZADA		
		HABANA		
		JEPELACIO		
		SORITOR		
		YANTALO		
	RIOJA	RIOJA	3	ALL DISTRICTS
		AWAJÚN		
		ELÍAS SOPLÍN VARGAS		
		NUEVA CAJAMARCA		
		PARDO MIGUEL		
		POSIC		
		SAN FERNANDO		
		YORONGOS		
		YURACYACU		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
SAN MARTÍN	SAN MARTÍN	CHIPURANA	2	FOUR DISTRICTS
		EL PORVENIR		
		HUIMBAYOC		
		PAPAPLAYA		
		TARAPOTO	3	TEN DISTRICTS
		ALBERTO LEVEU		
		CACATACHI		
		CHAZUTA		
		JUAN GUERRA		
		LA BANDA DE SHILCAYO		
		MORALES		
		SAN ANTONIO		
		SAUCE		
		SHAPAJA		
	TOCACHE	TOCACHE	2	ALL DISTRICTS
		NUEVO PROGRESO		
		POLVORA		
		SHUNTE		
		UCHIZA		
	EL DORADO	SAN JOSÉ DE SISA	3	ALL DISTRICTS
		AGUA BLANCA		
		SAN MARTÍN		
		SANTA ROSA		
		SHANTOJA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
HUÁNUCO	HUÁNUCO	HUÁNUCO	2	ALL DISTRICTS
		AMARILIS		
		CHINCHAO		
		CHURUMBAMBA		
		MARGOS		
		PILLCO MARCA		
		QUISQUI		
		SAN FRANCISCO DE CAYRÁN		
		SAN PEDRO DE CHAULÁN		
		SANTA MARÍA DEL VALLE		
		YARUMAYO		
		YACUS		
	HUACAYBAMBA	HUACAYBAMBA	2	ALL DISTRICTS
		CANCHABAMBA		
		COCHABAMBA		
		PINRA		

REGION	PROVINCE	DISTRICT	SEISMIC	NUMBER OF

(DPTO.)			ZONE	DISTRICTS
HUÁNUCO	**LEONCIO PRADO**	RUPA-RUPA	**2**	ALL DISTRICTS
		JOSÉ CRESPO Y CASTILLO		
		MARIANO DÁMASO BERAÚN		
		DANIEL ALOMÍA ROBLES		
		FELIPE LUYANDO		
		HERMILIO VALDIZÁN		
	MARAÑON	HUACACHUCRO	**2**	ALL DISTRICTS
		CHOLON		
		SAN BUENAVENTURA		
	PUERTO INCA	PUERTO INCA	**2**	ALL DISTRICTS
		CODO DEL POZUZO		
		HONORIA		
		TOURNAVISTA		
		YUYAPICHIS		
	YAROWILCA	CHAVINILLO	**2**	ALL DISTRICTS
		CAHUAC		
		CHACABAMBA		
		CHUPAN		
		JACAS CHICO		
		OBAS		
		PAMPAMARCA		
		CHORAS		
	PACHITEA	PANAO	**2**	ALL DISTRICTS
		CHAGLLA		
		MOLINO		
		UMARI		
	AMBO	AMBO	**2**	ALL DISTRICTS
		CAYNA		
		COLPAS		
		CONCHAMARCA		
		HUÁCAR		
		SAN FRANCISCO		
		SAN RAFAEL		
		TOMAY KICHWA		

REGION (DPTO.)	**PROVINCE**	**DISTRICT**	**SEISMIC ZONE**	**NUMBER OF DISTRICTS**

HUÁNUCO	**HUAMALÍES**	ARANCAY	**2**	EIGHT DISTRICTS
		CHAVÍN DE PARIARCA		
		JACAS GRANDE		
		JIRCAN		
		MONZON		
		PUNCHAO		
		SINGA		
		TANTAMAYO		
		LLATA	**3**	THREE DISTRICTS
		MIRAFLORES		
		PUÑOS		
	DOS DE MAYO	CHUQUIS	**2**	THREE DISTRICTS
		MARÍAS		
		QUIVILLA		
		LA UNION	**3**	SIX DISTRICTS
		PACHAS		
		RIPÁN		
		SHUNQUI		
		SILLAPATA		
		YANAS		
	LAURICOCHA	BAÑOS	**3**	ALL DISTRICTS
		JESÚS		
		JIVIA		
		QUEROPALCA		
		RONDOS		
		SAN FRANCISCO DE ASÍS		
		SAN MIGUEL DE CAURI		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
PASCO	**OXAPAMPA**	OXAPAMPA	**2**	ALL DISTRICTS
		CHONTABAMBA		
		HUANCABAMBA		
		PALCAZU		
		POZUZO		
		PUERTO BERMÚDEZ		
		VILLA RICA		
	PASCO	HUACHON	**2**	EIGHT DISTRICTS
		HUARIACA		
		NINACACA		
		PALLANCHACRA		
		PAUCARTAMBO		
		SAN FRANCISCO DE ASÍS DE YARUSYACÁN		
		TICLACAYÁN		
		YANACANCHA		
		CHAUPIMARCA (c. de Pasco)	**3**	FIVE DISTRICTS
		HUAYLLAY		
		SIMON BOLIVAR		
		TINYAHUARCO		
		VICCO		
	DANIEL A. CARRION	YANAHUANCA	**3**	ALL

		CHACAYAN		DISTRICTS
		GOYLLARISQUIZGA		
		PAUCAR		
		SAN PEDRO DE PILLAO		
		SANTA ANA DE TUSI		
		TAPUC		
		VILCABAMBA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
JUNÍN	CHANCHAMAYO	CHANCHAMAYO	2	ALL DISTRICTS
		PERENÉ		
		PICHANAQUI		
		SAN LUIS DE SHUARO		
		SAN RAMON		
		VITOC		
	SATIPO	COVIRIALI	2	ALL DISTRICTS SIX DISTRICTS
		LLAYLLA		
		MAZAMARI		
		PAMPA HERMOSA		
		PANGOA		
		RÍO NEGRO		
		RÍO TAMBO		
		SATIPO		
	TARMA	ACOBAMBA	2	SEIS DISTRITOS THREE DISTRICTS
		HUASAHUASI		
		PALCA		
		PALCAMAYO		
		SAN PEDRO DE CAJAS		
		TAPO		
		HUARICOLCA	3	TRES DISTRITOS
		LA UNION		
		TARMA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
JUNÍN	CONCEPCION	ANDAMARCA	2	FOUR

		COCHAS		DISTRICTS
		COMAS		
		MARISCAL CASTILLA		
		ACO	3	ELEVEN DISTRICTS
		CHAMBARA		
		CONCEPCION		
		HEROÍNAS DE TOLEDO		
		MANZANARES		
		MATAHUASI		
		MITO		
		NUEVE DE JULIO		
		ORCOTUNA		
		SAN JOSÉ DE QUERO		
		SANTA ROSA DE OCOPA		
	CHUPACA	AHUAC	3	ALL DISTRICTS
		CHONGOS BAJO		
		CHUPACA		
		HUACHAC		
		HUAMANCACA CHICO		
		SAN JUAN DE JARPA		
		SAN JUAN DE YSCOS		
		TRES DE DICIEMBRE		
		YANACANCHA		
	HUANCAYO	PARIAHUANCA	2	TWO DISTRICTS
		SANTO DOMINGO DE ACOBAMBA		
		CARHUACALLANGA	3	TWENTY SIX DISTRICTS
		CHACAPAMPA		
		CHICCHE		
		CHILCA		
		CHONGOS ALTO		
		CHUPURO		
		COLCA		
		CULLHUAS		
		EL TAMBO		
		HUACRAPUQUIO		
		HUALHUAS		
		HUANCAN		
		HUANCAYO		
		HUASICANCHA		
		HUAYUCACHI		
		INGENIO		
		PILCOMAYO		
		PUCARA		
		QUICHUAY		
		QUILCAS		
		SAN AGUSTÍN		
		SAN JERONIMO DE TUNÁN		
		SAÑO		
		SAPALLANGA		
		SICAYA		
		VIQUES		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
JUNÍN	**JAUJA**	APATA	2	FOUR

		MOLINOS		DISTRICTS
		MONOBAMBA		
		RICRAN		
		ACOLLA	3	THIRTY
		ATAURA		
		CANCHAYLLO		
		CURICACA		
		EL MANTARO		
		HUAMALI		
		HUARIPAMPA		
		HUERTAS		
		JANJAILLO		
		JAUJA		
		JULCAN		
		LEONOR ORDOÑEZ		
		LLOCLLAPAMPA		
		MARCO		
		MASMA		
		MASMA CHICCHE		
		MUQUI		
		MUQUIYAUYO		
		PACA		
		PACCHA		
		PANCÁN		
		PARCO		
		POMACANCHA		
		SAN LORENZO		
		SAN PEDRO DE CHUNAN		
		SAUSA		
		SINCOS		
		TUNANMARCA		
		YAULI		
		YAUYOS		
	JUNÍN	CARHUAMAYO	2	TWO DISTRICTS
		ULCUMAYO		
		JUNÍN	3	TWO DISTRICTS
		ONDORES		
	YAULI	CHACAPALPA	3	ALL DISTRICTS
		HUAY-HUAY		
		LA OROYA		
		MARCAPOMACOCHA		
		MOROCOCHA		
		PACCHA		
		SANTA BÁRBARA DE CARHUACAYÁN		
		SANTA ROSA DE SACCO		
		SUITUCANCHA		
		YAULI		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
CUSCO	CALCA	CALCA	2	ALL DISTRICTS
		COYA		

		LAMAY		
		LARES		
		PÍSAC		
		SAN SALVADOR		
		TARAY		
		YANATILE		
	URUBAMBA	CHINCHERO	**2**	ALL DISTRICTS
		HUAYLLABAMBA		
		MACHU PICCHU		
		MARAS		
		OLLANTAYTAMBO		
		URUBAMBA		
		YUCAY		
	PAUCARTAMBO	CAICAY	**2**	ALL DISTRICTS
		CHALLABAMBA		
		COLQUEPATA		
		HUANCARANI		
		KOSÑIPATA		
		PAUCARTAMBO		
	ANTA	ANCAHUASI	**2**	ALL DISTRICTS
		ANTA		
		CACHIMAYO		
		CHINCHAYPUJIO		
		HUAROCONDO		
		LIMATAMBO		
		MOLLEPATA		
		PUCYURA		
		ZURITE		
	QUISPICANCHIS	ANDAHUAYLILLAS	**2**	ALL DISTRICTS
		CAMANTI		
		CCARHUAYO		
		CCATCA		
		CUSIPATA		
		HUARO		
		LUCRE		
		MARCAPATA		
		OCONGATE		
		OROPESA		
		QUIQUIJANA		
		URCOS		
	PARURO	ACCHA	**2**	ALL DISTRICTS
		CCAPI		
		COLCHA		
		HUANOQUITE		
		OMACHA		
		PACCARITAMBO		
		PARURO		
		PILLPINTO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
CUSCO	**CANCHIS**	ALTO PICHIGUA	**2**	ALL DISTRICTS
		COMBAPATA		
		MARANGANI		
		PITUMARCA		

		SAN PABLO		
		SAN PEDRO		
		SUYCKUTAMBO		
		TINTA		
	CANAS	CHECCA	**2**	ALL DISTRICTS
		KUNTURKANKI		
		LANGUI		
		LAYO		
		PAMPAMARCA		
		QUEHUE		
		TÚPAC AMARU		
		YANAOCA		
	ACOMAYO	ACOMAYO	**2**	ALL DISTRICTS
		ACOPIA		
		ACOS		
		MOSOC LLACTA		
		POMACANCHI		
		RONDOCAN		
		SANGARARÁ		
	CUSCO	CCORCA	**2**	ALL DISTRICTS
		CUSCO		
		POROY		
		SAN JERONIMO		
		SAN SEBASTIÁN		
		SANTIAGO		
		SAYLLA		
		WANCHAQ		
	LA CONVENCION	ECHERATE	**2**	ALL DISTRICTS
		HUAYOPATA		
		MARANURA		
		OCOBAMBA		
		PICHARI		
		QUELLOUNO		
		QUIMBIRI		
		SANTA ANA		
		SANTA TERESA		
		VILCABAMBA		
	CHUMBIVILCAS	CAPACMARCA	**2**	FOUR DISTRICTS
		CHAMACA		
		COLQUEMARCA		
		LIVITACA		
		LLUSCO	**3**	FOUR DISTRICTS
		QUIÑOTA		
		SANTO TOMÁS		
		VELILLE		
	ESPINAR	CONDOROMA	**3**	ALL DISTRICTS
		COPORAQUE		
		ESPINAR		
		OCORURO		
		PALLPATA		
		PICHIGUA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
HUANCAVELICA	**CHURCAMPA**	ANCO	**2**	ALL DISTRICTS
		CHINCHIUASI		
		CHURCAMPA		
		COSME		

		EL CARMEN		
		LA MERCED		
		LOCROJA		
		PACHAMARCA		
		PAUCARBAMBA		
		SAN MIGUEL DE MAYOC		
		SAN PEDRO DE CORIS		
	ACOBAMBA	ACOBAMBA	**2**	ALL DISTRICTS
		ANDABAMBA		
		ANTA		
		CAJA		
		MARCAS		
		PAUCARÁ		
		POMACOCHA		
		ROSARIO		
	TAYACAJA	COLCABAMBA	**2**	TEN DISTRICTS
		DANIEL HERNÁNDEZ		
		HUACHOCOLPA		
		HUARIBAMBA		
		QUISHUAR		
		SALCABAMBA		
		SAN MARCOS DE ROCCHAC		
		SARCAHUASI		
		SURCUBAMBA		
		TINTAY PUNCU		
		ACOSTAMBO	**3**	SEVEN DISTRICTS
		ACRAQUIA		
		AHUAYCHA		
		HUANDO		
		ÑAHUIMPUQUIO		
		PAMPAS		
		PAZOS		
	ANGARAES	CHINCHO	**2**	ONE DISTRICT
		ANCHONGA	**3**	ELEVEN DISTRICTS
		CALLANMARCA		
		CCOCHACCASA		
		CONGALLA		
		HUANCA HUANCA		
		HUAYLLAY GRANDE		
		JULCAMARCA		
		LIRCAY		
		SAN ANTONIO DE ANTAPARCO		
		SECCLLA		
		STO TOMÁS DE PATA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
HUANCAVELICA	**HUANCAVELICA**	ACOBAMBILLA	**3**	ALL DISTRICTS
		ACORIA		
		ASCENSION		
		CONAYCA		

		CUENCA		
		HUACHOCOLPA		
		HUANCAVELICA		
		HUAYLLAHUARA		
		IZCUCHACA		
		LARIA		
		MANTA		
		MARISCAL CÁCERES		
		MOYA		
		NUEVO OCCORO		
		PALCA		
		PILCHACA		
		VILCA		
		YAULI		
	CASTROVIRREYNA	ARMA	**3**	ELEVEN DISTRICTS
		AURAHUA		
		CASTROVIRREYNA		
		CHUPAMARCA		
		COCAS		
		HUACHOS		
		HUAMATAMBO		
		MOLLEPAMPA		
		SANTA ANA		
		TANTARÁ		
		TICRAPO		
		CAPILLAS	**4**	TWO DISTRICTS
		SAN JUAN		
	HUAYTARÁ	SAN ANTONIO DE CUSICANCHA	**3**	THREE DISTRICTS
		PILPICHACA		
		QUERCO		
		AYAVÍ	**4**	THIRTEEN DISTRICTS
		CORDOVA		
		HUAYACUNDO ARMA		
		HUAYTARÁ		
		LARAMARCA		
		OCOYO		
		QUITO ARMA		
		SAN FRANCISCO DE SANGAYAICO		
		SAN ISIDRO		
		SANTIAGO DE CHOCORVOS		
		SANTIAGO DE QUIRAHUARA		
		SANTO DOMINGO DE CAPILLAS		
		TAMBO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AYACUCHO	**HUANTA**	AYAHUANCO	**2**	ALL DISTRICTS
		HIGUAIN		
		HUAMANGUILLA		
		HUANTA		

		LLOCHEGUA		
		LURICOCHA		
		SANTILLANA		
		SIVIA		
	LA MAR	ANCO	**2**	ALL DISTRICTS
		AYNA		
		CHILCAS		
		CHUNGUI		
		LUIS CARRANZA		
		SAN MIGUEL		
		SANTA ROSA		
		TAMBO		
	HUAMANGA	ACOCRO	**2**	TEN DISTRICTS
		ACOSVINCHOS		
		AYACUCHO		
		JESÚS NAZARENO		
		OCROS		
		PACAYCASA		
		QUINUA		
		SAN JOSÉ DE TICLLAS		
		SANTIAGO DE PISCHA		
		TAMBILLO		
		CARMEN ALTO	**3**	FIVE DISTRICTS
		CHIARA		
		SAN JUAN BAUTISTA		
		SOCOS		
		VINCHOS		
	VILCASHUAMÁN	CONCEPCION	**2**	ONE DISTRICT
		ACOMARCA	**3**	SEVEN DISTRICTS
		CARHUANCA		
		HUAMBALPA		
		INDEPENDENCIA		
		SAURAMA		
		VILCASHUAMÁN		
		VISCHONGO		
	HUANCASANCOS	CARAPO	**3**	ALL DISTRICTS
		SACSAMARCA		
		SANCOS		
		SANTIAGO DE LUCANAMARCA		
	CANGALLO	CANGALLO	**3**	ALL DISTRICTS
		CHUSCHI		
		LOS MOROCHUCOS		
		MARÍA PARADO DE BELLIDO		
		PARAS		
		TOTOS		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AYACUCHO	**PÁUCAR DEL SARA SARA**	COLTA	**3**	ALL DISTRICTS
		CORCULLA		
		LAMPA		
		MARCABAMBA		

		OYOLO		
		PARARCA		
		PAUSA		
		SAN JAVIER DE ALPABAMBA		
		SAN JOSÉ DE USHUA		
		SARA SARA		
	SUCRE	BELÉN	**3**	ALL DISTRICTS ALL DISTRICTS
		CHALCOS		
		CHILCAYOC		
		HUACAÑA		
		MORCOLLA		
		PAICO		
		QUEROBAMBA		
		SAN PEDRO DE LARCAY		
		SAN SALVADOR DE QUIJE		
		SANTIAGO DE PAUCARAY		
		SORAS		
	VÍCTOR FAJARDO	ALCAMENCA	**3**	TODOS LOS DISTRITOS
		APONGO		
		ASQUIPATA		
		CANARIA		
		CAYARA		
		COLCA		
		HUAMANQUIQUIA		
		HUANCAPI		
		HUANCARAYLLA		
		HUAYA		
		SARHUA		
		VILCANCHOS		
	PARINACOCHAS	CHUMPI	**3**	SIX DISTRICTS
		CORACORA		
		CORONEL CASTAÑEDA		
		PACAPAUSA		
		SAN FRANCISCO DE RAVACAYCU		
		UPAHUACHO		
		PULLO	**4**	TWO DISTRICTS
		PUYUSCA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AYACUCHO	**LUCANAS**	AUCARA	**3**	TEN DISTRICTS
		CABANA		
		CARMEN SALCEDO		
		CHAVIÑA		

		CHIPAO		
		LUCANAS		
		PUQUIO		
		SAN JUAN		
		SAN PEDRO DE PALCO		
		SANTA ANA DE HUAYCAHUACHO		
		HUAC HUAS	4	ELEVEN DISTRICTS
		LARAMATE		
		LEONCIO PRADO		
		LLAUTA		
		OCAÑA		
		OTOCA		
		SAISA		
		SAN CRÍSTOBAL		
		SAN PEDRO		
		SANCOS		
		SANTA LUCÍA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
APURÍMAC	**COTABAMBAS**	CALLHUAHUACHO	2	ALL DISTRICTS
		COTABAMBAS		
		COYLLURQUI		
		HAQUIRA		
		MARA		
		TAMBOBAMBA		
	GRAU	CHUQUIBAMBILLA	2	ALL DISTRICTS
		CURASCO		
		CURPAHUASI		
		GAMARRA		
		HUAYLLATI		
		MAMARA		
		MICAELA BASTIDAS		
		PATAYPAMPA		
		PROGRESO		
		SAN ANTONIO		
		SANTA ROSA		
		TURPAY		
		VILCABAMBA		
		VIRUNDO		
	ABANCAY	ABANCAY	2	ALL DISTRICTS
		CHACOCHE		
		CIRCA		
		CURAHUASI		
		HUANIPACA		
		LAMBRAMA		
		PICHIRHUA		
		SAN PEDRO DE CACHORA		
		TAMBURCO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
APURÍMAC	**CHINCHEROS**	ANCO-HUALLO	2	ALL DISTRICTS
		CHINCHEROS		
		COCHARCAS		
		HUACCANA		
		OCOBAMBA		

		ONGOY		
		RANRACANCHA		
		URANMARCA		
	ANDAHUAYLAS	ANDAHUAYLAS	2	THRITEEN DISTRICTS
		ANDARAPA		
		HUANCARAMA		
		HUANCARAY		
		KAQUIABAMBA		
		KISHUARA		
		PACOBAMBA		
		PACUCHA		
		SAN ANTONIO DE CACHI		
		SAN JERONIMO		
		SANTA MARIA DE CHICMO		
		TALAVERA		
		TURPO		
		CHIARA	3	SIX DISTRICTS
		HUAYANA		
		PAMPACHIRI		
		POMACOCHA		
		SAN MIGUEL DE CHACCRAMPA		
		TUMAY HUARACA		
	AYMARAES	CHAPIMARCA	2	FIVE DISTRICTS
		COLCABAMBA		
		LUCRE		
		SAN JUAN DE CHACÑA		
		TINTAY		
		CAPAYA	3	TWELVE DISTRICTS
		CARAYBAMBA		
		CHALHUANCA		
		COTARUSE		
		HUAYLLO		
		JUSTO APU SAHUARAURA		
		POCOHUANCA		
		SAÑAYCA		
		SORAYA		
		TAPAIRIHUA		
		TORAYA		
		YANACA		
	ANTABAMBA	ANTABAMBA	3	ALL DISTRICTS
		EL ORO		
		HIAQUIRCA		
		JUAN ESPINOZA MEDRANO		
		OROPESA		
		PACHACONAS		
		SABAINO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
TUMBES	**CONTRALMIRANTE VILLAR**	CASITAS	4	ALL DISTRICTS
		ZORRITOS		
	TUMBES	CORRALES	4	ALL DISTRICTS
		LA CRUZ		

		PAMPAS DE HOSPITAL		
		SAN JACINTO		
		SAN JUAN DE LA VIRGEN		
		TUMBES		
	ZARUMILLA	AGUAS VERDES	4	ALL DISTRICTS
		MATAPALO		
		PAPAYAL		
		ZARUMILLA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
PIURA	**HUANCABAMBA**	CANCHAQUE	3	ALL DISTRICTS
		EL CARMEN DE LA FRONTERA		
		HUANCABAMBA		
		HUARMACA		
		LALAQUIZ		
		SAN MIGUEL DE EL FAIQUE		
		SONDOR		
		SONDORILLO		
	AYABACA	AYABACA	3	SIX DISTRICTS
		JILILÍ		
		LAGUNAS		
		MONTERO		
		PACAIPAMPA		
		SICCHEZ		
		FRÍAS	4	FOUR DISTRICTS
		PAIMAS		
		SAPILLICA		
		SUYO		
	MORROPON	BUENOS AIRES	3	SIX DISTRICTS
		CHALACO		
		SALITRAL		
		SAN JUAN DE BIGOTE		
		SANTA CATALINA DE MOSSA		
		YAMANGO		
		CHULUCANAS	4	FOUR DISTRICTS
		LA MATANZA		
		MORROPON		
		SANTO DOMINGO		
	PIURA	CASTILLA	4	ALL DISTRICTS
		CATACAOS		
		CURA MORI		
		EL TALLÁN		
		LA ARENA		
		LA UNION		
		LAS LOMAS		
		PIURA		
		TAMBO GRANDE		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
PIURA	**PAITA**	AMOTAPE	4	ALL DISTRICTS
		ARENAL		
		COLÁN		
		LA HUACA		
		PAITA		

		TAMARINDO		
		VICHAYAL		
	SECHURA	BELLAVISTA LA UNION	4	ALL DISTRICTS
		BERNAL		
		CRISTO NOS VALGA		
		RINCONADA LLICUAR		
		SECHURA		
		VICE		
	SULLANA	BELLAVISTA	4	ALL DISTRICTS
		IGNACIO ESCUDERO		
		LANCONES		
		MARCAVELICA		
		MIGUEL CHECA		
		QUERECOTILLO		
		SALITRAL		
		SULLANA		
	TALARA	EL ALTO	4	ALL DISTRICTSS
		LA BREA		
		LOBITOS		
		LOS ORGANOS		
		MÁNCORA		
		PARIÑAS		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LAMBAYEQUE	**FERREÑAFE**	CAÑARIS	3	TWO DISTRICTS
		INCAHUASI		
		FERREÑAFE	4	FOUR DISTRICTS
		MANUEL A. MESONES MURO		
		PITIPO		

		PUEBLO NUEVO		
		SALAS	3	ONE DISTRITC
	LAMBAYEQUE	CHOCHOPE	4	ELEVEN DISTRICTS
		ILLIMO		
		JAYANCA		
		LAMBAYEQUE		
		MOCHUMI		
		MORROPE		
		MOTUPE		
		OLMOS		
		PACORA		
		SAN JOSÉ		
		TÚCUME		
	CHICLAYO	CAYALTÍ	4	ALL DISTRICTS
		CHICLAYO		
		CHONGOYAPE		
		ETEN		
		ETEN PUERTO		
		JOSÉ LEONARDO ORTIZ		
		LA VICTORIA		
		LAGUNAS		
		MONSEFÚ		
		NUEVA ARICA		
		OYOTÚN		
		PATAPO		
		PICSI		
		PIMENTEL		
		POMALCA		
		PUCALÁ		
		REQUE		
		SANTA ROSA		
		SAÑA		
		TUMÁN		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
CAJAMARCA	**HUALGAYOC**	BAMBAMARCA	**2**	ALL DISTRICTS
		CHUGUR		
		HUALGAYOC		
	SAN IGNACIO	CHIRINOS	**2**	FIVE DISTRICTS
		HUARANGO		

		LA COIPA		
		NAMBALLE		
		SAN IGNACIO		
		SAN JOSE DE LOURDES	2	TWO DISTRICTS
		TABACONAS		
	CELENDÍN	CELENDÍN	2	ALL DISTRICTS
		CHUMUCH		
		CORTEGANA		
		HUASMIN		
		JORGE CHÁVEZ		
		JOSÉ GÁLVEZ		
		LA LIBERTAD DE PALLAN		
		MIGUEL IGLESIAS		
		OXAMARCA		
		SOROCHUCO		
		SUCRE		
		UTCO		
	CUTERVO	CALLAYUC	2	FOURTEEN DISTRICTS
		CHOROS		
		CUJILLO		
		CUTERVO		
		LA RAMADA		
		PIMPINGOS		
		SAN ANDRÉS DE CUTERVO		
		SAN JUAN DE CUTERVO		
		SAN LUIS DE LUCMA		
		SANTA CRUZ		
		SANTO DOMINGO DE LA CAPILLA		
		SANTO TOMÁS		
		SOCOTA		
		TORIBIO CASANOVA		
		QUEROCOTILLO	3	ONE DISTRICT
	JAÉN	BELLAVISTA	2	EIGHT DISTRICTS
		CHONTALI		
		COLASAY		
		HUABAL		
		JAÉN		
		LAS PIRIAS		
		SAN JOSÉ DEL ALTO		
		SANTA ROSA		
		POMAHUACA	3	FOUR DISTRICTS
		PUCARÁ		
		SALLIQUE		
		SAN FELIPE		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
CAJAMARCA	**SAN MARCOS**	GREGORIO PITA	2	FOUR DISTRICTS
		ICHOCÁN		

		JOSÉ MANUEL QUIROZ		
		JOSÉ SABOGAL		
		CHANCAY	3	THREE DISTRICTS
		EDUARDO VILLANUEVA		
		PEDRO GÁLVEZ		
	CHOTA	ANGUIA	2	TWELVE DISTRICTS
		CHADÍN		
		CHALAMARCA		
		CHIGUIRIP		
		CHIMBAN		
		CHOROPAMPA		
		CHOTA		
		CONCHAN		
		LAJAS		
		PACCHA		
		PION		
		TACABAMBA		
		COCHABAMBA	3	SEVEN DISTRICTS
		HUAMBOS		
		LLAMA		
		MIRACOSTA		
		QUEROCOTO		
		SAN JUAN DE LICUPIS		
		TOCMOCHE		
	CAJABAMBA	SITACOCHA	2	ONE DISTRICT
		CACHACHI	3	THREE DISTRICTS
		CAJABAMBA		
		CONDEBAMBA		
	CAJAMARCA	ENCAÑADA	2	ONE DISTRICT
		ASUNCION	3	ELEVEN DISTRICTS
		CAJAMARCA		
		CHETILLA		
		COSPÁN		
		JESÚS		
		LLACANORA		
		LOS BAÑOS DEL INCA		
		MAGDALENA		
		MATARA		
		NAMORA		
		SAN JUAN		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
CAJAMARCA	CONTUMAZÁ	CHILETE	3	ALL DISTRICTS
		CONTUMAZÁ		
		CUPISNIQUE		
		GUZMANGO		
		SAN BENITO		

		SANTA CRUZ DE TOLEDO		
		TANTARICA		
		YONÁN		
	SAN MIGUEL	BOLÍVAR	**3**	ALL DISTRICTS
		CALQUIS		
		CATILLUC		
		EL PRADO		
		LA FLORIDA		
		LLAPA		
		NANCHOC		
		NIEPOS		
		SAN GREGORIO		
		SAN MIGUEL		
		SAN SILVESTRE DE COCHAN		
		TONGOD		
		UNION AGUA BLANCA		
	SAN PABLO	SAN BERNARDINO	**2**	ALL DISTRICTS
		SAN LUIS		
		SAN PABLO		
		TUMBADEN		
	SANTA CRUZ	ANDABAMBA	**2**	ALL DISTRICTS
		CATACHE		
		CHANCAYBAÑOS		
		LA ESPERANZA		
		NINABAMBA		
		PULÁN		
		SANTA CRUZ		
		SAUCEPAMPA		
		SEXI		
		UTICYACU		
		YAUYUCAN		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LA LIBERTAD	**BOLÍVAR**	BAMBAMARCA	**2**	ALL DISTRICTS
		BOLÍVAR		
		CONDORMARCA		
		LONGOTEA		
		UCHUMARCA		
		UCUNCHA		

	PATAZ	BULDIBUYO	**2**	ALL DISTRICTS
		CHILLIA		
		HUANCASPATA		
		HUAYLILLAS		
		HUAYO		
		ONGON		
		PARCOY		
		PATAZ		
		PIAS		
		SANTIAGO DE CHALLAS		
		TAURIJA		
		TAYABAMBA		
		URPAY		
	SÁNCHEZ CARRION	COCHORCO	**2**	TWO DISTRICTS
		SARTIMBAMBA		
		CHUGAY	**3**	SIX DISTRICTS
		CURGOS		
		HUAMACHUCO		
		MARCABAL		
		SANAGORAN		
		SARÍN		
	SANTIAGO DE CHUCO	ANGASMARCA	**3**	ALL DISTRICTS
		CACHICADÁN		
		MOLLEBAMBA		
		MOLLEPATA		
		QUIRUVILCA		
		SANTA CRUZ DE CHUCA		
		SANTIAGO DE CHUCO		
		SITABAMBA		
	GRAN CHIMÚ	CASCAS	**3**	ALL DISTRICTS
		LUCMA		
		MARMOT		
		SAYAPULLO		
	JULCÁN	CALAMARCA	**3**	ALL DISTRICTS
		CARABAMBA		
		HUASO		
		JULCÁN		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LA LIBERTAD	**OTUZCO**	AGALLPAMPA	**3**	ALL DISTRICTS
		CHARAT		
		HUARANCHAL		
		LA CUESTA		
		MACHE		
		OTUZCO		

		PARANDAY		
		SALPO		
		SINSICAP		
		USQUIL		
	CHEPÉN	CHEPÉN	4	ALL DISTRICTS
		PACANGA		
		PUEBLO NUEVO		
	ASCOPE	ASCOPE	4	ALL DISTRICTS
		CASA GRANDE		
		CHICAMA		
		CHOCOPE		
		MAGDALENA DE CAO		
		PAIJÁN		
		RÁZURI		
		SANTIAGO DE CAO		
	PACASMAYO	GUADALUPE	4	ALL DISTRICTS
		JEQUETEPEQUE		
		PACASMAYO		
		SAN JOSÉ		
		SAN PEDRO DE LLOC		
	TRUJILLO	EL PORVENIR	4	ALL DISTRICTS
		FLORENCIA DE MORA		
		HUANCHACO		
		LA ESPERANZA		
		LAREDO		
		MOCHE		
		POROTO		
		SALAVERRY		
		SIMBAL		
		TRUJILLO		
		VÍCTOR LARCO HERRERA		
	VIRÚ	CHAO	4	ALL DISTRICTS
		GUADALUPITO		
		VIRÚ		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
ÁNCASH	**ANTONIO RAYMONDI**	CHACCHO	2	THREE DISTRICS
		CHINGA		
		LLAMELLIN		
		ACZO	3	THREE DISTRICS
		MIRGAS		
		SAN JUAN DE RONTOY		
	HUARI	ANRA	2	SIX DISTICS
		HUACACHI		

		HUACCHIS		
		PAUCAS		
		RAPAYÁN		
		UCO		
		CAJAY	3	TEN DISTRICT
		CHAVÍN DE HUANTAR		
		HUACHIS		
		HUANTAR		
		HUARI		
		MASIN		
		PONTO		
		RAHUAPAMPA		
		SAN MARCOS		
		SAN PEDRO DE CHANA		
	ASUNCION	ACOCHACA	3	ALL DISTRICTS
		CHACAS		
	CARHUAZ	ACOPAMPA	3	ALL DISTRICTS
		AMASHCA		
		ANTA		
		ATAQUERO		
		CARHUAZ		
		MARCARÁ		
		PARIAHUANCA		
		SAN MIGUEL DE ACO		
		SHILLA		
		TINCO		
		YUNGAR		
	CARLOS F. FITZCARRALD	SAN LUIS	3	ALL DISTRICTS
		SAN NICOLÁS		
		YAUYA		
	CORONGO	ACO	3	ALL DISTRICTS
		BAMBAS		
		CORONGO		
		CUSCA		
		LA PAMPA		
		YÁNAC		
		YUPÁN		
	MARISCAL LUZURIAGA	CASCA	3	ALL DISTRICTS
		ELEAZAR GUZMÁN BARRON		
		FIDEL OLIVAS ESCUDERO		
		LLAMA		
		LLUMPA		
		LUCMA		
		MUSGA		
		PISCOBAMBA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
ÁNCASH	**PALLASCA**	BOLOGNESI	3	ALL DISTRICTS
		CABANA		
		CONCHUCOS		
		HUACASCHUQUE		
		HUANDOVAL		
		LACABAMBA		
		LLAPO		
		PALLASCA		
		PAMPAS		

		SANTA ROSA		
		TAUCA		
	POMABAMBA	HUAYLLÁN	**3**	ALL DISTRICTS
		PAROBAMBA		
		POMABAMBA		
		QUINUABAMBA		
	SIHUAS	ACOBAMBA	**3**	ALL DISTRICTS
		ALFONSO UGARTE		
		CASHAPAMPA		
		CHINGALPO		
		HUAYLLABAMBA		
		QUICHES		
		RAGASH		
		SAN JUAN		
		SICSIBAMBA		
		SIHUAS		
	HUAYLAS	CARAZ	**3**	ALL DISTRICTS
		HUALLANCA		
		HUATA		
		HUAYLAS		
		MATO		
		PAMPAROMAS		
		PUEBLO LIBRE		
		SANTA CRUZ		
		SANTO TORIBIO		
		YURACMARCA		
	YUNGAY	CASCAPARA	**3**	ALL DISTRICTS
		MANCOS		
		MATACOTO		
		QUILLO		
		RANRAHIRCA		
		SHUPLUY		
		YANAMA		
		YUNGAY		
	HUARAZ	COCHABAMBA	**3**	ALL DISTRICTS
		COLCABAMBA		
		HUANCHAY		
		HUARAZ		
		INDEPENDENCIA		
		JANGAS		
		LA LIBERTAD		
		OLLEROS		
		PAMPAS		
		PARIACOTO		
		PIRA		
		TARICA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
ÁNCASH	**BOLOGNESI**	ABELARDO PARDO LEZAMETA	**3**	ALL DISTRICTS
		ANTONIO RAYMONDI		
		AQUIA		
		CAJACAY		
		CANIS		
		CHIQUIAN		
		COLQUIOC		
		HUALLANCA		
		HUASTA		

		HUAYLLACAYAN		
		LA PRIMAVERA		
		MANGAS		
		PACLLON		
		SAN MIGUEL DE CORPANQUI		
		TICLLOS		
	RECUAY	CATAC	3	ALL DISTRICTS
		COTAPARACO		
		HUAYLLAPAMPA		
		LLACLLIN		
		MARCA		
		PAMPAS CHICO		
		PARARIN		
		RECUAY		
		TAPACOCHA		
		TICAPAMPA		
	AIJA	AIJA	3	TWO DISTRICTS
		CORIS		
		LA MERCED	4	THREE DISTRICS
		HUACLLÁN		
		SUCCHA		
	OCROS	ACAS	3	ALL DISTRICTS
		CAJAMARQUILLA		
		CARHUAPAMPA		
		CONGAS		
		LLIPA		
		OCROS		
		S.CRISTOBAL DE RAJÁN		
		SANTIAGO DE CHILCAS		
		COCHAS	4	TWO DISTRICTS
		SAN PEDRO		
	HUARMEY	COCHAPETI	3	THREE DISTRICS
		HUAYAN		
		MALVAS		
		CULEBRAS	4	TWO DISTRICTS
		HUARMEY		
	SANTA	CÁCERES DEL PERÚ	3	THREE DISTRICS
		MACATE		
		MORO		
		CHIMBOTE	4	SIX DISTRICS
		COISHCO		
		NEPEÑA		
		NUEVO CHIMBOTE		
		SAMANCO		
		SANTA		
	CASMA	BUENA VISTA ALTA	4	ALL DISTRICTS
		CASMA		
		COMANDANTE NOEL		
		YAUTÁN		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LIMA	CAJATAMBO	CAJATAMBO	3	ALL DISTRICTS
		COPA		
		GORGOR		
		HUACAPON		
		MANÁS		
	OYON	ANDAJES	3	ALL DISTRICTS
		CAUJUL		
		COCHAMARCA		
		NAVÁN		

		OYON		
		PACHANGARA		
	YAUYOS	ALIS	3	TWENTY NINE DISTRICTS
		AYAUCA		
		AYAVIRÍ		
		AZÁNGARO		
		CACRA		
		CARANIA		
		CATAHUASI		
		CHOCOS		
		COCHAS		
		COLONIA		
		HONGOS		
		HUAMPARA		
		HUANCAYA		
		HUANGÁSCAR		
		HUANTÁN		
		HUAÑEC		
		LARAOS		
		LINCHA		
		MADEAN		
		MIRAFLORES		
		QUINCHES		
		SAN JOAQUÍN		
		SAN LORENZO DE PUTINZA		
		SAN PEDRO DE PILAS TANTA		
		TOMAS		
		TUPE		
		VIÑAC		
		VITIS		
		YAUYOS		
		OMAS	4	THREE DISTRICTS
		QUINOCAY		
		TAURIPAMPA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LIMA	**HUAROCHIRÍ**	CALLAHUANCA	3	TWENTY FIVE DISTRICTS
		CARAMPOMA		
		CHICLA		
		HUACHUPAMPA		
		HUANZA		
		HUAROCHIRÍ		
		LAHUAYTAMBO		
		LANGA		
		LARAOS		
		MATUCANA		
		SAN ANDRÉS DE TUPICOCHA		
		SAN BARTOLOMÉ		

		SAN DAMIÁN		
		S. JERONIMO DE SURCO		
		SAN JUAN DE IRIS		
		SAN JUAN DE TANTARANCHE		
		SAN LORENZO DE QUINTI		
		SAN MATEO		
		SAN MATEO DE OTAO		
		SAN PEDRO DE CASTA		
		SAN PEDRO DE HUANCAYRE		
		SANGALLAYA		
		SANTA CRUZ DE COCACHACRA		
		SANTIAGO DE ANCHUCAYA		
		SANTIAGO DE TUNA		
		ANTIOQUÍA	4	SEVEN DISTRICTS
		CUENCA		
		MARIATANA		
		RICARDO PALMA		
		SAN ANTONIO DE CHACLLA		
		SANTA EULALIA		
		SANTO DOMINGO DE OLLEROS		
	CANTA	CANTA	3	FOUR DISTRICTS
		HUAROS		
		LACHAQUI		
		SAN BUENAVENTURA		
		ARAHUAY	4	THREE DISTRICTS
		HUAMANTANGA		
		SANTA ROSA DE QUIVES		
	HUARAL	ATAVILLOS ALTO	3	NINE DISTRICTS
		ATAVILLOS BAJO		
		IHUARÍ		
		LAMPÍAN		
		PACARAOS		
		SAN MIGUEL DE ACOS		
		SANTA CRUZ DE ANDAMARCA		
		SUMBILCA		
		VEINTISIETE DE NOVIEMBRE		
		AUCALLAMA	4	THREE DISTRICTS
		CHANCAY		
		HUARAL		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LIMA	HUAURA	CHECRAS	3	FOUR DISTRICTS
		LEONCIO PRADO		
		PACCHO		
		SANTA LEONOR		
		ÁMBAR	4	EIGHT DISTRICTS
		CALETA DE CARQUÍN		
		HUACHO		
		HUALMAY		
		HUAURA		
		SANTA MARÍA		
		SAYÁN		

		VEGUETA		
		ZÚÑIGA	3	ONE DISTRICT
	CAÑETE	ASIA	4	FIFTEEN DISTRICTS
		CALANGO		
		CERRO AZUL		
		CHILCA		
		COAYLLO		
		IMPERIAL		
		LUNAHUANÁ		
		MALA		
		NUEVO IMPERIAL		
		PACARÁN		
		QUILMANÁ		
		SAN ANTONIO		
		SAN LUIS		
		SAN VICENTE DE CAÑETE		
		SANTA CRUZ DE FLORES		
	BARRANCA	BARRANCA	4	ALL DISTRICTS
		PARAMONGA		
		PATIVILCA		
		SUPE		
		SUPE PUERTO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
LIMA	LIMA	ANCON	4	ALL DISTRICTS
		ATE		
		BARRANCO		
		BREÑA		
		CARABAYLLO		
		CHACLACAYO		
		CHORRILLOS		
		CIENEGUILLA		
		COMAS		
		EL AGUSTINO		
		INDEPENDENCIA		

		JESÚS MARÍA		
		LA MOLINA		
		LA VICTORIA		
		LIMA		
		LINCE		
		LOS OLIVOS		
		LURIGANCHO-CHOSICA		
		LURIN		
		MAGDALENA DEL MAR		
		MIRAFLORES		
		PACHACÁMAC		
		PUCUSANA		
		PUEBLO LIBRE		
		PUENTE PIEDRA		
		PUNTA HERMOSA		
		PUNTA NEGRA		
		RÍMAC		
		SAN BARTOLO		
		SAN BORJA		
		SAN ISIDRO		
		SAN JUAN DE LURIGANCHO		
		SAN JUAN DE MIRAFLORES		
		SAN LUIS		
		SAN MARTÍN DE PORRES		
		SAN MIGUEL		
		SANTA ANITA		
		SANTA MARÍA DEL MAR		
		SANTA ROSA		
		SANTIAGO DE SURCO		
		SURQUILLO		
		VILLA EL SALVADOR		
		VILLA MARÍA DEL TRIUNFO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
CALLAO	**CALLAO**	BELLAVISTA	**4**	ALL DISTRICTS
		CALLAO		
		CARMEN DE LA LEGUA-REYNOSO		
		LA PERLA		
		LA PUNTA		
		VENTANILLA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS

ICA	CHINCHA	SAN PEDRO DE HUACARPANA	3	ONE DISTRICT
		ALTO LARÁN	4	TEN DISTRICTS
		CHAVÍN		
		CHINCHA ALTA		
		CHINCHA BAJA		
		EL CARMEN		
		GROCIO PRADO		
		PUEBLO NUEVO		
		SAN JUAN DE YANAC		
		SUNAMPE		
		TAMBO DE MORA		
	PALPA	LLIPATA	4	ALL DISTRICTS
		PALPA		
		RÍO GRANDE		
		SANTA CRUZ		
		TIBILLO		
	ICA	ICA	4	ALL DISTRICTS
		LA TINGUIÑA		
		LOS AQUIJES		
		OCUCAJE		
		PACHACÚTEC		
		PARCONA		
		PUEBLO NUEVO		
		SALAS		
		SAN JOSÉ DE LOS MOLINOS		
		SAN JUAN BAUTISTA		
		SANTIAGO		
		SUBTANJALLA		
		TATE		
		YAUCA DEL ROSARIO		
	NAZCA	CHANGUILLO	4	ALL DISTRICTS
		EL INGENIO		
		MARCONA		
		NAZCA		
		VISTA ALEGRE		
	PISCO	HUANCANO	4	ALL DISTRICTS
		HUMAY		
		INDEPENDENCIA		
		PARACAS		
		PISCO		
		SAN ANDRÉS		
		SAN CLEMENTE		
		TÚPAC AMARU INCA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AREQUIPA	LA UNION	ALCA	3	ALL DISTRICTS
		CHARCANA		
		COTAHUASI		
		HUAYNACOTAS		
		PAMPAMARCA		
		PUYCA		
		QUECHUALLA		
		SAYLA		
		TAURIA		
		TOMEPAMPA		
		TORO		

	CAYLLOMA	ACHOMA	3	NINETEEN DISTRICTS
		CABANACONDE		
		CALLALLI		
		CAYLLOMA		
		CHIVAY		
		COPORAQUE		
		HUAMBO		
		HUANCA		
		ICHUPAMPA		
		LARI		
		LLUTA		
		MACA		
		MADRIGAL		
		SAN ANTONIO DE CHUCA		
		SIBAYO		
		TAPAY		
		TISCO		
		TUTI		
		YANQUE		
		MAJES	4	ONE DISTRICT
	CASTILLA	ANDAGUA	3	ELEVEN DISTRICTS
		AYO		
		CHACHAS		
		CHILCAYMARCA		
		CHOCO		
		MACHAGUAY		
		ORCOPAMPA		
		PAMPACOLCA		
		TIPÁN		
		UÑON		
		VIRACO		
		APLAO	4	THREE DISTRICTS
		HUANCARQUI		
		URACA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AREQUIPA	**AREQUIPA**	ALTO SELVA ALEGRE	3	TWENTY ONE DISTRICTS
		AREQUIPA		
		CAYMA		
		CERRO COLORADO		
		CHARACATO		
		CHIGUATA		
		JACOBO HUNTER		
		JOSÉ LUIS BUSTAMANTE Y RIVERO		
		MARIANO MELGAR		
		MIRAFLORES		

		MOLLEBAYA		
		PAUCARPATA		
		POCSI		
		QUEQUEÑA		
		SABANDIA		
		SACHACA		
		SAN JUAN DE TARUCANI		
		SOCABAYA		
		TIABAYA		
		YANAHUARA		
		YURA		
		LA JOYA	4	EIGHT DISTRICTS
		POLOBAYA		
		SAN JUAN DE SIGUAS		
		SANTA ISABEL DE SIGUAS		
		SANTA RITA DE SIGUAS		
		UCHUMAYO		
		VÍTOR		
		YARABAMBA		
	CONDESUYOS	CAYARANI	3	THREE DISTRICTS
		CHICHAS		
		SALAMANCA		
		ANDARAY	4	FIVE DISTRICTS
		CHUQUIBAMBA		
		IRAY		
		RÍO GRANDE		
		YANAQUIHUA		
	ISLAY	COCACHACRA	4	ALL DISTRICTS
		DEAN VALDIVIA		
		ISLAY		
		MEJÍA		
		MOLLENDO		
		PUNTA DE BOMBON		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
AREQUIPA	CAMANÁ	CAMANÁ	4	ALL DISTRICTS
		JOSÉ MARÍA QUÍMPER		
		MARIANO NICOLÁS VALCÁRCEL		
		MARISCAL CÁCERES		
		NICOLÁS DE PIÉROLA		
		OCOÑA		
		QUILCA		
		SAMUEL PASTOR		
	CARAVELÍ	ACARÍ	4	ALL DISTRICTS
		ATICO		

		ATIQUIPA		
		BELLA UNION		
		CAHUACHO		
		CARAVELÍ		
		CHALA		
		CHAPARRA		
		HUANUHUANU		
		JAQUI		
		LOMAS		
		QUICACHA		
		YAUCA		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
MOQUEGUA	GENERAL SÁNCHEZ CERRO	CHOJATA	3	TEN DISTRICTS
		COALAQUE		
		ICHUÑA		
		LLOQUE		
		MATALAQUE		
		OMATE		
		PUQUINA		
		QUINISTAQUILLAS		
		UBINAS		
		YUNGA		
		LA CAPILLA	4	ONE DISTRICT
	MARISCAL NIETO	CARUMAS	3	FIVE DISTRICTS
		CUCHUMBAYA		
		SAMEGUA		
		SAN CRISTOBAL DE CALACOA		
		TORATA		
		MOQUEGUA	4	ONE DISTRICT
	ILO	EL AGARROBAL	4	ALL DISTRICTS
		PACOCHA		
		ILO		

REGION (DPTO.)	PROVINCE	DISTRICT	SEISMIC ZONE	NUMBER OF DISTRICTS
TACNA	TARATA	CHUCATAMANI	3	ALL DISTRICTS
		ESTIQUE		
		ESTIQUE-PAMPA		
		SITAJARA		
		SUSAPAYA		
		TARATA		
		TARUCACHI		
		TICACO		
	CANDARAVE	CAIRANI	3	ALL DISTRICTS
		CAMILACA		
		CANDARAVE		
		CURIBAYA		

		HUANUARA		
		QUILAHUANI		
	JORGE BASADRE	ILABAYA	**4**	ALL DISTRICTS
		ITE		
		LOCUMBA		
	TACNA	PALCA	**3**	ONE DISTRICTS
		ALTO DE LA ALIANZA	**4**	EIGHT DISTRICTS
		CALANA		
		CIUDAD NUEVA		
		INCLÁN		
		PACHIA		
		POCOLLAY		
		SAMA		
		TACNA		

APPENDIX N° 2 SUGGESTED PROCEDURE FOR THE DETERMINATION OF SEISMIC ACTIONS

The seismic actions for structural design depend on the seismic zone (Z), the soil profile (S, T_p, T_L), the use of the building (U), earthquake resistant system (R) and the dynamics characteristic of the building (T, C) and its weight (P).

STAGE 1: SEISMIC HAZARD (Chapter 2)

The steps of this stage depend only on the location and characteristics of the foundation soil. Do not depend on the building characteristics.

Step 1 Zone Factor Z (Item 2.1))

Determine the seismic zone where the project is located base on the seismic zoning map (Figure Nº 1) or the table of provinces and districts in Annex Nº 1.

Determine the zone factor (Z) according to Table Nº1.

Step 2 Soil Profile (Item 2.3)

According to the results of the Geotechnical Study (*GS*) the soil profile type is determined according to item 2.3.1 where 5 soil profiles are defined. The classification should be made based on the parameters indicated in Table Nº 2 considering averages for the strata of the first 30 m under the foundation level.

When the properties of soil are not known to the depth of 30 m, the professional responsible for the GS will determine the type of soil profile base on known geotechnical conditions.

Step 3 Site Parameters S, T_P, y T_L (Item 2.4)

The soil amplification factor is obtained from Table Nº 3 and depends on the seismic zone and the soil profile type. The periods T_P and T_L are obtained from Table Nº 4 and only depends the type soil profile.

Step 4 Construct the function Seismic Amplification Factor C versus Period T

It depends on site parameters T_P y T_L. Three sections are defined, periods short, intermediate and long, and the expressions of this item.

STAGE 2: CHARACTERIZACION OF THE BUILDING (Chapter 3)

The steps of this stage depends on the building characteristics, such as its category, structural system and regular or irregular configuration.

Step 5 Category of Building and Use Factor U (Item 3.1)

The category of the building and use factor (U) are obtained from Table Nº 5

Step 6 Structural System (Item 3.2 y 3.3)

The structural system is determined according to the definitions that appear in item 3.2

Table Nº 6 (item 3.3) defines the structural systems allowed according to category of the building and the seismic zone in which it is located.

Step 7 Basic Coefficient of Reduction of Seismic Forces, R_0 (Item 3.4)

From the Table Nº 7 the coefficient value R_0 is obtained, which depends only on the structural system.

Step 8 Irregularity Factors I_a, I_p (Item 3.6)

The factor I_a will be determined as the lowest of the values in Table Nº 8 corresponding to the existing irregularities in height**.** The factor I_p will be determined as the lowest of the values in Table Nº 9 corresponding to the existing irregularities in plant.

In most cases it is possible to determine if a structure is regular or irregular from its structural configuration, but in the case of stiffness irregularity or torsional irregularity it must be checked with the results of the seismic analysis as indicated in the description of the said irregularities.

Step 9 Restrictions on Irregularity (Item 3.7)

Check restrictions to the irregularity according to the category and zone of the building in Table Nº 10. Modify the structure in case the restrictions of this table are not met.

Step 10 Coefficient of Reduction of Seismic Force R (Item 3.8)

$R = R_0 \cdot I_a \cdot I_p$. Is determined

STAGE 3: STRUCTURAL ANALYSIS (Chapter 4)

In this stage, the structural analysis is developed. Criteria are suggested for the definition of the mathematical model of the structure, it is indicated how the weight of the building must be calculated and the procedures of analysis are defined.

Step 11 Models for the Analysis (Item 4.2)

Develop the mathematical model of the structure. For structures of reinforced and masonry consider the properties of the gross sections ignoring cracking and reinforcement.

Step 12 Weight Estimate P (Item 4.3)

The weight is computed for the calculation of the seismic force, adding to the total permanent load a percentage of the live load that depends on the use and the category of the building, defined according what is indicated in this item.

Step 13 Seismic analysis procedures (Items 4.4 a 4.7)

The analysis procedures considered in this Standard are defined, which are static analysis (item 4.5) and spectral modal dynamic analysis (item 4.6).

Step 13A Static Analysis (Item 4.5)

This procedure is only applicable to structures that comply with 4.5.1.

Static analysis has the following steps:

- Calculate the shear force at the base $V = \frac{Z \cdot U \cdot C \cdot S}{R} \cdot P$ for each direction of analysis (item 4.5.2).
- To determine the value of *C* (Step 4 or item 2.5) the fundamental period of vibration of the structure (*T*) should be estimated in each direction (paragraph 4.5.4).
- Determine the distribution in the height of the seismic forces in each direction (item 4.5.3).
- Apply the forces obtained in the center of masses of each floor. In addition, the accidental torsional moment (item 4.5.5) must be considered.
- Consider vertical seismic forces (item 4.5.6) for the elements in which it is necessary.

Step 13B Dynamic analysis (Item 4.6)

If it is chosen or if it is a requirement to develop a dynamic modal spectral analysis it must:

- Determine modes of vibration and their corresponding natural periods and participating masses through dynamic analysis of the mathematical model (item 4.6.1).
- Compute the inelastic spectrum of pseudo accelerations $S_a = \frac{Z \cdot U \cdot C \cdot S}{R} \cdot g$ for each direction of analysis (item 4.6.2).
- Consider accidental eccentricity (item 4.6.5).
- Determine all the results of forces and displacements for each mode of vibration.
- Determine the maximum expected response corresponding to the combined effect of the modes considered (item 4.6.3).
- All results obtained for forces (item 4.6.4) must be scaled considering a minimum shear in the first floor that will be a percentage of the shear calculated for the static method (item 4.5.3). Displacement results are not scaled.
- Consider vertical seismic forces (item 4.6.2) using a spectrum with values equal to 2/3 of the most critical spectrum for the horizontal directions, for those elements in which is necessary.

STAGE 4: VALIDATION OF THE STRUCTURE

According to the results of the analysis it will determined if the structure proposed is valid, for which it must meet the requirements of regularity and rigidity indicated in this chapter.

Step 14 Review of the Hypotheses of the Analysis

With the results of the analysis the irregularity factors applied in step 8 will be revised. On the basis of these, it will be verified whether the R values are maintained or should be modified. In case of having used the procedure of static analysis, verify what is indicated in 4.5.1.

Step 15 Restrictions on Irregularity (Item 3.7)

Check the restrictions to the irregularity according to the category and zone of the building in Table Nº 10. If there are irregularities or extreme irregularities in buildings which are not allowed according to that Table, the structure must be modified and the analysis repeated to achieve a satisfactory result.

Step 16 Determination of lateral displacements (Item 5.1)

The lateral displacements are calculated according to the indications of this item.

Step 17 Allowable distortion (Item 5.2)

Verify that the maximum distortion of mezzanine obtained in the structure with the displacements calculated in the previous step is lower than that indicated in Table Nº. 11. Failure to comply the structure should be revised and the analysis repeated until the requirement is fulfilled.

Step 18 Separation between buildings (Item 5.3)

Determine the minimum separation to other buildings or property boundary according to the indications of this item.