

CHAPTER 2

SEISMIC HAZARD

2.1 Scope

This Chapter defines the minimum seismic hazard that has to be considered for the design of buildings.

2.2 Design Basis Ground Motion

Unless otherwise required, buildings shall be designed for a level of earthquake ground motion that has a 10% probability of exceedance in 50 years.

2.3 Seismic Zones

For the purpose of seismic design of buildings, Pakistan has been divided into five zones. These zones are based on the peak ground acceleration ranges summarized in Table 2.1.

The seismic zoning map of Pakistan is given in Figure 2.1. Seismic zoning map of each province is shown in Figures 2.2 to 2.5.

Table 2.2 lists the seismic zones for all tehsils of the country.

2.4 Site-specific Hazard Analysis

The requirements of the seismic zoning map shall be superseded if a site-specific hazard analysis, probabilistic, deterministic or both, is carried out for a building or structure.

2.5 Modeling of Ground Motion

The results of site-specific seismic hazard analysis may be represented by response spectra and acceleration-time histories. The pertinent details are included in Chapter 5.

Table 2.1-Seismic Zones

Seismic Zone	Peak Horizontal Ground Acceleration
1	0.05 to 0.08g
2A	0.08 to 0.16g
2B	0.16 to 0.24g
3	0.24 to 0.32g
4	> 0.32g

Where “g” is the acceleration due to gravity.

Table 2.2 - Seismic Zones of Tehsils of Pakistan

Tehsil	Seismic Zone	Tehsil	Seismic Zone	Tehsil	Seismic Zone
Punjab					
Attock	2B	Shorkot	2A	Multan City	2A
Hassanabdal	2B	Toba Tek Singh	2A	Multan Saddar	2A
Fateh Jang	2B	Kamalia	2A	Shujabad	2A
Pindi Gheb	2B	Gojra	2A	Jalalpur Pirwala	2A
Jand	2B	Gujranwala City	2A	Lodhran	2A
Rawalpindi	2B	Wazirabad	2A	Kahror Pacca	2A
Taxila	2B	Gujranwala Saddar	2A	Dunyapur	2A
Kahuta	2B	Nowshera Virkan	2A	Khanewal	2A
Murree	3	Kamoki	2A	Jehanian	2A
Kotli Sattian	3	Hafizabad	2A	Main Channu	2A
Gujar Khan	2B	Pindi Bhattian	2A	Kabirwala	2A
Jhelum	2B	Gujrat	2B	Dera Ghazi Khan	2A
Sohawa	2B	Kharian	2B	Taunsa	2B
Pind Dadan Khan	2B	Sarai Alamgir	2B	De-Ex.Area of D.G.Khan	2B
Dina	2B	Mandi Bahauddin	2B	Rajanpur	2A
Chakwal	2B	Malikwal	2B	Rojhan	2A
Talagang	2B	Phalia	2A	Jampur	2A
Choa Saidan Shah	2B	Sialkot	2B	De-Ex.Area of Rajanpur	2B
Sargodha	2A	Daska	2B	Leiah	2A
Sillanwali	2A	Pasrur	2B	Chaubara	2A
Bhalwal	2A	Narowal	2B	Karor Lal Esan	2A
Shahpur	2B	Shakargarh	2B	Muzaffargarh	2A
Sahiwal	2A	Lahore City	2A	Alipur	2A
Kot Momin	2A	Lahore Cantt	2A	Jatoi	2A
Bhakkar	2A	Kasur	2A	Kot Addu	2A
Kalur Kot	2B	Chunian	2A	Bahawalpur	2A
Mankera	2A	Pattoki	2A	Hasilpur	2A
Darya Khan	2A	Okara	2A	Yazman	2A
Khushab	2B	Depalpur	2A	Ahmadpur East	2A
Nurpur	2A	Renala Khurd	2A	Khairpur Tamewali	2A
Mianwali	2B	Sheikhupura	2A	Bahawalnagar	2A
Isa Khel	2B	Nankana Sahib	2A	Minchinabad	2A
Piplan	2B	Ferozwala	2A	Fort Abbas	1
Faisalabad City	2A	Safdarabad	2A	Haroonabad	2A
Faisalabad Saddar	2A	Vehari	2A	Chishtian	2A
Chak Jhumra	2A	Burewala	2A	Rahim Yar Khan	2A
Sammundri	2A	Mailsi	2A	Khanpur	2A
Jaranwala	2A	Sahiwal	2A	Liaquatpur	2A
Tandlianwala	2A	Chichawatni	2A	Sadiqabad	2A
Jhang	2A	Pakpattan	2A		
Chiniot	2A	Arifwala	2A		

Tehsil	Seismic Zone	Tehsil	Seismic Zone	Tehsil	Seismic Zone
Balochistan					
Quetta	3	Dera Bugti	3	Aranji (S/T)	2B
Panjpai (S/T)	3	Sangsillah (S/T)	3	Awaran	2B
Pishin	4	Sui	3	Mshki (S/T)	3
Hurramzai (S/T)	4	Loti	3	Jhal Jao	3
Barshore (S/T)	3	Phelawagh	3	Kharan	3
Karezat (S/T)	4	Malam (S/T)	3	Besima (S/T)	2B
Bostan (S/T)	4	Baiker (S/T)	3	Nag (S/T)	2B
Killa Abdullah	3	Pir Koh (S/T)	3	Wasuk (S/T)	2B
Gulistan (S/T)	3	Jaffarabad/Jhat Pat	2B	Mashkhel (S/T)	2A
Chaman	3	Panhwar (S/T)	2B	Bela	2B
Dobandi (S/T)	3	Usta Mohammad	2B	Uthal	2B
Chagai (S/T)	2A	Gandaka (S/T)	2B	Lakhra	2B
Dalbandin	2A	Nasirabad/Chattar	3	Liari (S/T)	2B
Nushki	4	Tamboo	3	Hub	2B
Nokundi S/T	2A	D.M.Jamali	2B	Gadani (S/T)	2B
Taftan	2A	Bolan/Dhadar	3	Sonmiani/Winder	2B
Loralai/Bori	3	Bhag	3	Dureji	2B
Mekhtar (S/T)	3	Balanari (S/T)	3	Kanraj	2B
Duki	3	Sani (S/T)	3	Kech	2B
Barkhan	3	Khattan (S/T)	3	Buleda (S/T)	2B
Musakhel	3	Mach	3	Zamuran (S/T)	2B
Kingri (S/T)	3	Kachhi/Gandawa	2B	Hoshab (S/T)	2B
Killa Saifullah	3	Mirpur (S/T)	2B	Balnigor (S/T)	2B
Muslim Bagh	4	Jhal Magsi	2B	Dasht (S/T)	3
Loiband (S/T)	3	Kalat	3	Tump	2B
Baddini (S/T)	3	Mangochar (S/T)	3	Mand (S/T)	2B
Zhob	3	Johan (S/T)	3	Gwadar	3
Sambaza (S/T)	3	Surab	2B	Jiwani	2B
Sherani (S/T)	3	Gazg (S/T)	3	Suntsar (S/T)	2B
Qamar Din Karez	2B	Mastung	3	Pasni	3
Ashwat (S/T)	2B	Kirdgap (S/T)	3	Ormara	3
Sibi	3	Dasht	3	Panjgur	2B
Kutmandai (S/T)	3	Khad Koocha (S/T)	3	Parome (S/T)	2B
Sangan (S/T)	3	Khuzdar	2B	Gichk (S/T)	2B
Lehri	3	Zehri	2B	Gowargo	2A
Ziarat	4	Moola (S/T)	2B		
Harnai	3	Karakh (S/T)	2B		
Sinjawi (S/T)	4	Nal (S/T)	3		
Kohllu	3	Wadh (S/T)	2B		
Kahan	3	Ornach (S/T)	3		
Mawand	3	Saroon (S/T)	2B		

Tehsil	Seismic Zone	Tehsil	Seismic Zone	Tehsil	Seismic Zone
NWFP					
Chitral	4	Swabi	2B	Kurram	
Drosh	3	Lahore	2B	Lower Kurram	2B
Lutkoh	3	Charsadda	2B	Upper Kurram	2B
Mastuj	3	Tangi	3	Kurram F.R.	2B
Turkoh	3	Peshawar	2B	Orakzai	
Mulkoh	3	Nowshera	2B	Central Orakzai	2B
Dir	3	Kohat	2B	Lower Orkzai	2B
Barawal	3	Lachi	2B	Upper Orkzai	2B
Kohistan	3	Hangu	2B	Ismailzai	2B
Wari	3	Karak	2B	South Waziristan	
Khall	3	Banda Daud Shah	2B	Ladha	2B
Temergara	3	Takht-E-Nasrati	2B	Makin (Charlai)	2B
Balambat	3	Bannu	2B	Sararogha	2B
Lalqila	3	Lakki Marwat	2B	Sarwekai	2B
Adenzai	3	Dera Ismail Khan	2A	Tiarza	2B
Munda	3	Daraban	3	Wana	2B
Samarbagh (Barwa)	3	Paharpur	2B	Toi Khullah	2B
Swat		Kulachi	2B	Birmal	2B
Matta	3	Tank	2B	North Waziristan	
Shangla/Alpuri	3	Bajaur		Datta Khel	2B
Besham	3	Barang	3	Dossali	2B
Chakesar	3	Charmang	3	Garyum	2B
Martung	3	Khar Bajaur	3	Ghulam Khan	2B
Puran	2B	Mamund	3	Mir Ali	2B
Buner/Daggar	2B	Salarzai	3	Miran Shah	2B
Malakand/Swat		Utmankhel (Qzafi)	3	Razmak	2B
Ranizai	3				
Sam Ranizai	2B	Nawagai	3	Spinwam	2B
Dassu	3	Mohmand		Shewa	2B
Pattan	3	Halimzai	3		
Palas	3	Pindiali	3		
Mansehra	3	Safi	3		
Balakot	4	Upper Mohmand	3		
Oghi	2B	Utman Khel(Ambar)	3		
T.A.Adj.Mansehra Distt	3	Yake Ghund	3		
Batagram	3	Pringhar	3		
Allai	3	Khyber			
Abbottabad	3	Bara	2B		
Haripur	2B	Jamurd	2B		
Ghazi	2B	Landi Kotal	3		
Mardan	2B	Mula Ghori	3		
Takht Bhai	2B				

Tehsil	Seismic Zone	Tehsil	Seismic Zone	Tehsil	Seismic Zone
Sindh					
Jacobabad	2A	Khairpur Nathan Shah	2B	Tharparkar/Chachro	2A
Garhi Khairo	2A	Sehwan	2A	Nagar Parkar	2B
Thul	2A	Mehar	2A	Diplo	3
Kandhkot	2A	Johi	2B	Mithi	2B
Kashmor	2A	Kotri	2A	Karachi East	2B
Shikarpur	2A	Thano Bula Khan	2A	Karachi West	2B
Khanpur	2A	Hyderabad City	2A	Karachi South	2B
Garhi Yasin	2A	Matari	2A	Karachi Central	2B
Lakhi	2A	Tando Allahyar	2A	Malir	2B
Larkana	2A	Hala	2A		
Miro Khan	2A	Latifabad	2A	FEDERAL AREA	
Rato Dero	2A	Hyderabad	2A	Islamabad	2B
Shahdaddkot	2B	Qasimabad	2A		
Dokri	2A	Tando Mohd Khan	2A	AJK	
Kambar	2B	Badin	2B	Bagh	4
Warah	2A	Golarchi	2A	Bhimbar	2B
Sukkur	2A	Matli	2A	Hajira	4
Rohri	2A	Tando Bagho	2B	Kotli	3
Pano Aqil	2A	Talhar		Muzaffarabad	4
Salehpat	2A	Thatta	2A	New Mirpur	2B
Ghotki	2A	Mirpur Sakro	2A	Palandri	3
Khengarh	2A	Keti Bunder	2A	Rawalakot	3
Mirpur Mathelo	2A	Ghorabari	2A		
Ubauro	2A	Sujawal	2A	NORTHERN AREA	
Daharki	2A	Mirpur Bathoro	2A	Chilas	3
Khairpur	2A	Jati	2A	Dasu	3
Kingri	2A	Shah Bunder	2A	Gakuch	3
Sobhodero	2A	Kharo Chan	2A	Gilgit	3
Gambat	2A	Sanghar	2A	Ishkuman	2B
Kot Diji	2A	Sinjhor	2A	Skardu	3
Mirwah	2A	Khipro	2A	Yasin	3
Faiz Ganj	2A	Shahdadpur	2A		
Nara	2A	Jam Nawaz Ali	2A		
Naushahro Feroze	2A	Tando Adam	2A		
Kandioro	2A	Mirpur Khas	2A		
Bhiria	2A	Digri	2A		
Moro	2A	Kot Ghulam Moh	2A		
Nawab Shah	2A	Umerkot	2A		
Skrand	2A	Samaro	2A		
Daulatpur	2A	Kunri	2A		
Dadu	2A	Pithoro	2A		