The scenario of Kerman Earthquake

Introduction

By locating Iran in parts of orogenic belt of Alp – Himalaya it has been known as the last and the youngest orogenic Area. So by releasing energy from the strains of active fault we will experience horrible earthquake in our country.

Iran is one of 10 countries which are determined as earthquake prone ones. By increasing population, the risk of earthquake is increased too, and moreover direct damages of earthquake, other risks like liquefaction and land slide threaten people.

Kerman province is not exception in this case and by having huge and active fault, every year will be observed a lot of earthquakes which some of them cause a lot of damages.

Assessments of damages causes the authorities analyze the earthquake scenario by effective way. In addition, they can model the results and plan for disaster reduction.

The goal of this proposal is reduction of disaster and save people. After the strong earthquake, the situation of society is not normal, the information is not complete and the numbers of casualties are so high. In this situation time is so important, because by managing of time we can save more lives. Preparing the plan of vulnerability places in earthquake and earthquake scenario will help to manage gold time. After the earthquake happen, all the relief forces transport to place to decrease the casualties according to preplanning.

The introduction of Kerman city

Kerman city is located in 57° to 57° 7 east longitudes and 30° 14 to 30° 19 north latitude in north part of Kerman plain. And has normal slip south east- North western and dry weather.

Kerman Geology

A) Cretaceous limestone

Much of the Cretaceous outcrops of around the city is belonged to Upper Cretaceous. As follows:

1 - The rocks are located in the eastern edge of the city and 2 castles have been built on them that are called girl and Ardeshir, and these castles are the Primary nucleus of Kerman.

2 - The eastern part of the city overlooking ghaem Forest is tagh-e ali Mount.

3 - Saidi mountain is located in the North East.

4 - Several small separated outcrops are Hoze-e Dagh, Kamar Abbas and Kamar siyah mountains. In addition there is a biased syncline in the north and North West of the city and there is one near the Zangi Abad which is called Zangi Abad syncline.

5 - Anbeluieh Mountain is in the West of Kerman.

6 - Jupar mountains in the south and southwest of Kerman plain.

B) Young conglomerate (Neogene - Quaternary)

It can be considered as the oldest Quaternary sediments of the wide range in the northeast of Kerman. This conglomerate unit is made from not hard cement, and, except in some areas that are located along major faults, the other exposed are horizontal and have been less affected by folding.

C) Quaternary sediments (IV period)

Kerman has been made on these deposits and these are the main foundation of the city. Includes 1 - old plain: consisting of old alluvial fans and alluvial terraces located in the North East and the North West and the East of the City. 2- Very young Salt desert plains: in the North, North West, South and South-East town. 3- Wind Plains: These plains are mostly composed of sand dunes that are widely spread in the south of Kerman and the source of producing the sand of these alluvial fan deposits is Chary River, which is located in the southwest of the city. These sediment due to discharged and lack of cohesion act like a fluid material in earthquake, and easily become fluid and so are one of the factor of Kerman foundation. Wind deposits are found mostly in the south. 4- New alluvium: These units constitute the newest geological units of the region and are mostly located in the northern region and a few of them are in the eastern plains on the river bed Saeedi and Sarasiab.

1-2 - Regional tectonics and structural geology

Due to several Orogenic movements, especially the great Alpine orogenic movements from the late of the Second period many faults are appeared in the region that transfigured the existing layers in the highlands. Among the most important of these faults we can mention Nayband fault, Gook, Kuhbanan, Baghyn and Anar.

Due to importance of faults and their role in seismic regions by using satellite Landsat TM (1996), a number of aerial photographs of the area and geological map with 250000/1 scale and all the faults in the area with 200 radius kilometers to the center of Kerman are plotted.

2- Assessment of earthquake hazard2-1 - seismic history of the region

Kerman province has experienced devastating earthquakes in the history of seismic provinces of Iran. Kerman region over 2000 years of history, has witnessed many moderate to strong earthquakes. In order to assess the seismology of the area, having the historic seismic data is necessary. Earthquakes occurred in the area of the province can be divided into two groups, historical earthquakes (before the twentieth century) and the twentieth century earthquakes.

2-2 - The historic earthquake

The earthquakes that have occurred prior to 1900s and have been described in the writings of historians, is called historical earthquakes. (Table 1 and Figure 1)

Table 1: Historical earthquakes occurred in the region and their impact on the city of Kerman (Mbrasyz and Melville, 1982), (YAGHMAEI, 1371) and (A. Race and Dastanpvr, 1378)

Fault	Area	Intensity	MS	North	East	Event	Event
Name		NOA	$(\mathbf{D}^{\prime}, 1, \boldsymbol{\cdot})$	latitude	longitude	Date	Date
		MMI	(Richter)	(degrees)	(degrees)	(AD)	(AH)
							× ,
Kuhbanan	Horjand	VII	5.8	30.5	57.3	1854	1233
						Maaaahaa	Persian
						November	month
							Azar
Description	damage	to the city	of Kerma	an): was fe	lt in Kerm	an, but the	
damage rep	ort has not	been regist	ered.				
		I					
Kuhbanan	Chatroud	VIII	6	30.6	57	1864/1/17	
							1242/10/2

Mbrasyz (1982) has announced earthquake on the night of the 7th of Shaban 1280 and its place in Chatroud. The earthquake killed many people and has arrived considerable damage to Kerman. so that The Green Ghobe is damaged and Ivan Jame Mozafar collapsed.							
Kuhbanan	Chatroud	VIII	5	30.6	57	1871/8/4	1250/5/13
The quake was felt in Kerman.							
Kuhbanan	Chatroud	VIII	6	30.6	57	1875/5/-	1254/7/-
In May 18	75 a strong	earthquak	e in the Ku	hbanan reg	ion damage	d homes in	
gur and Tu	ukhrajerd V	villages. Tl	he earthqua	ake caused	Drying Up	springs of	
Tukhrajerd	and Rash	k Villages	s. Wasit V	/illage also	was dest	royed. The	
		earthqu	iake was st	rongly felt i	n Kerman a	nd its round	
Gook	sich	VII	5.6	31.2	57.30	1877/-/-	1255/-/-
(Golbaf)							
Caused des	truction of S	Sirch, Hass	an Abad an	d Hashtada	n villages.		
Kuhbanan		VIII	5.7	30.6	57	1897/5/22	1276/2/28
it occurred	140 kilome	ters in Keri	nan around	Kuhbanan.			
It occurred near Kerman. Distance of 140 kilometers Kuhbanan							
Kuhbanan Chatroud - 30.6 57 1897/5/27 12						1276/3/20	
Several peo	Several people were killed and several public and private buildings in Kerman						
damaged in	n some case	s not repai	rable. Gree	en Ghobe co	ollapsed and	I the people	
inside were injured and garden Naseriyeh buildings damaged.							



Figure 1: Map of historical earthquakes

2-3- Earthquakes of this century (the twentieth century)

From the 1900s onwards the earthquakes that have been recorded by a seismograph machines are included of the details about the causes of earthquakes, earthquake magnitude, date and time of earthquakes and are called earthquakes of this century. In the study area, in the radius of 300 km from the center of Kerman many earthquakes have been recorded 307 earthquakes with magnitude greater than 4 Richter (mb). Significant earthquake damage is listed in Table 2 and is plotted in Figure 2.

Table (2): The list of destructive earthquakes of the twentieth century (Fatemi et al 1371) and (A. Race and Dastanpvr 1378)

Fault Name	Area	Intensity MMI	Ms	Event Date
				(AH)
-	Joshan			1288/8/5
The quake occ	urred 50 km Eas	t of Kerman and v	was caused little	
damage in Kerr	nan			
	Ravar		6.2	1290/1/30
Killed about 7				

lakarkuh locat destroyed. Near The destruction				
mosque killed 5 and some Publ homes out of people were inj				
	1302/6/31			
Gughr county was destroyed number of pub serious gaps. C damaged and Rafsanjan, 120				
Kuhbanan	North Bahabad	VIII	6.2	1312/9/8
Earthquake cau West Bahabad	sed destruction a and was felt stron	nd loss of life in a gly in Kerman.	village in North	
	Negar and Bardsir			1322/5/2
The earthquake strongly in the o	e destroyed homes city of Kerman.	and villages in Ne	egar and was felt	
	Golbaf	VIII	6	1327/4/14
Several villages The earthquake				
	Sirch		5.3	1348/6/12
Earthquake felt	in Kerman and cu	used little damage.	1	
Kuhbanan	Gysk Zarand		5.7	1356/9/29
Several villages died and 260 w				
Golbaf	Golbaf		6.8	1360/3/21

Golbaf town near the epicenter was located was completely				
destroyed, nea) were injured.			
(Shahpasans za				
Lakarkuh	Sirch	VIII	7	1360/5/6
The earthquake	e is one of the s	trongest earthquak	es in the nearly	
1,300 people l	killed, 915 injure	d and 25,000 wer	e left homeless.	
Market cap of	Haj Ali mosque i	n Kerman and Mał	nan loss and part	
of the tomb of t	the Shah neamatol	ah vali king was de	estroyed	
Sarvestan	Golba		5.7	1368/8/29
The earthquake	e occurred in sout	hern Golbaf 40 pe	ople were killed	
and 45 wounde	ed. South Golbaf	earthquake occurre	ed along a small	
piece	of	Golbaf	fault.	
Was strongly fe	elt in Kerman.			
Bam	Bam	X	6.4	1382/10/5
Earthquake due	e to old, low qua	lity and resilience	of the buildings	
and the lack	of preparedness	of local agencies	and the public,	
causing a disa	ster in the histo	ry of Bam. Was	strongly felt in	
Kerman.				
Branches of	Zarand	VIII	6.3	1383/12/4
Kuhbanan				
Earthquake Wa				





Focal depths of earthquakes

In this study, the most Focal depths of earthquakes are obtained at 33-35 km. Although the amount is not clear and it shows the earthquakes are shallow depths.

Seismic sources

The main sources of regional seismic identification of linear sources and calculations have been done for them. 114 seismic faults within 200 km of the project site based on seismic database (satellite imagery, geological maps, and aerial photographs) were determined and 18 active effective fault segment of Kerman identified. (Figure 3)



Figure3: faults within 200 km of the center of Kerman

Earthquake Risk Assessment in Kerman

Risk of earthquakes in Kerman methods 1 - Statistical Methods 2 - probabilistic method 3 - analytical methods, has been studied. The statistical method used to statistical relationship Gutenberg - Richter and gathering last earthquakes in a long period of time, the maximum seismic magnitude has been estimated.

In the probabilistic approach, using statistical data and probability functions, the most likely earthquake acceleration at a specified time interval were calculated Earthquake risk analysis of probabilistic method suggests the possibility of an earthquake with a Richter magnitude of approximately 7, in length every 10 years within a radius of 300 km around the city.

The analysis uses the ability of seismic faults in estimating the magnitude, intensity, velocity and acceleration of the earthquake was due to any fault in kerman city.

The analysis shows that Kerman is located in one of the most active seismic tectonic areas in Iran and many active faults are located near the city. The 18 pieces are identified faults, faults that cause acceleration of more than 0.2g in Kerman, and were selected for further work. (Table 3)

Table 3: The fault that caused the earthquake in Kerman with Acceleration more than 0.2 g

Ms	Velocity	Intensity in		Distance from	Fault	Fault name
	(m/s)	site (MMI ¹)	acceleration	site (Km)	lenght	
			(g)		(Km)	
6.6	122.62	IX				Kerman - Zangi
			0.43	Under site	22	Abad
6.4	59.8	IX	0.32	16	43	Mahan
6.8	56.41	IX				Kuhbanan (Part
			0.31	14	33	8)
7.2	41.95	VIII				Kuhbanan (Part
			0.24	34	85	9)
6.9	36.95	VIII	0.23	25	37	Davaran (Part 1)
7.6	37.40	VII	0.2	49	134	South Nayband

Micro-zonation and Seismic hazard map of the city

Micro-zonation

To determine the effect of surface conditions on different parts of a region, microzonation maps are being prepared. In Micro-zonation studies local conditions on ground motion, liquefaction and slope failure are considered. The three parameters in three different grades (grades 1, 2, 3) are available and from grades 1 to 3, the volume and accuracy of the required data and cost increases. The semidetailed microzoning study was selected for Kerman.

Micro-structural seismic hazard zonation Kerman

Landslide hazard micro-zonation

Kerman has developed in Kerman plain surface (playa). Slope In city is less than 10 degrees and Slope failure and the risk of injury is not considered. In an earthquake, the debris of the Sahezaman mountain is located on the eastern edge of Kerman are falling. Based on field observations, they can

¹ Modified Mercalli Intensity

not make major injuries (Abbasnejad and Hassan Zadeh, 1385)

1- liquefaction hazard micro-zonation

According to ISSMEE (1993) instruction in grade micro-zonation, Liquefaction potential based on geological criteria (especially the Sedimentology and hydrology) and geomorphology of the area is estimated and Micro-zonation map was prepared. Geomorphological criteria for identifying areas with loose sandy sediments - silty help. One of the most important environmental factors affecting the risk of liquefaction is shallow groundwater. Based on the experiences of earthquakes occurring in different parts of the world, in many cases where liquefaction occurred on smooth surfaces, depth of water is not more than 3 meters. However, in limited cases, to a depth of about 4 meters liquefaction occurred. However, no liquefaction in flat areas where water depth is not seen in more than 5 meters.

The map shows that the depth of groundwater is changing less than 10 m in the north to about 100 meters south-west of the city. However, water levels will rise 0.5 meters in average annual (Ahmadi. Afzady, 1381) Aquifer recharge wells by sewage are caused. In general, given the rapidly rising water, the city's locations that the groundwater level is less than 7 meters, high liquefaction potential can be (Composed of sandy sediments). Sediment liquefaction susceptibility maps were prepared by combining maps of water table depth and type of Using ArcGIS software (figure4).The risk covers a small portion of the city near its center and the historic fabric of the city.



Figure 4: Map of areas prone to liquefaction in Kerman

Ground motion micro-zonation

Seismic semi-detailed microzoning to evaluate the intensification of land can be used the results of standard penetration tests, classification on the basis of geological borehole data, geotechnical data, assays Microtremors or wave velocity in soil and sediment(ISSMFE²,1993). in Kerman is used Combining the results of the Microtremors Studies and classification based on borehole information.

Rustaiyan has done seismic studies of Kerman city with recording instrument Kinemetrics SSR-1 and Short-period seismograph Kinemetrics SSR-1. Measurements were carried out at 53 points, which is obtained from them the 39 appropriate records. Dominant periods, and the range of maximum microtremors was determined using Power density spectrum And were processed using Pytsa software.

The analysis of spectral methods horizontal to vertical component (known as Nakamura technique) is used. In these studies microtremors dominant periods in the range of 0/05 second and 1.25-1.75 second focused, the first case Represents reflection of shallow seismic bed rock (less thick alluvium) and the latter is indicative of a deep seismic bed

² International Society for Soil Mechanics and Foundation Engineering

rock. According to the map, the dominant periods are in the range of 1.5 or more. Thus in this area, the strong ground motion intensity (due to high sediment thickness) will be higher. Microtremors dominant periods increases from East to west and from North to south of the city. Therefore low thickness sediment is in eastern and northern parts of city and the high thickness sediment is in western and southern parts of the city. Intensification of strong ground motion is influenced by the type of sediment, so that it is higher in fine grained soil than coarse grained type. For example, based on information provided by Bergi (1382), the increasing range in intensity of the earthquake at ground level than at the base of the rock, are considered as below following:

in loam, loam and sandy loam 1.6, in the sand, 1.5 and the coarse alluvial 1.4.

The intensification of ground motion micro-zonation map in Kerman were obtained with integration Microtremors and sedimentological data in GIS (Figure 5)



Figure 5: The intensity of ground motion micro-zonation map surrounding areas in Kerman

In the map, Clayey and silty deposits containing more than 1.5 Microtremors dominant periods areas intensify further and have been considered As areas with "High-intensity potential". Areas with Microtremor dominant periods in the range of 1 to 1.5 and made deposits of clay and sand or clay - silt are presented as "moderate intensity Potential". Finally, areas in which the dominant periods Microtremors less than (1) that, regardless of the type of sediment have been identified as "low potential for intensifying". Given that the maximum earthquake intensity (based -intensity) in the basement at the Kerman IX MMI is estimated, The actual amount of local geological conditions in the affected areas with the potential intensification of high, medium and low, respectively, in the X +, X and X- improved Mrkaly could be evaluated.

Data collection and basic maps

At this point, society, people and assets at risk are identified. With data collection and assessment of community vulnerability can be identified against current and future threats.

Based on collected data, Kerman structures were classified in six types: 1 - Structures adobe mud, 2 - Masonry with vaulted roof system , 3 - Masonry building without frame, 4 - Framed Masonry Building , 5 - Steel structures, 6 - a reinforced concrete structures (Fig. 6 to 11). Kerman area is 140 square kilometers, Therefore, to obtain structural information, 15 teams of two persons trained in the identification of structures collected required data structures Kerman city, including: 1 - Structure 2 - Number of floors - 3 Location 4 - wide alleys and streets and main thoroughfares and called each one, 5 - the Urban Land ... with rapid field screening method (table4).

Intensity MMI	vulnerability	Structure code	type structures
VII	complete	1	Adobe building
VIII	Very high	2	Masonry with vaulted roof system
VIII	high	3	Masonry building without frame
IX	moderate	4	Framed Masonry Building
X	low	5	Steel structure
XI	Very low	6	Reinforced concrete structures

Table 4: The data necessary to determine the type structures layer



Figure 7: Masonry with vaulted roof system(2)



Figure6: Adobe building(1)



Figure 9: Framed Buildings (4)



Figure8: Masonry building(3)



Figure11: Reinforced concrete structures (6)



Figure10: Steel structure(5)

Crisis Management Center of Kerman has divided the city into 13 operational areas (Figure 12). There are Population statistics in Table (5) and the total number and percentage data of structures in these regions of Kerman in Table (6). This information is using to assess the vulnerability of city.



Figure 12: Operating areas Maps in Kerman

table 5: The statistics of Kerman	populations	in 2008
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Area	Family	woman	Man	Population
Area1	4252	8642	13108	21750
Area 2	11861	24135	24976	49111
Area 3	4266	10118	9402	19520
Area 4	12946	26627	29347	55974
Area 5	12051	24318	25328	49646
Area 6	12356	23172	23520	46692
Area 7	8834	16726	17637	34363
Area 8	10834	20030	20528	40612
Area 9	12149	22756	23056	45812
Area10	13017	24938	25749	50687
Area 11	11624	23177	24044	47221
Area 12	5051	9513	9438	18951

Area 13	7128	14351	13765	28116
Total	126369	248503	259952	508455

Table 6: The number and percent of Structures

type	Adobe	Masonry	Masonry	Framed	Steel	Reinforced
structures	building	with	building	Masonry	structure	concrete
		vaulted	without	Building		structures
/		1001 System	frame			
Areas						
Area1	302	677	1700	67	13	0
Area 2	1036	38	9886	196	96	10
Area 3	706	44	3185	257	92	19
Area 4	653	6	7211	3421	20	15
Area 5	88	24	11599	716	10	21
Area 6	795	895	8412	2665	894	39
Area 7	166	54	1925	3964	691	169
Area 8	3	66	5840	1715	603	1264
Area 9	220	703	10082	374	121	175
Area10	622	177	9814	126	30	76
Area 11	369	204	8668	668	127	4
Area 12	2385	142	3230	318	56	0
Area 13	1869	1708	5252	453	605	12

5- Assessment of structure and building vulnerability and population of Kerman city

By developing of city and increasing of population, in earthquake we will encounter problems in access of safe place and also search and rescue activities. From the aspect of built more than 50 percent of Kerman buildings are brick and without foundation. By regarding to earthquake experience of Bam. One of the most casualty reasons was density of populations in unsuitable buildings. So the necessity of scenario earthquake for Kerman is so critical. Because it will help managers to plan for reducing of risks. As a result by progressing of earthquake assessment of Kerman City, Karmania Soft ware for different scenario was designed.

Introduction of Karmania Hazard software

Modeling map with information about reaction of important and vital buildings in earthquake will affect on managers decisions effectively. Karmania Hazard is a modeling and managing software works in ArcGIS invronmet.

This software in 2008 was produced by this center and the quake risk of different earthquakes has been modeled in different area so modeled damages of structures will be submitted to users by a map and also reports 1- the situation of different damages to various building and structures. 2- the situation of people in earthquake 3- assessment of needs for search and rescue and temporary occupancy, removing debris 4 – determining of village that are in 60 kilometers of Kerman.

In designing of software, it is attempted to use suitable, normal and newer empirical equations by researchers of Iran and other countries for assessment of potential of quake in different area especially in Kerman. The aim was reaching to the same results like in reality. Indeed. This software by corresponding equation with other zones of Country and replace of data can be used in every city of Iran. Also it has ability for modeling of different vulnerabilities like life line and roads by definition of related equations.

For modeling operations of earthquake vulnerabilities in software following things are necessary.

1- The map of earthquake risk

2- Preparing of basis map likes building, or others and grouping them in one group if they have the same operations.

3-choose one method for distinguishing of vulnerabilities in the way which vulnerability of buildings is determined quantitatively.

4- Preparing of map for determining of vulnerability distribution in any kind of building as a function of earth quake and the magnitude of earth.

By entering of needed data to software like basis map (Microtremor information, geology, thick of sediments (Figure 13)) and the map of structures and population ,vulnerability map and report will be prepared.



Preparing of basis map

1- City structures map which is inclusive of information about different kinds of structures and the numbers of their floors.



Figure 14: The map of Kerman cities structures according of field studies in 2008

2- The population map

Because of different intensity of population in different parts of day, in this software four times during is determined. 6- 14, 14- 18, 18-22, 22-6 and also 4 season is modeled. This software assesses equipments for relief and residence of population according to 4 seasons as a report.



Figure 15: Distribution map of Kerman city population according to statistics in 2008

The methods of vulnerability assessment

Two main methods for vulnerability assessment:

A. forecast vulnerability

In this vulnerability the function of buildings will be determined by calculation and characteristic of design or by the basis of assessor experience. This Method is suitable more for structures that we haven't any information about their function in the past earthquakes. But it possible to determine the quake resistance exactly.

B. visited vulnerability

In visited vulnerability, we get help from statistical data of past earthquakes. This method is suitable for structures that have been built without engineering method by low resistance (like stone, wood...). Although the calculation of it is hard, a lot of information about their function in the past earthquakes is valuable. For vulnerability assessment of Kerman this method was used.

The modeling of earthquake with 6/3 Richter with Karmania Hazard software

According to geology situation of Kuhbanan Zone part8 that is located in 15 kilometer of Kerman north east. This is one of the dangerous fault zones in town that can force IX MMI to the city. Kuhbanan fault with 300 kilometers length with north west- south east is from the west of Kerman to west north of Bahabad.

The name of this fault is Kuhbanan and in the way it is divided to 9 parts. Finally the result of building and population vulnerability and modeling of earthquake scenario with 6/3 Richter in part 8 of Kuhbanan fault has been analyzed by this software.

The result of modeling

The Kerman city has been experienced a lot of damages because of earthquake with 6/3 Richter (Kuhbanan fault) (Figure16)

- according to building map in Kerman city there are 120207 buildings that has this kind of vulnerabilities
- the risk of damages completely : 2886 structures
- so much risky zone: 10302
- very risky zone:56848
- moderate risky zone:44856

- little risky zone :4451
- very little risky zone:864

But it should be mentioned

The number of bat structure which has high vulnerability: 9156

The number of brick structures with vaulted roof which has high vulnerability: 4700

The number of brick structures with iron beam without foundation with moderate vulnerability: 86107

As a whole more than 83 percent of Kerman structures have more than 50 percent vulnerability

About 4 percent of Kerman structures have enough resistance

Population risks:

- the risk of damages completely : 7648 people and 2030 families
- so much risky zone: 42515 people and 10984 families
- -
- very risky zone: 228153 people and 57008 families
- -
- moderate risky zone: 197578 people and 47376 families

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- little risky zone : 27177 people and 7444 families
- very little risky zone: 5219 people and 1487 families

53 percent of Kerman population lives in area with more than 50 percent risk.





The distribution of population vulnerability

In this last century, the cause of 75 percent casualties of earthquake is collapsing of the structures. This simple and nonresistance structure will be fall by the minor quake and in strong quake will be ruin completely (Figure 17).



Figure17: Population vulnerability map

Conclusion

According to risk assessment of earthquake and micro zoning, and analyzing risk of Kerman by odds and statistics, it's distinguished that Kerman city is one of active earthquake unit in Iran and has a lot of active quakes. The magnitude of earthquake in Kerman will be about IX MMI because of Kerman Zangi Abad, north of Kerman and Ekhtiyarabad fault distances. This magnitude will be X MMI if the thick of Miocene quaternary sediments in the city increase. So in this situation the city will be destroyed.

Micro zoning of earthquake degree 2 in Kerman city shows that the risk of landslide in Kerman is negative, but there is the risk of liquefaction in small part of city. And also because of increasing in Miocene quaternary sediments thick beneath the city that is proved by increasing of Microtremor wave and because of nonresistant sediments, the risk of quake will be increased. (From south to center and the west)

Because of this, the magnitude of earthquake will be reach to X MMI. According to Kerman city plan (the degree of risk in center and west part and south will be increase and the structures of them will be collapsed).

In Reality, the aim of us in assessment of risks is emphasis on planning for reducing of disaster risks and reducing of vulnerability of society. As a whole by having the map of vulnerability and population plan and also chart report of damages to different structures by its name, managers can manage search and rescue operations better and don't be amazed and stray. The presence of this kind of Scenario and plan before any disaster will be as guidance in earthquake for city managers and causes for improving of weak cases and will be increase the safety of city

This center by modeling of earthquake, distinguished a lot of vulnerable local places and the week cases in relief functions, so, started to train local communities and set the CBDRM teams in them. And also in 8 local communities, the CERT&SAR teams for women and men were set and 32 locals communities were trained in CBDRM. Now they are being trained in Cert & SAR. This report is selected from 600 pages report which is submitted to planning and budget organization of country in 7 steps.